

Draft Joint Environmental Assessment

Year-round Habitat for Yellowstone Bison

July 2013



**Montana Fish,
Wildlife & Parks**



Executive Summary

This environmental assessment evaluates potential for the presence of bison year-round within locations adjacent to Yellowstone National Park (YNP) in Montana. Currently, bison migrating out of the Park during the winter are tolerated in specific areas within the Gardiner and Hebgen Basins. There are five alternatives evaluated that would be considered as an adaptive management adjustment to the Interagency Bison Management Plan (IBMP) including the No Action Alternative.

The IBMP was established in 2000 in order to coordinate bison management among five agencies: Montana Fish, Wildlife & Parks (FWP), Montana Department of Livestock (DoL), National Park Service, United States Forest Service (USFS), and United States Department of Agriculture's Animal and Plant Health Inspection Service (APHIS). The Confederated Salish and Kootenai Tribes, InterTribal Buffalo Cooperative, and Nez Perce Tribe became IBMP cooperating agencies in 2009; as such they also participate in any adaptive management adjustment decisions. In keeping with the adaptive management framework set up by the IBMP, the IBMP partner agencies meet several times a year to assess the effectiveness and outcomes of the IBMP management activities and incorporate short and long-term adaptive management adjustments to the IBMP based on prevailing conditions, experience, and new data.

The proposed adjustments are based in part upon recommendations of the Yellowstone Bison Citizens Working Group (CWG). CWG's stated rationale for the habitat recommendations was based upon the fact that the current bison population does not have access to enough year-round habitat given current population levels outside YNP which includes National Forest lands. The CWG acknowledged that it would like to see bison have access to more of this habitat allowing for more fair-chase hunting as a population management tool which is more desirable than the expenditure of taxpayer dollars to haze, capture, and slaughter migrating bison.

Alternatives:

- A) No Action – Management of migrating YNP bison would continue under guidance of the IBMP, and bison would be confined to specific bison-tolerant zones in the Gardiner Basin and Hebgen Basin (Horse Butte and Madison Flats). Bison could use those zones during the winter and would be hazed back into YNP in May each year.
- B) YNP Bison could use habitats year-round in the Gardiner Basin (bulls only) and portions of the Gallatin National Forest near West Yellowstone (both sexes) – Under this alternative, the following adaptive management adjustments would be implemented to the IBMP and include 421,821 acres. Of those acres, 141,870 are currently used seasonally by bison.
 - YNP bison (both sexes) could access and utilize habitat on portions of the Gallatin National Forest (GNF) west and north west of the Park boundary including Horse Butte, the Madison Flats (Flats), south of U.S. Hwy 20, Monument Mountain Unit of the Lee Metcalf Wilderness, Cabin Creek Wildlife and Recreation Area, and Upper Gallatin River corridor to Buck Creek.
 - YNP bull bison could access and utilize habitat on USFS and other lands north of the Park boundary and south of Yankee Jim Canyon year-round. Bison would be

prohibited traveling north of the hydrological divide (i.e., mountain ridge-tops) between Dome Mountain/Paradise Valley and the Gardiner Basin on the east side of the Yellowstone River, and Tom Miner Basin and the Gardiner Basin on the west side of the Yellowstone River.

Existing IBMP management actions would continue to be measured and reported in the IBMP Annual Reports. Many of the existing management actions and their metrics would be expanded to include documentation of the year-round activities of bison management and the tracking of public safety incidents, landowner relations, public safety and livestock conflicts, and brucellosis transmission. In addition to these monitoring metrics, FWP and DoL would add the following metrics to establish baseline and ongoing data about bison behavior and movements within the new year-round habitat.

- Complete periodic surveys of the number and distribution of bison within Horse Butte, the Flats, south of U.S. Highway 20, Monument Mountain Unit of the Lee Metcalf Wilderness, Cabin Creek Wildlife and Recreation Area, and Upper Gallatin River corridor to Buck Creek.
- Complete periodic surveys of the number and distribution of bull bison within the Gardiner Basin.
- Determine natural routes and timeframes for bison migrating back into YNP from year-round habitats.
- Document bison movements within year-round habitats.
- Annually document the numbers of bison and dates bison attempt to exit year-round habitat boundaries.
- Increase the understanding of bison population interactions and coexistence with resident wildlife within year-round habitat. Document and evaluate annually.
- Consult with USFS on vegetation and rangeland monitoring in the area and collaborate on habitat projects as needed.
- Evaluate the effectiveness of year-round habitat natural boundaries.

C) YNP bison (both sexes) could access and utilize habitats year-round on Gallatin National Forest lands known as Horse Butte and north along the U.S. Highway 191 corridor north to Buck Creek

This alternative covers a smaller geographic area than Alternative B. It does not include the Madison Flats or the areas north and south of U.S. Highway 20. Total number of acres included is approximately 255,714. Management of bison on the west side would be identical to what was described for Alternative B except within a smaller area.

Ongoing documentation of bison management activities would continue under this alternative as described under Alternative B. New monitoring metrics would be added to track the effects of year-round bison within new areas.

D) YNP bison (both sexes) could access and utilize habitats year-round on Gallatin National Forest lands near West Yellowstone only within the existing Zone 2 boundaries (Horse Butte and Madison Flats)

This alternative would include Horse Butte, the Madison Flats, and small area along U.S. Highway 8. These areas encompass approximately 37,870 acres and were identified in the 2000 ROD as Zone 2.

Management of bison in Zone 2 on the west side would not change from the IBMP Operating Procedures with the exception of the elimination of a permanent haze-back date for bison into YNP for the west side. The measurement matrixes are currently used to monitor bison behaviors and movements, document livestock and landowner concerns/calls, summarize ongoing brucellosis/bison genetics research data and findings, and summarize bison harvest by license and treaty hunters. Status of vaccination programs for bison and cattle would continue to be used.

E) YNP bison (both sexes) could access and utilize habitats year-round only on Horse Butte within Gallatin National Forest near West Yellowstone

This alternative is identical to Alternative D except the geographic boundary of the year-round bison-tolerant area is smaller. Bison within Zone 2 and outside Horse Butte would be hazed either onto Horse Butte or back into YNP. Horse Butte encompasses approximately 11,500 acres.

Ongoing documentation of management activities would continue under this alternative. New monitoring metrics would be added to the management activities to track the effects of year-round bison within new areas. The metrics would be the same as described under Alternative B with the exception of the elimination of any associated with the Gardiner Basin.

F) YNP bison (bulls only) could access and utilize existing bison-tolerant areas year-round within the Gardiner Basin

Bull bison currently may access and utilize the Eagle/Bear Creek area year-round. Under this alternative, bull bison could remain year-round in the Gardiner Basin which includes the area between the northern boundary of YNP and the southern entrance to Yankee Jim Canyon. Bison would be prohibited to travel north of the hydrological divide (i.e., mountain ridge-tops) between Dome Mountain/Paradise Valley and the Gardiner Basin on the east side of the Yellowstone River, and Tom Miner basin and the Gardiner Basin on the west side of the Yellowstone River. Total number of acres within the northern bison-tolerant area is approximately 104,000.

Often bulls, cows, and calves are congregated in mixed groups. When this occurs, these mixed groups would be hazed into YNP by the May 1 deadline due to the difficulties in separating bulls and cow/calf pairs. Bull bison migrating north back into the Gardiner Basin and designated areas after May 1 could remain in the bison-tolerant areas during subsequent seasons. Only lone bulls and groups of bulls would not be actively hazed back into YNP in the spring.

Overall, bison management of both sexes would continue under the IBMP Operating Procedures described in Alternative A. The measurement matrixes currently used to monitor bison behaviors and movements, document livestock and landowner concerns/calls, summarize ongoing brucellosis/bison genetics research data and findings, summarize bison harvest by license and treaty hunters, and status of vaccination programs for bison and cattle would continue to be used.

New monitoring metrics would be added to the management activities to track the effects of year-round bison within new areas. The metrics would be the same as described under Alternative B with the exception of the elimination of any associated with the west side management area.

Potential Consequences

If the No Action alternative were chosen, there would be no new impacts to the physical or human environments. The seasonal presence of bison in the Gardiner and Hebgen Basins would continue to affect local residents requiring the response of FWP staff, and bison would continue to be actively managed and hazed back into the Park in May.

The anticipated consequences to the physical and human environment if one of the other alternatives were chosen are mixed: some positive, some negative, and some neutral based on an estimate of 500 bison using the year-round habitat on the western boundary and up to 100 bull bison using the Gardiner Basin.

Many of the impacts to public safety, recreation, and livestock would be measureable, and steps would be taken to mitigate those affects such as addition signage, public educational outreach, bison-resistant fencing, and appropriate bison management to decrease bison-human conflicts. Positive impacts include increased area where bison may be hunted and with that the potential for higher harvest, better wildlife viewing, elimination or decreased hazing activities, the addition of a native species in their historic range, the opportunity for new research for bison within a larger landscape, and the opportunity for IBMP partner agencies to learn how bison could be managed year-round.

Social values and opinions regarding bison management may be affected by the implementation of any one of the adaptive management alternatives. Some might view the presence of year-round bison as being in conflict with agricultural interests; others might view the management actions as a positive benefit to the species, the Greater Yellowstone Ecosystem, and for the cultural values bison embody.

With the exception of the elimination of a permanent haze-back date for bison into YNP, the agencies would continue to adhere to the IBMP Operating Procedures as previously described. Management of bison within the new year-round habitat would follow the principles of the IBMP and the current IBMP Operating Procedures for all the adaptive management alternatives.

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Abbreviations

AHPA	Animal Health Protection Act
APHIS	Animal and Plant Health Inspection Service
CBA	Canadian Bison Association
CEIC	Census and Economic Information Center
CSKT	Confederated Salish and Kootenai Tribes
CWG	Citizens Working Group
DEIS	Draft Environmental Impact Statement
DLI	Montana Department of Labor and Industry
DOC	Montana Department of Commerce
DoL	Montana Department of Livestock
DSA	Designated Surveillance Area
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement – Bison Management Plan
FR	Federal Register
FWP	Montana Department of Fish, Wildlife & Parks
FWS	U.S. Fish & Wildlife Service
GNF	Gallatin National Forest
GYE	Greater Yellowstone Ecosystem
HD	Hunting District
IBMP	Interagency Bison Management Plan
ITBC	InterTribal Buffalo Cooperative
MCA	Montana Code Annotated
MDT	Montana Department of Transportation
MEPA	Montana Environmental Policy Act
MTNHP	Montana Natural Heritage Program
NEPA	National Environmental Policy Act
NGO	Non-government Organization
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NYCWWG	Northern Yellowstone Cooperative Wildlife Working Group
ROD	Record of Decision
RTR	Royal Teton Ranch
SMA	Special Management Area
UM&R	Uniform Methods and Rules
UN	United Nations
USDI	U.S. Department of Interior
USFS	U.S. Forest Service
WCS	Wildlife Conservation Society
WMU	Wolf Management Unit
YNP	Yellowstone National Park

CHAPTER 1.0: PURPOSE OF AND NEED FOR ACTION

1.1 PROPOSED ACTION

Montana Fish, Wildlife and Parks (FWP) and the Montana Department of Livestock (DoL) are proposing the following adaptive management adjustments to the Interagency Bison Management Plan (IBMP) for use within Montana:

- YNP bison access and utilize the following portions of the Gallatin National Forest near West Yellowstone year-round: 1) the Hebgen Basin (Horse Butte, the Flats, and south of U.S. Highway 20), 2) the Cabin Creek Recreation and Wildlife Management Unit, 3) the Monument Mountain Unit of the Lee Metcalf Wilderness Area, and 4) the Upper Gallatin River corridor.
- YNP bull bison could access and utilize the Gardiner Basin year-round within the area established by the 2011 IBMP adjustments.

The proposed adjustments are based upon recommendations of the Yellowstone Bison Citizens Working Group (CWG) and agreed upon in principle by the IBMP partners at the May 2012 IBMP meeting. The proposed adjustments do not alter the basic management direction or goals of the IBMP to maintain a wild, free-ranging population of bison and address the risk of brucellosis transmission to protect the economic interest and viability of the livestock industry in Montana.

Background on the IBMP

The IBMP was established in 2000 in order to coordinate bison management among five agencies; FWP, DoL, National Park Service (NPS), United States Forest Service (USFS), and United States Department of Agriculture's Animal and Plant Health Inspection Service (APHIS). These five agencies agreed to work cooperatively within an adaptive management framework to implement the IBMP. The Confederated Salish and Kootenai Tribes, InterTribal Buffalo Cooperative, and Nez Perce Tribe became IBMP cooperating agencies in 2009; as such they also participate in any adaptive management adjustments decisions.

In keeping with the adaptive management framework set up by the IBMP, the IBMP partner agencies meet several times a year to assess the effectiveness and outcomes of the IBMP management activities and incorporate short- and long-term adaptive management adjustments to the IBMP based on prevailing conditions, experience, and new data.

1.2 NEED FOR ACTION

At the February 2012 IBMP meeting, the CWG presented their recommendations to IBMP partners regarding a broad range of issues relating to bison management.

Specific to the proposed action and to habitat effectiveness/habitat expansion, the group recommended the following (CWG 2011):

1. Identify public lands that could/should be open to bison year-round in accordance with state and federal law.

2. Systematically identify suitable, available habitat outside Yellowstone National Park in the Greater Yellowstone Area (i.e., Federal, State and private lands)
3. Develop and implement strategies that manage bison as wildlife on those lands, specifically:
 - a. Hebgen Basin
 - i. Designate Horse Butte Peninsula and the Flats as year-round bison habitat by May 2012 following an adequate public process for this management change.
 - ii. By the end of 2012, interview and map landowners to identify where bison are welcome, unwelcome, which landowners are on the fence and what their reservations are.
 - iii. By the end of 2013, implement adequate fencing or acceptable alternatives.
 - b. Gardiner Basin
 - i. By the end of 2012, interview and map landowners to identify where bison are welcome, unwelcome, which landowners are on the fence and what their reservations are.
 - ii. By the end of 2013, implement adequate fencing or acceptable alternatives.
 - iii. Following the interview process and implementation of fencing/alternative strategies, consider designating the Gardiner Basin year-round habitat using an adequate public process.
 - c. Beyond the Gardiner Basin
 - i. Based on a minimum of two years of bison experience in the Gardiner Basin, and
 - ii. Using adequate public process, consider expanding bison access to roam on Dome Mountain Ranch, Dome Mountain Wildlife Management Area, and surrounding lands with landowner concurrence.
 - d. Upper Gallatin/Taylor Fork/Cabin Creek/Porcupine/Buffalo Horn Creek, etc.
 - i. Begin a public process to evaluate opportunities for reintroduction and management of bison in this area including within Yellowstone National Park.
 - ii. Start work to amend/alter State and Federal Management Plans and other decisions to account for the presence of bison on the landscape and take responsibility/be accountable for successfully implementing those plans regarding bison.
 - e. Additional Habitat Areas
 - i. Immediately initiate and complete by the end of 2013 the statewide bison management plan to restore wild bison to additional biologically suitable, socially acceptable areas.

CWG's stated rationale for the habitat recommendations was based on the fact that the current bison population does not have access to year-round habitat given current population levels outside Yellowstone National Park (YNP) which includes national forest lands. The CWG

acknowledged that it would like to see bison have access to more of this habitat allowing for more fair-chase hunting as a population management tool which is more desirable than the expenditure of taxpayer dollars to haze, capture, and slaughter migrating bison.

The proposed action is under consideration because the following factors have changed since the adoption of the 2000 IBMP that was part of the Bison Management Plan - Final Environmental Impact State (FEIS):

1. Cattle are no longer found on Horse Butte due to a change in ownership and associated change in land use.
2. The USFS grazing allotments on Horse Butte and along the Taylor Fork have been closed.
3. Changes were made in the federal rules that govern the response to brucellosis infection of cattle.
4. Research suggests there is little risk of brucellosis transmission from bull bison to cattle.

Furthermore, the Record of Decision for the 2000 FEIS had identified the Cabin Creek Recreation and Wildlife Management Area and the Monument Mountain Unit of the Lee Metcalf Wilderness as locations where untested bison would be accommodated year-round without agency interference because these areas do not have cattle grazing within them or nearby (USDI et al. 2000b). This component of the federal Record of Decision (ROD) was echoed in the 2000 State of Montana Bison Management Plan ROD which also acknowledged that bison could move to the Upper Gallatin River above the mouth of Taylor Fork (DoL and FWP 2000).

None of these areas have been consistently utilized before because bison management challenges existed for the area between the YNP boundary and those Gallatin National Forest (GNF) units such as active grazing allotments, presence of cattle (permanent and seasonal), and the development of private residences.

Separately but equally important in the consideration to expand the bison-tolerant area north of YNP are the 2010 changes to federal brucellosis regulations. APHIS adopted changes to long-standing brucellosis regulations so that in the event of an outbreak: 1) a cattle producer is no longer required to depopulate an entire herd; and 2) a state would not be automatically downgraded from Brucellosis Class Free status. These changes were published in the Federal Register in December 2010 (75 FR 81090).

The IBMP partners have maintained through past adaptive management adjustments the methodology to implement adjustments in bison management, which is to observe/document bison behavior, evaluate effectiveness, and adjust accordingly. This methodology would be maintained with the proposed actions. The proposed expansion also would provide partners greater opportunity to gain knowledge about bison movements in a larger area outside YNP and assess the potential for expanded bison hunting opportunities in the future to assist in bison population management.

1.3 OBJECTIVES OF THE ACTIONS

- To further maintain a wild, free-ranging population of bison by providing year-round habitat north and west of YNP.
- To continue to reduce the risk of brucellosis transmission between bison and cattle.
- To provide the potential for greater hunter opportunities and to use hunting as a tool for bison population management.
- To expand opportunities for remote vaccination of bison for brucellosis.
- To increase IBMP partner knowledge of bison behavior and movements within a larger geographic area.

1.4 RELEVANT AUTHORITIES, DOCUMENTS, AND OVERLAPPING JURISDICTIONS

1.4.1 Authorities

Montana Fish, Wildlife and Parks (FWP)

Section 87-1-201(1), Montana Code Annotated (MCA), establishes FWP as the responsible agency for supervision of the management for all the wildlife, fish, game, furbearing animals, and game and nongame birds of the state. Furthermore, FWP has the power to spend monies for the protection, preservation, and propagation of the wildlife, fish, game, furbearers, waterfowl, nongame species, and endangered species of the state (§ 87-1-201(3) MCA). FWP also has the authority to enforce all the laws of the State regarding the protection, preservation, and propagation of the wildlife, fish, game, furbearers, waterfowl, nongame species, and endangered species of the state (§ 87-1-201(2) MCA). Section 87-1-216(1) MCA identifies wild buffalo or bison as a species in need of management and YNP bison as a species requiring disease control, and directs FWP to cooperate with the DoL in the management of YNP bison.

Montana Department of Livestock (DoL)

DoL is granted broad and discretionary authority to regulate publicly-owned bison that enter Montana from a herd that is infected with a dangerous disease (YNP bison) or whenever those bison jeopardize Montana's compliance with state or federally administered livestock disease control programs including the authority to remove, destroy, take, capture, and hunt the bison (§ 81-2-120(1)-(4) MCA). Additionally, administrative rule 32.3.224(A) describes the actions that may be taken when migratory bison exposed or infected with brucellosis enter the state.

1.4.2 Relevant Documents

Adequacy of National Environmental Policy Act Documentation (2011). This memorandum summarizes that the proposed IBMP adaptive management adjustments conform to the Federal 2000 FEIS and ROD for the IBMP which fully covers the proposed adjustments and constitutes compliance by federal agencies with the requirements of National Environmental Policy Act (NEPA). YNP, GNF, and APHIS signed this memorandum.

Bison Management Plan for Montana and Yellowstone National Park (2000). The State of Montana was a co-lead with the U.S. Departments of the Interior and Agriculture in the development of the Interagency Draft Environmental Impact Statement (DEIS) and Bison

Management Plan. A Federal Final EIS (FEIS) for Bison Management for the State of Montana and YNP, which included the IBMP, was published in August 2000. In November 2000, the FEIS for the IBMP was completed in which eight alternatives were analyzed. The final State of Montana and Federal Records of Decision (ROD) were published in December 2000 pursuant to the requirements of the Montana Environmental Policy Act (MEPA) and NEPA. These documents considered the potential use of the Gardiner Basin and Gallatin National Forest (GNF), both north and west of YNP, as part of a bison-tolerant zone (Alternative 2) and the use of a quarantine facility to hold seronegative bison until they were returned to YNP. This EA is, therefore, tiered to the Interagency Bison Management Plan EIS and the following documents. All IBMP documents can be found at www.ibmp.info.

Interagency Bison Management Plan, Adaptive Management Adjustments (2008). These adjustments, along with the Record of Decision for the IBMP, provide the foundation for the current management of bison leaving YNP and discuss the expansion of the bison-tolerant area in the Gardiner Basin. The adjustments implemented in 2008 formally incorporated adaptive changes to the IBMP by establishing short- and long-term adaptive management adjustments based on the prevailing conditions with its joint Operating Procedures (<http://www.ibmp.info/Library/2008%20IBMP%20Adaptive%20Management%20Plan.pdf>).

Interagency Bison Management Plan, Annual Reports (2009-2012). These reports include narrative summaries that address the effects and effectiveness of each management action in the IBMP Adaptive Management Plan that was agreed upon and signed by the partner agencies in December 2008 (<http://www.ibmp.info/library.php>). In each of these reports, there were discussions of the possible expansion of bison-tolerant areas.

Interagency Bison Management Plan, Operating Procedures (2012). The purpose of the operating procedures is to implement the actions set forth in the 2000 IBMP and IBMP Adaptive Management Plan (<http://www.ibmp.info/Library/2008%20IBMP%20Adaptive%20Management%20Plan.pdf>).

Montana Fish, Wildlife and Parks and Montana Department of Livestock, Adaptive Management Adjustments to the IBMP (2011). This project sought to allow YNP bison on habitat on FS and other lands north of the Park boundary and south of Yankee Jim Canyon within the Gardiner Basin during the winter. Bison would be prohibited from moving north of the hydrological divide (i.e., mountain ridge-tops) between Dome Mountain/Paradise Valley and the Gardiner Basin on the east side of the Yellowstone River, and Tom Miner basin and the Gardiner Basin on the west side of the Yellowstone River.
http://fwp.mt.gov/news/publicNotices/environmentalAssessments/plans/pn_0011.html

Montana Fish, Wildlife and Parks, Royal Teton Ranch Grazing Restriction and Bison Access Agreement Environmental Assessment and Decision Notice (2008). This project sought to implement Step 2 of the IBMP on the north side of YNP in restricting livestock grazing on the ranch and to establish a bison corridor within the ranch between YNP and USFS land south of Yankee Jim Canyon
(http://fwp.mt.gov/news/publicNotices/decisionNotices/pn_0326.html).

1.4.3 Overlapping Jurisdictions

Along with FWP and DoL, the following partners participate in the IBMP and have proposed the bison management adjustments in this environmental analysis. Each partner retains its management prerogatives and the IBMP partners manage within that framework.

Confederated Salish and Kootenai Tribes (CSKT)

Under their 19th century treaty rights, members of the CSKT are one of four tribes/tribal groups that currently are recognized to have treaty hunting rights in the Yellowstone area.

The Flathead Indian Reservation in northwestern Montana is home to three tribes: the Bitterroot Salish, Upper Pend d'Oreille, and the Kootenai. "Confederated Salish" refers to both the Salish and Pend d'Oreille tribes.

InterTribal Buffalo Cooperative (ITBC)

ITBC has a membership of 56 tribes in 19 states with a collective herd of over 15,000 bison. ITBC is committed to re-establishing buffalo herds on Indian lands in a manner that promotes cultural enhancement, spiritual revitalization, ecological restoration, and economic development.

The role of the ITBC, as established by its membership, is to act as a facilitator in coordinating education and training programs, developing marketing strategies, coordinating the transfer of surplus buffalo from national parks to tribal lands, and providing technical assistance to its membership in developing sound management plans that will help each tribal herd become a successful and self-sufficient operation.

Nez Perce Tribe

Under their 19th century treaty rights, members of the Nez Perce are also currently recognized to have treaty hunting rights in the Yellowstone area.

Historically, the traditional homeland of the Nez Perce is North Central Idaho, Southeastern Washington, Northeastern Oregon with some travel into areas in Western Montana, and Wyoming. Today, many of the tribal members live on the Nez Perce Reservation located in North Central Idaho (Nez Perce 2011).

U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service, Veterinary Services (APHIS)

APHIS has regulatory authorities under the Animal Health Protection Act (AHPA) (7 U.S.C. § 8301 *et seq.*). Through the AHPA, Congress authorized the Secretary of Agriculture to cooperate with state authorities to carry out the provisions of the AHPA and administer its regulations. Thus, APHIS enters into cooperative agreements with individual states for a brucellosis eradication program. This program is further defined by the Code of Federal Regulations and Brucellosis Uniform Methods and Rules (UM&R). The UM&R describes minimum standard procedures for surveillance, testing, quarantine, and interstate transport. As part of its authority, APHIS has the federal regulatory authority to approve quarantine protocols and, as indicated above, recently amended long-standing brucellosis regulations so that in the

event of an outbreak cattle producers are no longer required to depopulate an entire herd and a state would not be automatically downgraded from Brucellosis Class Free status.

USDA, Forest Service, Gallatin National Forest (GNF)

The Forest Service administers national forests for multiple purposes including providing habitat for wildlife and grazing allotments for cattle. The GNF Land and Resource Management Plan (1987) emphasizes wildlife habitat management for the geographic area of the IBMP. The Plan for the GNF is sufficient to guide proposed actions and activities in facilitating implementation of the IBMP. The principal role of the USFS in implementing the IBMP is to provide habitat for bison (USDI et al. 2000b).

U.S. Department of Interior, National Park Service, Yellowstone National Park (YNP)

Federal law provides the Secretary of the Interior with exclusive jurisdiction within the boundaries of YNP.

1.5 DECISIONS TO BE MADE

The decision to be made is whether Yellowstone bison should have year-round access to locations identified in this analysis document or to maintain the current management of bison outside YNP in specified areas only during the winter and spring. This environmental assessment (EA) discloses the analysis and environmental consequences associated with implementing the alternatives identified in Chapter 3. This EA provides information and analysis to determine whether an action results in a significant effect and would therefore require the completion of an EIS. If an EIS is not required, a Decision Notice will document the agencies' final decision and the rationale for it. The final decision will be made by officials from FWP and the Montana Department of Livestock.

1.6 SCOPING

The proposed action was presented to 2,855 interested parties in the form of a scoping notice on July 23, 2012, and was posted on the FWP and DoL websites. In addition, a press release regarding the scoping effort was distributed to all major newspapers within the State of Montana on that same day. FWP and DoL also hosted two scoping meetings, West Yellowstone on August 20 and Gardiner on August 21. Approximately fifty people attended each meeting. Comments by participants were transcribed at the meeting to ensure their accuracy and the commenter's intent.

The scoping period was from July 23 through August 24. A total of 1,887 different individuals submitted comments via email and regular mail from in-state, out-of-state, and international addresses during the scoping period.

In addition to the formal scoping process, the public and local ranch owners participated in a field trip of the Taylor Fork area on August 29, 2012, as part of the IBMP quarterly meeting. The attendees of the fieldtrip provided comments and questions to FWP and DoL staff at an informal meeting after the fieldtrip.

The purpose of scoping is not only to inform the public and to identify issues and concerns regarding a proposal, but also to determine which issues to analyze in depth and to use in the development of alternatives to the proposed action. DoL and FWP managers and biologists compiled a list of issues using comments from the public, other agencies, and resource specialists. The issues were separated in two groups: those analyzed in detail and those that were eliminated from detailed analysis.

1.6.1 Issues Studied in Detail

Issues and concerns submitted by the public and within the scope of the proposed action include the following:

- Impacts to Public Safety:
 - Increased traffic hazards
 - Threat to personal safety
 - Presence of bison could bring large carnivores to residential areas (i.e. wolves and grizzlies)
- Private Property Damage:
 - Damage to landscaping
 - Damage to existing fencing
 - Threat to domestic animals
- Effects to Existing Habitat and Wildlife:
 - Impact on rangeland conditions
 - Need for additional fencing that could affect wildlife movements
 - Compete with existing wildlife for forage
 - Threat of spreading weeds
- Bison Management
 - Change existing hazing activities
 - Management of bison along highway corridors
 - Management of bison within new areas
 - Bison population management in new areas
- Impacts to the Livestock Industry
 - Threat of spreading brucellosis
 - Impact USFS allotments
 - Impact local livestock producers
 - Need for additional fencing, testing of cattle, vaccinations, etc.
- Impacts to Private Landowner Rights
 - Liability issues
 - Landowner management of bison on private property
 - Potential financial burden to protect private property
- Impacts to License and Tribal Hunting
- Impacts to Local Businesses and Local Economy
- Costs and Impacts to Agencies
- YNP bison population
- Containment

1.6.2 Issues Eliminated From Further Study

Numerous comments were submitted that, after evaluation, were eliminated from further analysis because they were either outside the scope of the project, not applicable, were beyond the jurisdiction of FWP or DoL, or would have negligible minor effect to existing resources. A summary of those issues is listed below as well as the agencies' reasoning for eliminating them.

1. Application of Senate Bill 212, a component of § 87-1-216 MCA
The co-authoring of this document by FWP and DoL and the ongoing coordination of the management of bison between the agencies meets the requirements of sections 1-3 and 8 of this law.
Based on the intent of the legislation in 2011, FWP and DoL determined sections 4-7 do not apply to the proposed action since neither department is releasing or transplanting wild bison. Under the proposed action, naturally migrating bison could access and utilize designated public and private lands.
2. Contamination of water by bison
FWP and DoL believe that the movement of bison onto additional public lands would have negligible affects to water resources in the areas under consideration based on observations by NPS staff of bison within YNP and other researchers. Furthermore, Van Vuren (2001) found that the location of bison foraging was relatively unaffected by the availability of water in comparison to cattle, and that bison were less likely to graze close to water. During his observations of the free-ranging herd of bison in the Henry Mountains, Utah, Nelson (1965) observed that, "very little time was spent at the water hole. As soon as their water needs were satisfied, they immediately began grazing and moving away from the water and did not show a tendency to hang around the area as is common with cattle".
3. Trucking of bison to new year-round habitats
The proposed action does not include any translocation activities. The proposed action focuses on only naturally migrating bison. Accordingly, as indicated above, FWP and DoL determined the provisions of SB 212 (87-1-216(4)-(7) MCA) do not apply.
4. Consideration of other locations within Montana for year-round bison
Some comments included suggestions for excess YNP bison to be moved to other locations such as the Charlie Russell National Wildlife Refuge, FWP-owned wildlife management areas, and the Red Rocks National Wildlife Refuge. These suggestions are beyond the geographic scope of the proposed action.
5. Management of brucellosis in elk
FWP and DoL recognize the presence of brucellosis in elk and that elk use the new areas under consideration for this proposed action. However, this topic is beyond the scope of the proposed action. The proposed action is an adaptive management adjustment under the IBMP. Elk were not considered under the 2000 EIS or under the subsequent management plan.
6. Population management of bison within YNP
The management of the size of the bison herds within YNP is under the jurisdiction of the NPS, not FWP or DoL. Population size is addressed in the IBMP, and this proposal does not change the population target/triggers of the IBMP.

7. Conservation of the genetics of YNP bison

This project does not affect the ongoing conservation efforts by YNP or others to preserve “pure” bison genes. Such efforts are beyond the scope of the proposed action since the proposed action does not include any components that would impact YNP bison genetics.

8. Brucellosis as a bio-terrorism agent

Brucellosis is an infectious disease caused by bacteria of the genus *Brucella*. Various *Brucella* species affect sheep, goats, cattle, deer, elk, and dogs. This comment was potentially fueled by a June 2000 article in the Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report that *Brucella* species (*B. melitenensis* and *B. suis*) are potential agents of biological terrorism. The article describes the investigation of such a case of a New Hampshire woman in 1999. Although numerous tests were completed, testing for *Brucella* and other antibodies, no diagnosis for the women’s eventual death was confirmed. Currently within Montana, the *Brucella* species present in elk is uncontrolled with only *Brucella abortus*, also present in bison and cattle, designated a dangerous disease. See Section 3.7 for additional statistics on human exposure to brucellosis. FWP and DoL do not believe this topic is within the scope of the proposed action because of the low numbers of human infections resulting from infected elk. The risk is expected to be that much lower because the number of bison that are expected to use the newly expanded area is a small percentage of brucellosis-infected elk that are already native to the landscape.

9. Connection of proposed action with United Nations Agenda 21

Agenda 21 is a comprehensive plan of action to integrate knowledge of the environment and integrations for development in order to improve living standards for all peoples and to better protect and manage ecosystems that sustain all peoples to be taken globally, nationally, and locally by organization of the United Nations System (UN 2009). There is no intended link between Agenda 21 and the proposed action. The proposed action was not designed in any way to meet the objectives of Agenda 21. The scope of the Agenda 21 objectives is beyond the scope of the proposed action, thus no additional analysis will be completed on this topic.

1.7 APPLICABLE LICENSES

There is the potential that FWP and DoL may need to apply for a Special-Use Authorization permit from the Forest Service for a right-of-way encumbrance in locations where barriers to bison movement are necessary to improve public safety or to restrict bison to within the project’s boundaries. The agencies would apply for those permits when required and prior to the installation of any new structures.

CHAPTER 2.0: ALTERNATIVES

2.1 INTRODUCTION

The basis for the current bison management in Montana is the Modified Preferred Alternative as presented in the ROD (2000) and the FEIS (2000) along with any adopted and implemented adaptive management adjustments through 2011.

2.2 ALTERNATIVE A – NO ACTION, IBMP WOULD REMAIN UNCHANGED AND WOULD CONTINUE UNDER THE GUIDANCE OF THE 2008 AND 2011 ADAPTIVE MANAGEMENT ADJUSTMENTS TO THE IBMP

Under this alternative, the IBMP partner agencies would manage migrating bison leaving YNP under the original IBMP guidance and all subsequent adaptive management adjustments through 2011.

Summary of Current Operating Procedures Affecting Both the Northern and Western Boundaries

1. Organization: Bison management operations occurring outside the Park will be under the direction of an on-site Operations Chief from DoL. Hazing, shooting, capture, research, and monitoring operations will include participants from DoL, APHIS, FWP, NPS, and USFS.
2. Monitoring Bison Movements Inside YNP: The Division of Resource Management and Visitor Protection in YNP would be responsible for monitoring, recording and notification of bison activity within the Park and in the Eagle Creek/Bear Creek area. When it appears likely that bison will migrate out of the Park (within 24 hours) near West Yellowstone, Montana, or Gardiner, Montana, or near the Little Trail Creek-Maiden Basin hydrographic divide, Yellowstone National Park shall notify the Helena office of the DoL. Additional monitoring activities would be completed as necessary and when logistically possible.
3. Monitoring Bison Movements Outside YNP: Complete weekly surveys of the number and distribution of bison within Zone 2 (i.e. Gardiner Basin, Horse Butte, and Madison Flats). Monitor bison in the Eagle Creek/Bear Creek area twice per week during the winter. Bison in the Absaroka-Beartooth Wilderness area would not be monitored or managed in any way except for human safety concerns. The agencies will periodically monitor bison that may move into the Cabin Creek Recreation and Wildlife Management Area, the Monument Mountain Unit of the Lee Metcalf Wilderness, or in the Upper Gallatin River above the mouth of Taylor Fork. The agencies may agree to other monitoring provisions on a case-by-case basis.
4. Hazing: Hazing of bison may be attempted to discourage bison from leaving the Park, to move bison back into the Park from outside the Park, move bison within Zone 2, or to move bison further into the Park away from the Park boundary. The YNP Chief Ranger or designee will determine the timing, location, and duration of hazing within the Park. DoL is the lead agency to implement hazing outside of YNP. Similarly, DoL may request the assistance of FWP, NPS, and USFS.

- Bison would be hazed back into the Park on May 1 for the Gardiner Basin and on May 15 for the areas near West Yellowstone. Bison would be tolerated in the Eagle/Bear Creek area year-round.
5. **Capturing Bison:** The NPS is the lead agency to implement bison capture within YNP and may request assistance from DoL and FWP, or other cooperating agencies. DoL is the lead agency to implement bison capture outside of YNP. Similarly, DoL may request the assistance of FWP, NPS, and USFS. All bison captured will be handled according to applicable methods for blood and brucellosis testing, pregnancy testing, vaccination, tagging, sorting safety, and hauling. DoL, FWP, and APHIS are responsible for handling bison captured outside the Park. Those bison testing seronegative for brucellosis on the northern boundary would be held at the Stephens Creek facility until spring, then released back into YNP. Those testing seropositive for brucellosis may be slaughtered and their meat distributed to food banks and tribal groups.
 6. **Lethal Removal for Risk Management:** DoL is the lead agency for field slaughter, field dress, and resultant transport of bison carcasses that are removed outside the Park under the terms of this plan. DoL may request the assistance of FWP, NPS, and APHIS. USFS assistance may be requested for public safety purposes during removal operations. Charitable organization(s) and/or Indian tribal governments would receive carcasses for distribution through their social service system. Indian tribal organizations or their designee(s) may receive the bison heads and hides.

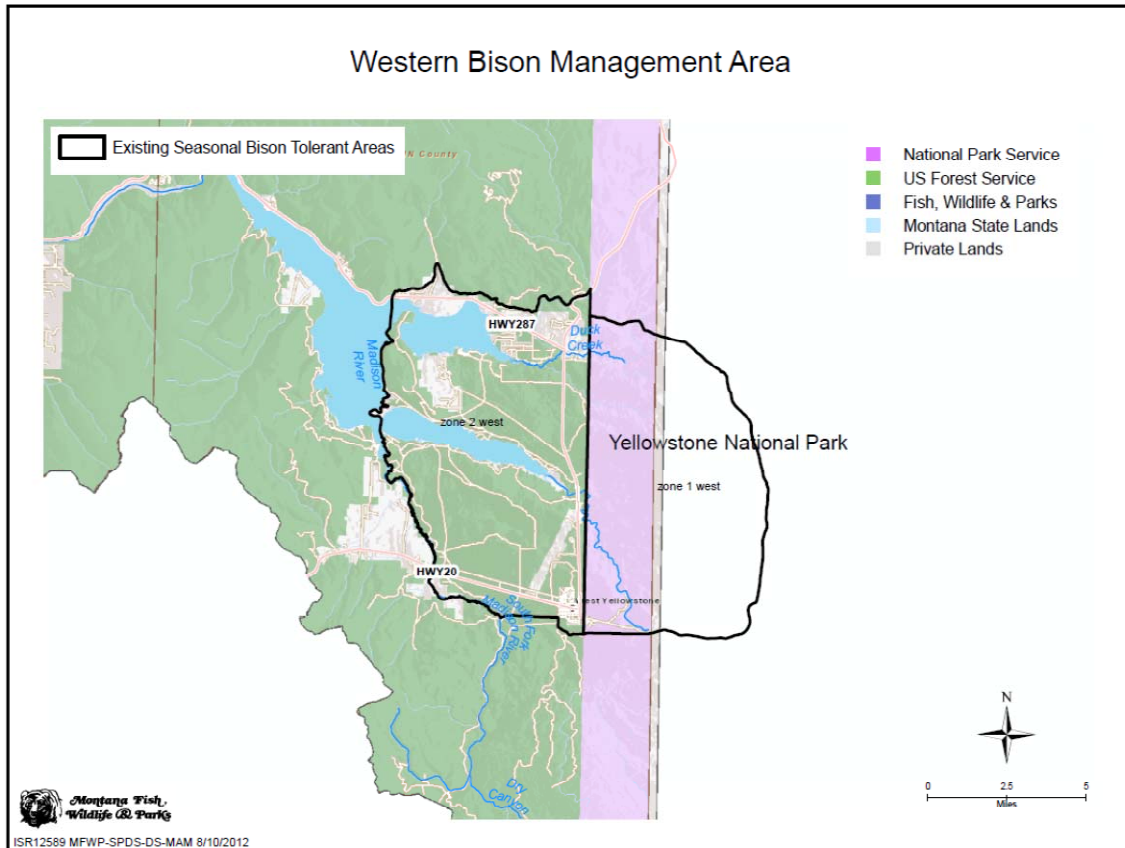
A copy of 2012 IBMP Operating Procedures is attached as Appendix A. The following map shows the existing bison-tolerant area on the western boundary of YNP.

Yankee Jim Canyon would continue to be the northern-most boundary of the bison-tolerant zone (Figure 2) within the Gardiner Basin which was originally identified in the FEIS as the edge of the tolerance area.

Bison would be tolerated outside the Park within Zones 2 from November through April, and bison would continue to be tolerated year-round within the Eagle Creek/Bear Creek area. Bison moving beyond the bison-tolerant areas would trigger management actions such as hazing back into the Park or back into the established tolerance areas (Zone 2 or Eagle Creek/Bear Creek), increased surveillance, capture, or lethal removal at the discretion of the State Veterinarian.

As part of the IBMP, partner agencies developed measurable objectives in order to evaluate the effects and effectiveness of management actions that, in turn, would assist in the development of new adaptive management adjustments. A summary of the current management actions and monitoring metric can be found in Appendix B. IBMP annual reports display current bison behavior and management data as it relates to specific measurements in detail.

Figure 1. Map of the Current Bison-tolerant Area for of Western Bison Management Area



2.3 ALTERNATIVE B – YNP BISON COULD ACCESS AND UTILIZE HABITATS IN THE GARDINER BASIN AND PORTIONS OF THE GALLATIN NATIONAL FOREST NEAR WEST YELLOWSTONE YEAR-ROUND

Under this alternative, the following adaptive management adjustments would be implemented to the IBMP:

- YNP bison (both sexes) could access and utilize habitat on portions of the GNF west and north west of the Park boundary including: Horse Butte, the Flats, south of U.S. Hwy 20, Monument Mountain Unit of the Lee Metcalf Wilderness, Cabin Creek Wildlife and Recreation Area, and Upper Gallatin River corridor to Buck Creek.
- YNP bull bison could access and utilize habitat on USFS and other lands north of the Park boundary and south of Yankee Jim Canyon year-round. Bison would be prohibited to travel north of the hydrological divide (i.e., mountain ridge-tops) between Dome Mountain/Paradise Valley and the Gardiner Basin on the east side of the Yellowstone River, and Tom Miner Basin and the Gardiner Basin on the west side of the Yellowstone River.
- Evaluate the effects of these adjustments and modify as necessary to prevent bison from occupying lands not indentified in this document.

Figure 2. Map of the Current Bison-tolerant Area for the Gardiner Basin and the Eagle/Bear Creek Area

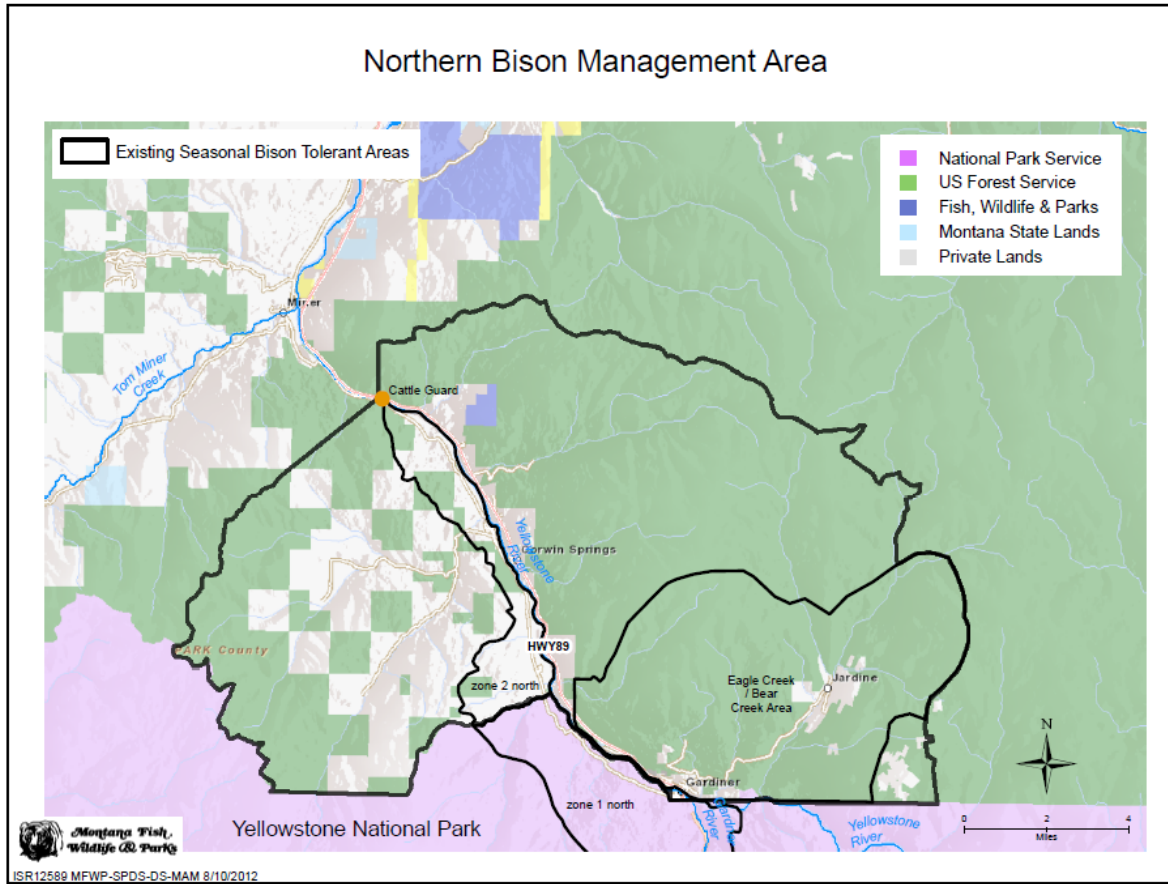


Table 1. Total Acreage Included.

Location	# of Acres
Gardiner Basin & Eagle/Bear Creek	104,000
Existing Zone 2 – West Side	37,870
New Habitat – West Side	279,950
TOTAL	421,821

See Figure 2 for a map of the Gardiner Basin component of this alternative.

With the exception of the elimination of a permanent haze-back date for bison into YNP, the agencies would continue to adhere to the IBMP Operating Procedures as previously described. Management of bison within the new year-round habitat would follow the principles of the IBMP and the current IBMP Operating Procedures. Current capture and vaccination efforts of bison would continue. Furthermore, use of the lethal removal of bison by FWP, DoL, and other IBMP agencies would remain a viable management tool as would the removal of bison by landowners when there is an imminent threat to personal safety and personal property. The following bullets highlight additional management procedures for year-round bison:

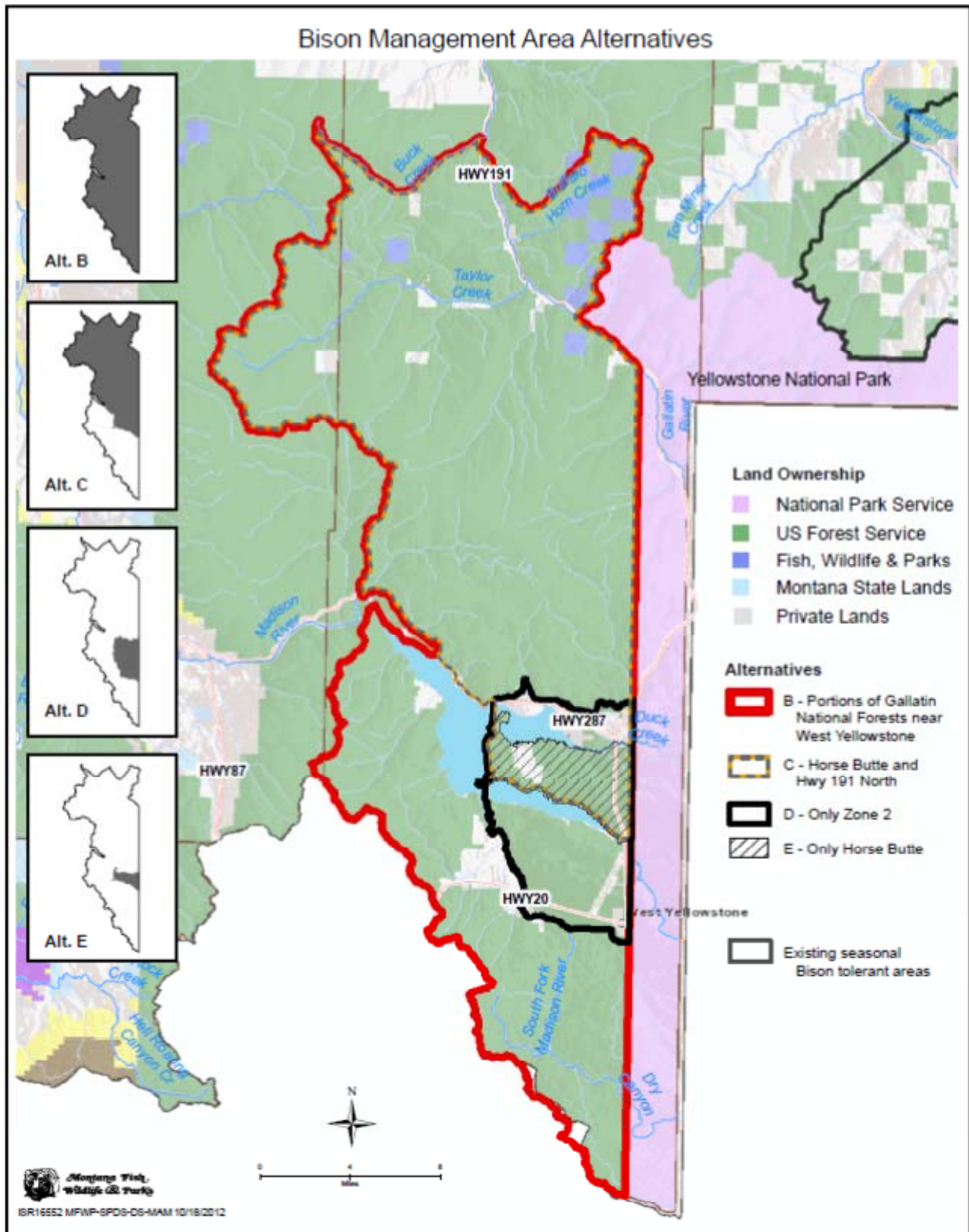
- Bison would continue to be hazed away from highways and major traffic corridors when needed to avoid substantial human safety risk.
- DoL would collaborate with local livestock owners in new bison-tolerant areas with projects to ensure spatial separation between cattle and bison.
- FWP, DoL, and other IBMP partners would use bison movement management to ensure spatial separation of bison and cattle on public lands and respond to conflicts with other livestock. This may include pushing bison away from livestock by all-terrain vehicles or on horseback to another nearby location, also on public lands.

Existing IBMP management actions would continue to be measured and reported in the IBMP Annual Reports. Many of the existing management actions and their metrics would be expanded to include documentation of the year-round activities of bison management and the tracking of public safety incidents, landowner relations, and brucellosis transmission. In addition to these monitoring metrics, FWP and DoL may add the following metrics to establish baseline and ongoing data about bison behavior and movements within the new year-round habitat.

- Complete periodic surveys of the number and distribution of bison within Horse Butte, the Flats, south of U.S. Hwy 20, Monument Mountain Unit of the Lee Metcalf Wilderness, Cabin Creek Wildlife and Recreation Area, and Upper Gallatin River corridor to Buck Creek in conjunction with other wildlife surveys.
- Complete periodic surveys of the number and distribution of bull bison within the Gardiner Basin.
- Determine natural routes and timeframes for bison migrating back into YNP from year-round habitats.
- Document bison movements within year-round habitats.
- Annually document the numbers of bison and dates bison attempt to exit year-round habitat boundaries.
- Increase the understanding of bison population interactions and coexistence with resident wildlife within year-round habitat. Document and evaluate annually.
- Consult with USFS on vegetation and rangeland monitoring in the area and collaborate on habitat projects as needed.
- Evaluation of the effectiveness of year-round habitat natural boundaries.

By following the documentation and evaluation procedures currently used by the IBMP partners for bison management, additional adaptive management adjustments may be necessary to ensure the risk of the spread of brucellosis between bison and cattle is minimized, public safety is protected, and existing resources (i.e. vegetation, wildlife, etc.) are not jeopardized by the ongoing presence of YNP bison.

Figure 3. Proposed Year-round Bison Habitat on the Western Boundary



2.4 ALTERNATIVE C – YNP BISON (BOTH SEXES) COULD ACCESS AND UTILIZE HABITATS ON GALLATIN NATIONAL FOREST LANDS KNOWN AS HORSE BUTTE AND NORTH ALONG THE U.S. HIGHWAY 191 CORRIDOR NORTH TO BUCK CREEK YEAR-ROUND

This alternative covers a smaller geographic area than Alternative B. It does not include the Madison Flats or the areas north and south of U.S. Highway 20. Total number of acres included is approximately 255,714. Management of bison on the west side would be identical to what was described for Alternative B. See Figure 3 for the identification of the project area for this alternative.

Ongoing documentation of management activities would continue under this alternative. New monitoring metrics would be added to the management activities to track the effects of year-round bison within new areas. The metrics would be the same as described under Alternative B with the exception of the elimination of any associated with the Gardiner Basin.

2.5 ALTERNATIVE D – YNP BISON (BOTH SEXES) COULD ACCESS AND UTILIZE HABITATS ON GALLATIN NATIONAL FOREST LANDS NEAR WEST YELLOWSTONE ONLY WITHIN THE EXISTING ZONE 2 BOUNDARIES (HORSE BUTTE AND MADISON FLATS) YEAR-ROUND

This alternative would include Horse Butte, the Madison Flats, and small area along U.S. Highway 8 that was identified in the 2000 ROD as Zone 2. These areas encompass approximately 37,870 acres. See Figure 3 for the identification of the project area for this alternative.

Management of bison within Zone 2 on the west side would not change from the 2012 IBMP Operating Procedures with the exception of the elimination of a permanent haze-back date for bison into YNP for the west side. The measurement matrixes currently used to monitor bison behaviors and movements, document livestock and landowner concerns/calls, summarize ongoing brucellosis/bison genetics research data and findings, summarize bison harvest by license and treaty hunters, and status of vaccination programs for bison and cattle would continue to be used.

2.6 ALTERNATIVE E – YNP BISON (BOTH SEXES) COULD ACCESS AND UTILIZE HABITATS ONLY ON HORSE BUTTE WITHIN GALLATIN NATIONAL FOREST NEAR WEST YELLOWSTONE YEAR-ROUND

This alternative is identical to Alternative D except the geographic boundary of the year-round bison-tolerant area is smaller, and bison within Zone 2 and outside Horse Butte would be hazed either onto Horse Butte or back into YNP. Horse Butte encompasses approximately 11,500 acres. See Figure 3 for the identification of the project area for this alternative.

Ongoing documentation of management activities would continue under this alternative. New monitoring metrics would be added to the management activities to track the effects of year-round bison within new areas. The metrics would be the same as described under Alternative B with the exception of the elimination of any associated with the Gardiner Basin.

2.7 ALTERNATIVE F – YNP BISON (BULLS ONLY) COULD ACCESS AND UTILIZE EXISTING BISON-TOLERANT AREAS YEAR-ROUND WITHIN THE GARDINER BASIN

Bull bison currently may use the Eagle/Bear Creek area year-round. Under this alternative, bull bison could remain in the Gardiner Basin which includes the area between the northern boundary of YNP and the southern entrance to Yankee Jim Canyon. Bison would be prohibited to travel north of the hydrological divide (i.e., mountain ridge-tops) between Dome Mountain/Paradise Valley and the Gardiner Basin on the east side of the Yellowstone River, and Tom Miner basin and the Gardiner Basin on the west side of the Yellowstone River. Total number of acres within the northern bison-tolerant area is approximately 104,000. See Figure 2 for a map of the area.

Often bulls, cows, and calves are congregated in mixed groups. When this occurs, these mixed groups would be hazed into YNP by the May 1 deadline due to the difficulties in separating bulls and cow/calf pairs. Bull bison migrating north back into the Gardiner Basin and designated areas after May 1 could remain in the bison-tolerant areas subsequent seasons. Only lone bulls and groups of bulls would not be actively hazed back into YNP in the spring.

Overall, bison management of both sexes would continue the 2012 IBMP Operating Procedures described in Alternative A. The measurement matrixes currently used to monitor bison behaviors and movements, document livestock and landowner concerns/calls, summarize ongoing brucellosis/bison genetics research data and findings, summarize bison harvest by license and treaty hunters, and status of vaccination programs for bison and cattle would continue to be used.

New monitoring metrics would be added to the management activities to track the effects of year-round bison within new areas. The metrics would be the same as described under Alternative B with the exception of the elimination of any associated with the west side management area.

2.8 Costs for All Alternatives

FWP expenses for bison-related management activities, which include hazing, response to landowner calls and public safety incidences, and assistance for other IBMP partner activities, are included under the existing budgets for regional wildlife management, enforcement duties, and general administration. DoL's annual bison management budget is \$250,000 which covers expenses for the handling and testing of YNP bison.

Depending upon the alternative chosen, additional costs to the agencies may be zero or substantial. It is difficult to define possible additional costs because it is unknown at what level current management activities would change with year-round bison on designated lands.

FWP would initially need three bison technicians to provide support for bison management under Alternative B and two bison technicians to implement Alternatives C, D, and E. Furthermore, the potential for new staff would also help to alleviate burdens placed upon IBMP partners and local law enforcement. At this time, the proposal for contracted staff is still under consideration.

Additionally, FWP may hire seasonal staff to survey and monitor bison movements within the expanded habitat if necessary. Seasonal staff would be supervised by FWP regional wildlife biologists.

Estimated additional costs for year-round bison management for all alternatives are:

- \$19.45/hour for seasonal bison technicians and staff for survey and inventory of bison (FWP)

- \$35,000 annual costs for operations (FWP)

- \$50,000 on-time equipment costs (FWP)

CHAPTER 3.0: AFFECTED RESOURCES AND PREDICTED ENVIRONMENTAL CONSEQUENCES

3.1 PROJECT SETTING

Description of existing bison-tolerant areas North of YNP (Gardiner Basin and Eagle Creek/Bear Creek Area)

The landscape of the existing bison-tolerant areas north of YNP is characterized by steep mountain ranges with grassland and sagebrush meadows in the lower elevations. The area is a mixture of private and National Forest System lands. The Gallatin and Absaroka Mountain ranges dominate the north-central portion of the area on the west and east sides of the Yellowstone River valley, respectively. Portions of Zone 2 are along the west side of the Yellowstone River north of Reese/Stephens Creek. Eagle and Bear Creek drainages are east of the community of Gardiner north of YNP.

The climate of the area features long, cold winters, and short, cool summers. Average monthly temperatures are noted below as is precipitation and snowfall depths.

Table 2. Gardiner Monthly Climate Summary (April 1956 – May 2012)
Data from the Western Regional Climate Center (NOAA 2012)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Av. Max Temp. (F)	33.1	38.2	46.6	56.1	66.4	76.2	86.1	84.5	74.2	60.6	42.8	33.8
Av. Min Temp. (F)	14.2	14.3	23.6	30.5	38.3	45.6	51.8	50.5	42.0	33.4	23.1	16.0
Av. Total Precip. (inches)	0.43	0.34	0.54	0.8	1.56	1.48	1.06	0.92	0.86	0.80	0.64	0.46
Av. Total Snowfall (inches)	5.5	3.0	3.5	2.8	0.5	0.0	0.0	0.0	0.1	0.4	4.1	5.5

Yankee Jim Canyon (the most northern boundary of Zone 2) is a narrow, natural constriction point for bison movement that facilitates the halt bison movement north. The steep rocky terrain that impinges immediately on the Yellowstone River at this point provides a pincer point for bison movement. Bison restriction is further controlled through installation of the two roadway bison guards immediately south of the canyon and fencing running up the hillsides from the roads installed in response to the 2010-2011 bison migration. The Yellowstone River, steep terrain, snow depth, and other features would also help prevent bison movement to the north.

Zone 2 encompasses approximately 5,800 acres. Elevation ranges from 5,100 to 5,200 feet. Annual precipitation averages 8 to 12 inches. Vegetation is best described as bunchgrass steppe or shrub steppe communities. Grasses in these areas include Idaho fescue (*Festuca idahoensis*), junegrass (*Koeleria macrantha*), and occasionally bluebunch wheatgrass (*Elymus spicatus*).

Zone 2 also includes the Royal Teton Ranch (RTR). The IBMP called for the purchase of the Ranch's grazing rights in Step 2 as a precursor for potential bison movement through the property to public lands. In 2008, FWP purchased the lease for those grazing rights. Under the terms of the lease, bison are able to move through the ranch to USFS lands south of Yankee Jim Canyon.

The Eagle Creek/Bear Creek area is approximately 29,000 acres in size and is located within the GNF, primarily on the benches about a half mile north and east of Gardiner, Montana. A network of roads and trails crisscross the area, but the major access is via Park County Road 15 (known locally as the Jardine Road) which goes to the town of Jardine.

There are considerable elevational differences found across the Eagle Creek/Bear Creek area. The elevation is 5,200 feet at the valley floor and 10,500 feet at the crest of the hydrographic divide. This area is bordered on the southwest by the Yellowstone River and the northwest by the Little Trail Creek/Maiden Basin hydrographic divide. It is traversed by Bear Creek and Eagle Creek and their respective tributaries.

The Eagle Creek/Bear Creek area's precipitation is about 10 to 12 inches a year, and the average annual precipitation increases as the elevation increases. Vegetation is a mosaic of dry sagebrush shrublands and dry grasslands such as bluebunch wheatgrass and Idaho fescue at the lower elevations, and additional moisture at higher elevations allows for the presence of forests.

Human presence

In 2010, the population of Park County, Montana, was nearly 16,000 people (CEIC 2010). The estimated population of residents within Zone 2 is 65 and in the Bear Creek/Eagle Creek 772 which includes the community of Gardiner. There is one year-round livestock operator in the Bear Creek/Eagle Creek area (though this operator has not maintained livestock on the property for the last few years). Additionally, there are two active grazing allotments within the existing bison tolerant area, one on each side of the Yellowstone River near Yankee Jim Canyon: Slip n' Slide on the east side and Green Lake on the west side that are used during the summer when bison are not present.

There are approximately 363 residents within the expanded bison-tolerant area (See Appendix C for Census Block Population Maps). Private properties in the Gardiner Valley, between the YNP boundary and Yankee Jim Canyon, occupy a total area of about 17,000 acres. There are two landowners who have cattle grazing operations in the tolerance area during the time of migration.

The community of Gardiner is at the northern entrance to Yellowstone National Park and is the only entrance open year-round to YNP. In 2012, 238,837 vehicles entered the Park through this entrance (NPS 2013).

For additional information regarding those resources within the project area, see Sections 3.4 (Livestock Resources) and 3.5 (Socioeconomic Resources).

Description of existing seasonal bison-tolerant areas west of YNP (Zone 2)

The Horse Butte area is approximately 24,000 acres in size and lies generally north of Highway 20 leading west from the town of West Yellowstone. It is also east of the south fork of the Madison River and Hebgen Lake. Lands north of Hebgen Lake up to and adjacent to the southern boundary of the Cabin Creek Recreation and Wildlife Management Area are part of the area described as the West Yellowstone or Horse Butte area in this environmental assessment. Much of this area is open meadow mixed with conifer forest and is lower in elevation than the

Cabin Creek or Lee Metcalf portions of the western Special Management Area (SMA) (USDI et al. 2000a).

Most of the West Yellowstone area of the western SMA is found on a 7,000- foot plateau which includes the obsidian flats found in the area in the east and central portion of the SMA. This part of the SMA supports primarily lodgepole pine (*Pinus contorta*). At one point, a rhyolite monolith (Horse Butte) rises about 300 feet in elevation from the center of the SMA. The monolith supports a subalpine fir (*Abies lasiocarpa*) /pinegrass (*Calamagrostis rubescens*) forest habitat type on northerly exposures, grasses such as Idaho fescue and Ross’s sedge (*Carex rossii*) on southern exposures, and distinctive aspen (*Populus tremuloides*) groves on the small area of flat terrain (USDI et al. 2000a). Riparian and wetlands occur primarily along the Madison and Gallatin Rivers, as well as following the drainages of Cougar, Duck, Grayling, and Specimen Creeks (FWS 2012).

The climate near West Yellowstone has long, cold winters, and short, cool summers. The elevation at this station is 6,700 feet, and average monthly temperatures are noted below as is precipitation and snowfall depths. Winter temperatures can occasionally reach -40 degrees Fahrenheit.

Table 3. West Yellowstone Monthly Climate Summary (January 1924 – Jan. 2012)
Data from the Western Regional Climate Center (NOAA 2012)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Av. Max Temp. (F)	24.2	30.8	38.0	47.6	59.3	68.5	79.2	77.2	66.4	52.5	34.5	25.3
Av. Min Temp. (F)	-0.2	2.5	8.7	19.7	28.7	35.3	39.6	37.2	29.4	22.1	10.3	1.8
Av. Total Precip. (inches)	2.14	1.72	1.72	1.53	2.05	2.37	1.50	1.37	1.48	1.54	1.95	2.20
Av. Total Snowfall (inches)	32.9	26.6	23.3	10.7	3.3	0.6	0.0	0.1	1.1	7.3	22.9	31.4

Human presence

In 2010, the population of Gallatin County, Montana, was over 89,500 people with nearly 1,300 residing in the town of West Yellowstone (DLI 2012). The estimated population of residents within Zone 2 is 1,641 based upon the 2010 U.S. Census data. Private properties within Zone 2, including the community of West Yellowstone, occupy a total area of about 4,900 acres.

There are two livestock operators within the Zone 2 boundary, most of which only graze cattle on private lands in the summer and late fall when bison are not present. There are two active GNF grazing allotments within the existing Zone 2 seasonal bison-tolerant area. Both the Moose and Grayling allotments are used by horses from July 1 until late September.

The town of West Yellowstone is at the western entrance to YNP which is only open to automobiles April through November. In the winter months, the entrance is used by snow coaches and snowmobiles. During 2012, over 471,700 vehicles traveled through this gate into the Park (NPS 2013).

For additional information regarding those resources within the project area, see Sections 3.4 (Livestock Resources) and 3.5 (Socioeconomic Resources).

Description of lands within the additional proposed year-round bison-tolerant area

All of the proposed additional year-round bison-tolerant area is in Gallatin County and primarily within the general vicinity of the town of West Yellowstone and Hebgen Lake. The vast majority of this area is owned by the Gallatin National Forest (88.5%) with the remainder owned by FWP (3.3%), private landowners (3.8%), the National Park Service (0.7%), and small percentages owned by Montana Department of Transportation (right-of-ways), and local government.

The portion of the Cabin Creek Recreation and Wildlife Management area that would become available to bison is approximately 37,000 acres in size, and is accessed by U.S. Highway 191 and U.S. Highway 287. It is primarily high elevation (8,200 feet to 10,600 feet) mixed forest and open meadow. The Cabin Creek area is managed for grizzly bears and big game and allows recreation consistent with animal presence. Semi-primitive and non-motorized recreation is allowed. The area is rarely used by bison but may be occupied by a few bulls (USDI et al. 2000a).

The Monument Mountain Unit of the Lee Metcalf Wilderness is 31,000 acres in size and is also accessed by U.S. Highway 191 and U.S. Highway 287. It ranges in elevation from 7,400 feet to about 10,100 feet and is mixed conifer forest and mountain meadows. Bison are most likely to use the lower elevations of the wilderness and enter the area from the east on Bacon Rind Creek or from either of the roads leading into it (USDI et al. 2000a).

There is a wide variety of vegetation within the Cabin Creek Recreation and Wildlife Management Area and the adjoining Monument Mountain Unit of the Lee Metcalf Wilderness. This variety is associated with elevations that range from 7,200 to 10,600 feet (Sage Peak) and numerous soil types. The vegetation present within the Cabin Creek Area and adjoining Monument Mountain Unit is associated with forested, mountain meadow, alpine meadow, or rock rubble habitats (USDI et al. 2000a).

Approximately 65% of the land area is forested. These forested areas are dominated by mixed conifer stands of lodgepole pine, Englemann spruce (*Picea engelmannii*), and subalpine fir. Whitebark pine (*Pinus albicaulis*) is generally the dominant tree species above 8,400 feet. Aspen is not a significant component of the forested habitats. Douglas-fir (*Pseudotsuga menziesii*) exists at the lower elevations on southern aspects. The grass/forb associations within the forested areas consist of pinegrass, sedge, trisetum, huckleberry, and arnica (USDI et al. 2000a).

Mountain meadows are interspersed throughout the area and comprise about 20% of the area. Some of these meadows are up to 600 acres and contain clumps or isolated patches of subalpine fir/spruce and/or clumps of whitebark pine and subalpine fir/spruce. The grass component consists of grasses such as meadow barley (*Hordeum brachyantherum*), sedge, tufted hairgrass (*Deschampsia cespitosa*), alpine timothy (*Phleum alpinum*), while forb components consist of plants such as meadowrue, carrotleaf, paintbrush, aster, potentilla, mountain dandelion (*Agoseris*

glauca), and geranium. The wetter mountain meadows have shrub components consisting of willow, and some of the drier meadows have a sagebrush component. (USDI et al. 2000a)

Set apart from the mountain meadows by elevation are the alpine meadows. These non-forested areas comprise 10% of the area and are generally above 9,400 feet where harsh climate limits growth. Trees such as alpine fir, spruce, and whitebark pine are stunted, deformed, and isolated. Grass plants include Idaho fescue, tufted hairgrass, and sedge. Forbs include mountain dandelion, lupine, and clover. Shrubs include purple mountain heath (*Phyllodoce breweri*) (USDI et al. 2000a).

Rock rubble or rubble land make up approximately 5% of the unit. Moss and lichen are found in these high elevation areas, but there are also isolated areas of stunted whitebark pine. Purple mountain heath is also found in some of the rock crevices (USDI et al. 2000a).

There is one other official U.S. Weather Service Station in the area other than the West Yellowstone: the Hebgen Dam station. Hebgen Dam is 21 miles northwest of West Yellowstone at an elevation of 6,550 feet. Temperatures, precipitation, and snow depths in the Cabin Creek Management and Monument Mountain Unit may deviate from the data for Hebgen Dam depending upon elevation and vegetative cover.

Table 4. Hebgen Dam Monthly Climate Summary (June 1904 – Apr. 2012)
Data from the Western Regional Climate Center (NOAA 2012)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Av. Max Temp. (F)	21.8	37.8	36.7	46.9	58.9	68.2	78.2	77.1	66.8	51.8	34.3	23.3
Av. Min Temp. (F)	2.0	3.8	11.1	22.1	31.2	37.8	43.1	41.5	34.8	37.2	16.3	5.2
Av. Total Precip. (inches)	2.88	2.28	2.29	1.81	2.6	2.79	1.73	1.59	1.66	1.83	2.44	2.72
Av. Total Snowfall (inches)	43.7	33.2	26.5	10.3	2.7	0.3	.0	0.0	0.8	5.3	24.6	41.3

Human presence within the proposed expanded zone

There are approximately 1,786 residents within the proposed expanded bison-tolerant area (see Appendix C for Census Block Population Maps) primarily near Hebgen Lake, Watkins Creek, and near Taylor Fork Creek. Private properties in the proposed year-round bison habitat area occupy a total area of approximately 8,500 acres of the 279,950 acres within the proposed expanded bison-tolerant zone.

Within the existing seasonal bison-tolerant area there are two livestock operations on private land, one on Horse Butte and the other near the Narrows of Hebgen Lake. In addition to those operators, five other Montana ranches graze cattle on private lands within the proposed year-round bison habitat area. Additionally, there are ten active GNF grazing allotments within proposed year-round bison habitat area. They are: Basin (cow/calf), Grayling (horse), Moose (horse), North Cinnamon (horse), Sage Creek (horse), Sheep/Mile (cow/calf), South Cinnamon (horse), South Fork (cow/calf), Taylor Fork (horse), and Watkins Creek (cow/calf).

Many of the visitors to the west gate of YNP travel the Highway 191 corridor between Bozeman and West Yellowstone and points into Idaho. Traveling this route, drivers travel through a portion of YNP that is within Montana but does not have an official Park entrance. Traffic count on Highway 191 at this boundary in YNP in 2012 totaled 878,187 vehicles (NPS 2013).

For additional information regarding those resources within the project area, see Sections 3.4 (Livestock Resources) and 3.5 (Socioeconomic Resources).

3.1.1 Context for Analysis

Since no data could be located regarding historic bison movements within the expanded bison habitat under consideration or the numbers of bison that used that area, the following parameters were used for analysis of predicted environmental consequences.

- Up to 100 YNP bull bison within the Gardiner Basin
In order to estimate the range of bull numbers that might be expected to use the Gardiner Basin in summer, FWP and DoL estimated the number of bulls remaining outside the north boundary at the end of winter in recent years. In most years, this number is less than 20 bulls. However, during the severe winter of 2011 there were approximately 350 bison that remained outside of the northern boundary at the end of winter and that eventually were hazed back into the Park. FWP and DoL used the demographic structure of the herd to estimate the number of bulls that were likely present. The demographic structure of the northern herd is estimated each year by NPS. There is variation from year to year, but the recent average (2010-2012) has been 34 calves and 61 bulls per 100 cows. Using these ratios, a group of 350 bison would have approximately 100 bulls. Assuming the population targets are met and the number of bison in the northern herd remains at or below current levels, the agencies expect the maximum number of bulls remaining in Gardiner Basin at the end of a severe winter would be no more than 100. During most years, FWP and DoL expect the number of bulls at the end of winter to be much fewer. As summer progresses, the agencies also expect most bulls would return to YNP for the breeding season in July-August with the number of bulls present in the basin ultimately diminishing through the course of the summer.
- Estimated at 500 YNP bison within the western expanded bison habitat
This number is based upon the typical number of bison annually hazed by IBMP agencies back into YNP from Zone 2 near West Yellowstone. This number includes bulls and cow/calf pairs. Similar to the movements of the bull bison in the Gardiner Basin, as summer progresses it is likely many of the bison would return to YNP for the breeding season in July-August with the number of bulls present diminishing through the course of the summer.

3.2 BISON

Extensive information is available regarding bison behavior, habitats, historic migrations, and breeding through numerous sources. The Bison Management Plan FEIS (2000) and an FWP publication titled “Background Information on Issues of Concern for Montana: Plains Bison Ecology, Management, and Conservation” (2011) are two such examples. Relevant portions of those documents are summarized in this section in addition to data from other sources.

Population Size & Movements

Over the past four years, the population of Yellowstone Park’s bison has ranged between 3,000 in 2008 and approximately 4,500 in the spring of 2013 (R. Wallen, NPS, pers. comm. 2013). Of the 2013 population estimate, distribution between the northern herd and central herd was 3,160 and 1,300 respectively (R. Wallen, NPS, per. comm. 2013). The peak population estimate of 5,000 bison was recorded in summer 2005 (NPS 2011).

The bison population is affected by a number of factors including weather, forage production, and predation. Periodic severe winter weather can cause varying (sometimes significant) levels of natural winterkill (White et al. 2011b; USDI et al. 2000a).

NPS staff published a scientific article (Geremia et al. 2011) summarizing analyses of the relationships between bison population size, winter severity, and the number of bison removed near the boundary of YNP. Accumulating snow pack interacts with bison herd sizes to increase the numbers of bison migrating to lower elevation ranges near the boundary of YNP. There is a high probability that fewer than 10% of the population will exit the Park with moderate herd sizes (1,000-2,000), snow pack less than 60% of average, and average forage production on the summer ranges in YNP. At higher values, however, the number of bison migrating to boundary ranges during winter and spring rapidly increases. Under severe snow pack conditions, there is a significant chance that the majority of bison could migrate to the lower elevation ranges where snow pack is lower and new vegetation growth begins earlier in spring than on the higher elevation summer ranges in the Park (Thein et al. 2009; USDA, APHIS et al. 2011a).

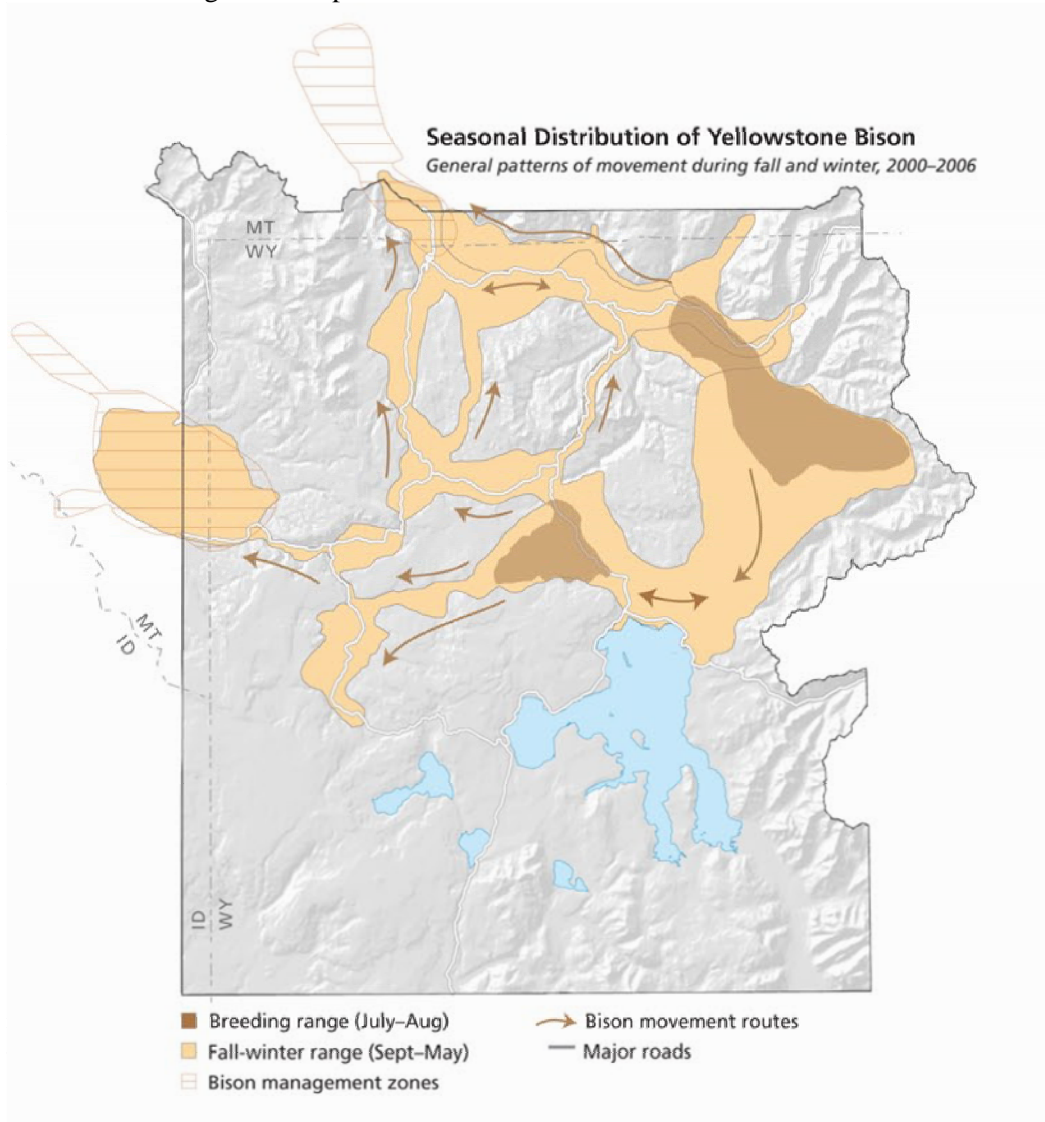
Bison usually choose the most energy-efficient travel route over flat, open terrain, although they may sometime select courses that are exceptionally steep, rough, or otherwise inhospitable. In deep snow, they commonly travel in single file with alternating leaders to reduce energy expenditures (Bruggeman et al. 2009).

The following map from the Atlas of Yellowstone (Marcus et al. 2012) shows the general routes traveled by Yellowstone bison.

Northern Boundary

Migration routes out of the Park to the north included two primary routes into the Gardiner Basin: 1) across the Blacktail Deer Plateau and down the Lava Creek drainage along the creek or the road corridor; and 2) down the Yellowstone River trail to Eagle Creek or Shooting Range Flats. The primary exit routes out of the Park were across Reese Creek west of the Yellowstone River along the Highway 89 corridor, or through Eagle Creek to Little Trail Creek (Geremia et al. 2011; USDA et al. 2011a).

Figure 4. Map of Season Distribution of Yellowstone Bison



In Winter 1989, bison occupied the Gardiner Basin as far north as Yankee Jim Canyon. However, some went beyond the basin to the north. When bison migrate into the Gardiner Basin in large numbers, management strategies have focused on keeping them southeast of Reese Creek, in the Park near Stephens Creek, and east of the Little Trail Creek watershed in the GNF even though their natural tendency would be to migrate farther north. When winter conditions become severe (deep snow pack) within YNP, larger out-migrations occur necessitating management actions. Such was the case during the winter of 2010-2011(see Table 4). These types of movements demonstrate that while YNP has a large amount of habitat for bison, it does not provide sufficient winter and spring habitat for the population. The magnitude of the annual migration to low elevation is dependent on winter severity and population abundance (Geremia et al. 2011). Bison are more tolerant of snow and better adapted to survival in deep snow than most other ungulates, but during winters when deep snow limits access to higher elevation forage, some bison migrate to lower elevation habitat outside of the Park similar to deer, elk, and

pronghorn. Bison have been herded back inside the Park or captured for the last 11 years based on the IBMP guidelines. The occurrence of bison near Yankee Jim Canyon depends largely on factors mentioned above and the management actions/efforts of the IBMP partner agencies.

Table 5. Total Number of Bison Observed Per Month and Winter Period at the Northern Boundary (Source: IBMP Annual Reports 2009-12)

	2008-2009	2009-2010	2010-2011	2011-2012
November	n/a	0	0	0
December	0	0	38	29
January	n/a	n/a	175	0
February	0	2	34	13
March	n/a	1	279	44
April	126	46	401	90
May	56	2	251	8

* These totals reflect aerial and ground surveys of Zone 1, Zone 2, and Eagle Creek.

Since Winter 2008-2009, IBMP partner agencies have conducted weekly counts and locations of bull bison within the Gardiner Basin. The number of bulls in the Basin has varied from 15 during the Winter 2008-09 to 59 during Winter 2010-11. Observations of bull bison have been throughout the existing bison-tolerant area and north to Yankee Jim Canyon. In more recent years, IBMP annual reports have noted some bull bison attempting to move beyond Yankee Jim Canyon (the northern bison-tolerant boundary) with the most numerous migration north during the Winter 2010-2011. Most bull bison were successfully hazed back into Zone 2; however, a small portion was lethally removed after hazing was unsuccessful.

Western Boundary

As reported in the 2010-2011 IBMP Annual Report, radio-marked bison have used two primary migration routes to reach the western boundary of YNP and move into the Hebgen Basin. Bison move west along the Yellowstone River to the area near 7-mile Bridge after which some bison travel north through Cougar Meadows and some bison travel west through Baker's Hole (Figure 5). These routes intersect further west along the Madison River after which nearly all bison move along the north bank of the Madison River to Hebgen Lake. Bison initially use the bench above the north bank of the Madison River and the Madison Arm of Hebgen Lake, but bison eventually access both sides of the lake when conditions are suitable. Some bison use the lake's delta as a way to cross from the Horse Butte peninsula to the south side of the Madison Arm (Figure 6).

During the winter of 2011-2012, there were 20 separate breaches north and south of the Zone 3 boundary involving various sizes of bison groups. Group sizes ranged from a single bull to 117 in a mixed group.

Figure 5. Major Migration Routes of Bison to the West Boundary of YNP and into Montana

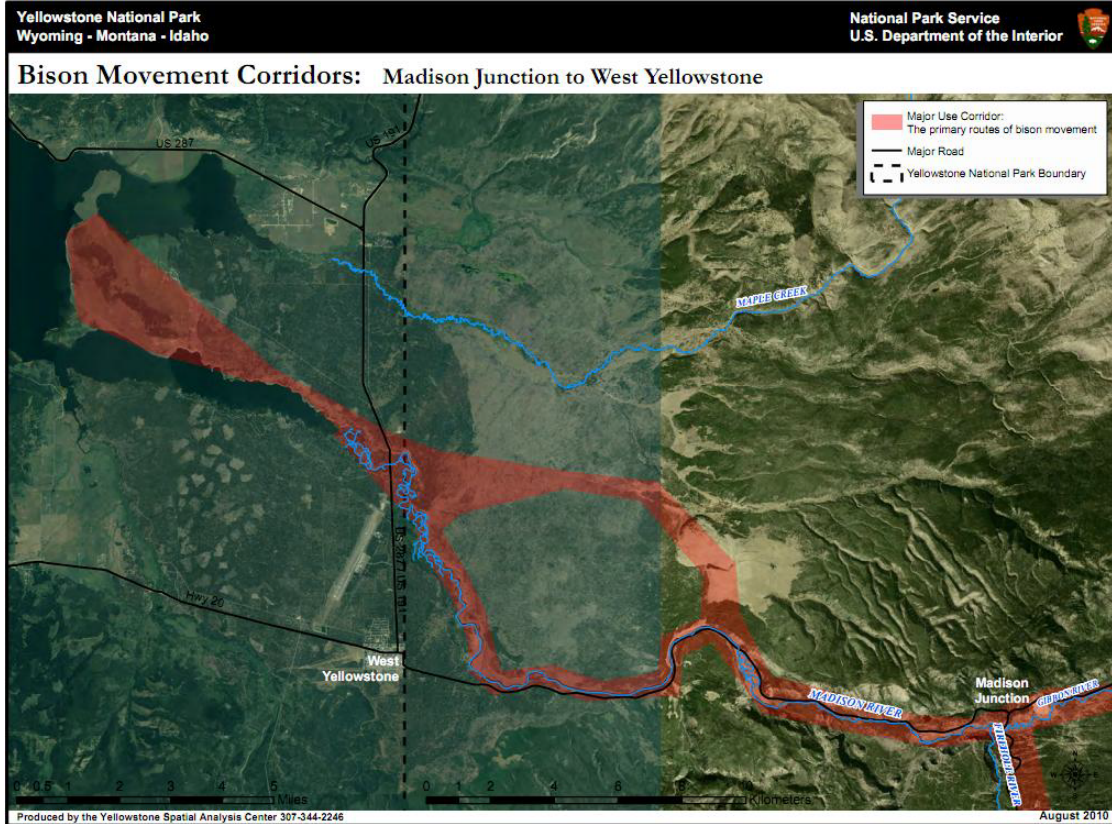


Figure 6. Relocation Points (in pink) and Movement Routes of Bison Using the South Fork Area along the Madison River, and the Flats Area South of the Madison Arm of Hebgen Lake

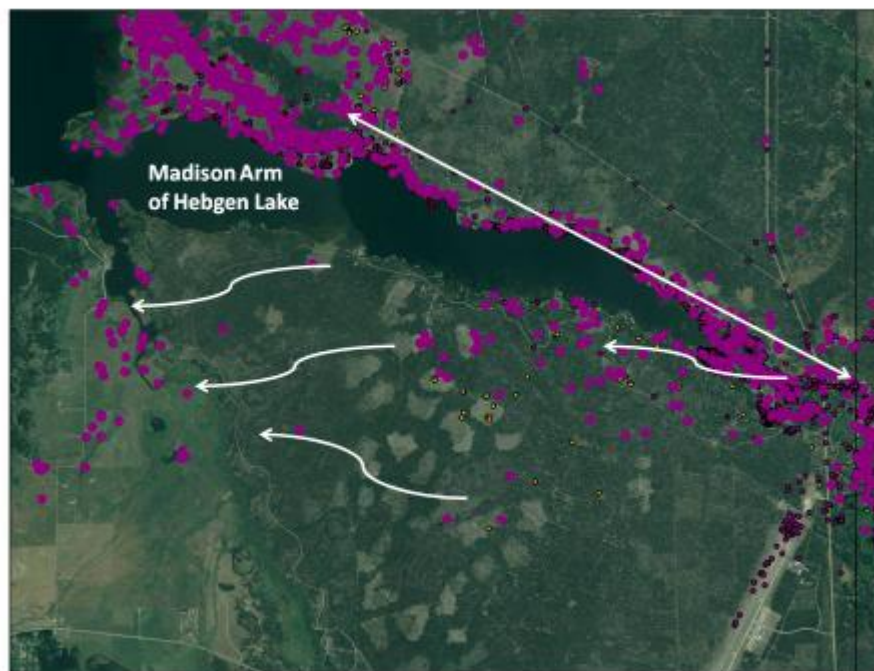


Table 6. Total Number of Bison Observed Per Month on the Western Boundary
(Source: IBMP Annual Reports 2009-12)

	2008-2009	2009-2010	2010-2011	2011-2012
November	n/a	3	9	n/a
December	4	1	n/a	132
January	n/a	4	576	112
February	27	12	59	70
March	n/a	16	125	189
April	515	268	223	525
May	749	517	435	189

* These totals reflect aerial and ground surveys that include Zone 1 and Zone 2

YNP bison have occasionally migrated into Idaho with the most recent occurrence being July 2012 when two bull bison made the 20 mile trek to Island Park Idaho. Previous to that, the last report of bison traveling into Idaho was in 2009. Within the State of Idaho, bison are categorized as a protected nongame species (13.01.06 Idaho Administrative Rules). Additionally, bison are also identified as a species in need of management due to the significant potential for the spread of contagious disease to persons, livestock, and other animals (Idaho Statute 25-618) including the spread of brucellosis. When migratory bison exposed to or affected with brucellosis or other communicable disease is determined to pose a significant threat to persons, livestock, or other wildlife, those animals can be physically removed from within the state boundaries (capture, trucked, or slaughterhouse) or killed by firearms at its location. The two bison that traveled to Island Park in 2012 were lethally removed.

Habitat & Forage

Bison are most often seen grazing in open meadows and along river valleys within YNP (Meagher 1973). Sedges, and to a lesser extent grasses, constitute the preferred diet of Yellowstone bison. In winter, 99% of their diet is grasses and sedges with browse being the remaining 1%. In summer they consume slightly more forbs (Meagher 1973). Portions of the GNF included within the existing bison-tolerant area within the Gardiner Basin contain areas of grassland and sagebrush meadows in the lower elevations with aspen and coniferous forests in higher elevations.

When conditions such as very deep or heavily crusted snow limit availability or access to forage, a breakdown in social bonds may occur (USDI et al. 2000a). Smaller groups of bison split from the large herds and search for isolated habitats which individually support only limited numbers of bison (USDI et al. 2000a). Using their massive heads supported by powerful neck and shoulder muscles, bison have the ability to displace snow to access forage in areas unavailable to other ungulates (USDI et al. 2000a).

Bison evolved through natural selection as a “dominate grazer” on complex landscapes (Fuhlendorf et al. 2010) and historically occupied a variety of habitats. Bison were found throughout the prairies, the arid plains and grasslands, meadows, river valleys, aspen parklands, coniferous forests, woodlands, and openings in the boreal forests (Long 2003; Burde and Feldhamer 2005; FWP and MNHP 2010a). Bison use woodlands in the summer for shade and in

the winter when the accumulation of snow prevents feeding in more open terrain (Meagher 1978; Burde and Feldhamer 2005).

Maps showing the existing and predicted bison habitats in the Gardiner Basin and Hebgen Basin are included in Appendix D.

Ecological Role of Bison

There is some indication that grazing by both bison and elk can increase the productivity and stability of grassland systems and enhance the nutrient content of grazed plants (Frank and McNaughton 1993; Singer 1995). Bison may contribute to new plant growth by distributing seeds, breaking up soil surfaces with their hooves and wallows, and fertilizing by recycling nutrients through their waste products (USDI et al. 2000a). However, trampled areas and wallows may also provide opportunities for invasion by nonnative and exotic vegetation and may contribute to soil and streambank erosion (USDI et al. 2000a).

Large numbers of bison can physically alter environments. Bison play a key role in ecosystem processes by contributing to the maintenance of grasslands and shrublands through rubbing trees and saplings, debarking and sometimes killing them (Knapp et al. 1999; Meagher 1973). It has been suggested that tree rubbing and debarking by bison may impede or even prevent forest invasion of open grasslands (Meagher 1973).

Social Interactions & Behavior

Bison are quite sociable as long as the habitat allows them to aggregate. Large herds of bison of mixed sex and age classes may congregate on range with suitable forage, especially during the rut period in July and August (USDI et al. 2000a). Much of bison behavior is based on the differential groupings of animals. Cow-calf herds, for example, are most pronounced in the spring during calving. This herding instinct may be motivated primarily to protect calves against predators because adult bison have few natural predators (USDI et al. 2000a).

Young bulls (3 to 6 years of age) or older bulls (more than 10 years of age) exhibit different social behaviors. Young bulls often separate from the cow-calf herds after the rut to form small fraternal groups. They generally coexist peacefully with each other for most of the year, but as the rut approaches increased competition and fights for dominance occur. Older bulls are often found as scattered individuals that may move long distances. These bulls are often the least tolerant of any other animals, including humans, and in limited cases avoid returning to the summer aggregation (USDI et al. 2000a).

Despite their size and seemingly slow-moving habits, bison are surprisingly agile and quick (USDI et al. 2000a). They can reach their top speed in just a few strides and can run up to 30 mph (CBA 2012).

Breeding & Calving

The rut (breeding activity) season occurs from about mid-July to mid-August. The majority of females attain sexual maturity by 2½ years of age. Males are sexually mature the same time as females, but more dominant older bulls usually will not allow younger bulls to become part of the active breeding population until they are at least six years of age (USDI et al. 2000a).

Typically, bison are born in the spring. Calving begins by mid-April, but most births occur during May. There are always a few out-of-season births. Single births are the rule; reports of twins are extremely rare (USDI et al. 2000a).

Brucellosis in Bison

Evidence suggests that brucellosis was introduced to North America from Europe during the 1500s (Meagher and Meyer 1994; Aguirre and Starkey 1994). Bovine brucellosis, also known as Bang's disease, is caused by infection with the bacterium *Brucella abortus* (Tessaro 1989; Tessaro 1992). The primary hosts for bovine brucellosis are cattle, bison, and other bovid species (Tessaro 1992); however, other wild ungulates such as elk (*Cervus elaphus*) are also susceptible (Davis 1990; Rhyan et al. 1997).

The disease is primarily transmitted through oral contact with aborted fetuses, contaminated placentas, and uterine discharges (Reynolds et al. 1982; Tessaro 1989). Greater than 90% of infected female bison abort during the first pregnancy; however, naturally acquired immunity reduces this abortion rate to 20% after the second pregnancy, and to nearly zero after the third pregnancy (Davis et al. 1990; Davis et al. 1991). Male bison experience inflammation of the seminal vessels, testicles, and epididymis, and, in advanced cases, sterility (Tessaro 1992).

Hunting, Socioeconomics, and Cultural Resources

See Sections 3.3, 3.5, and 3.8 for information regarding bison hunting, socioeconomic resources related to bison, and cultural resources respectively.

Alternative A, No Action Alternative (Status Quo):

Under this scenario, there would be no changes to the current boundaries of the bison-tolerant areas north and west of YNP. Bison would be hazed when necessary to prevent them from entering non-tolerant areas. On the northern boundary, when hazing is no longer effective, NPS would continue to capture all migrating bison at the Stephens Creek facility up to its holding capacity. Captured bison would continue to be tested and those likely infectious brucellosis seropositive bison may be taken to slaughter.

Current hazing activities and other bison management techniques would still be used to ensure public safety and separation of bison and cattle in Montana, and bison would be hazed back into YNP (on or about May 1 at north boundary and on or about May 15 at west boundary). No adjustments to the current IBMP would be implemented at this time.

When episodic bison migration occurs because of factors discussed previously under this No Action alternative, no additional public lands areas would be available for bison to use during the winter. Experience from Winter 2010 - 2011 shows that hazing bison moving out of Zone 3 back to Zone 2 could be difficult if not impossible. The expanded conservation area on the north boundary provides greater opportunities for bison and thus will result in less intensive hazing than prior to 2012. IBMP partners would continue to use existing tools such as hazing to appropriate habitats, shipment to slaughter to meet management objectives, or lethal removal to resolve safety issues. Managers would continue to give priority to those cases involving threats

to public safety and private property, and situations where the comingling of cattle and bison is probable.

IBMP partners would continue to monitor bison and record data on their movements as follows (USDA et al. 2010):

- Survey the number and distribution of bison in the Gardiner and Hebgen Basins on a weekly basis.
- Annually document the numbers and dates that bison attempt to move north of Yankee Jim Canyon on the north or exit Zone 2 on the west.
- Annually document the number of bison using habitats in Montana and the number of management activities needed to manage bison distribution.
- Annually collect data to update the relationships between bison management at the Stephens Creek facility and the interaction between bison density and snow pack in the central and northern herds.
- Annually collect data to determine natural migration routes and timeframes in the absence of hazing for bison migration out of and back into the Park.

Alternative B, Year-Round Bison along Northern and Western Boundaries of YNP:

This alternative would provide the maximum potential for bison to freely range beyond YNP boundaries onto other public lands and private lands where they are tolerated. As the occurrence of breaches into Zone 3 along the western boundary during the winter/spring of 2011-2012 shows, bison are naturally moving into the proposed year-round habitat available north of Hebgen Lake.

Initially, FWP and DoL are predicting few bison would move beyond the defined year-round bison habitat's boundaries because the bison would not be familiar with the new area. In time, more bison may remain within the year-round habitat and attempt to move beyond the designated year-round habitat boundaries on the north and western areas. If that should occur, bison would be hazed back onto year-round habitat lands as an initial management response. If hazing effort were unsuccessful, lethal removal would be used. The availability of year-round habitat may facilitate earlier migrations of bison into the year-round habitat areas.

The implementation of Alternative B would not alter the interagency bison population management goals of 3,000-3,500 bison between the two YNP herds. FWP and DoL would survey and share information on the bison population in year-round habitat areas with NPS staff so that data can be used in the evaluating YNP bison management decisions.

Additional untested bison would be exposed to resident elk herds known to be infected with brucellosis. The conditions facilitating contact between bison and elk on a shared winter range in the Madison headwaters area of Yellowstone during 1991 through 2006 showed that despite this relatively high risk of transmission, levels of elk exposure to *B. abortus* (2-4%) were similar to those in free-ranging elk populations that do not commingle with bison (1-3%), suggesting that *B. abortus* transmission from bison-to-elk under natural conditions is rare (Proffitt et al. 2010).

See Section 3.4 for predicted impacts to livestock resources.

The reduction or elimination of seasonal hazing activities in the Hebgen Basin is expected to have a positive benefit to pregnant bison and newborn calves. Often the hazing activities coincide with the birthing cycles of bison which can cause stress to female bison yet to give birth, females that have recently given birth, and young calves. If this alternative was chosen, female bison would be able to give birth unbothered and remain in habitats that are known to have a spring “green up” earlier than many areas in YNP. Some hazing in close proximity to areas occupied by cattle along the South Fork of the Madison River and north of the Grayling Creek Arm of Hebgen Lake would be expected during years when snowpack melts out later than average. Hazing in these areas is expected to be of shorter distances than the no action alternative and would be expected to directly impact a much smaller proportion of the bison occupying habitat in Montana.

A potential positive secondary benefit to a reduction in hazing activities is that there would be less disturbances and stress to other wildlife species that are present in the Hebgen and Gardiner Basins present during the spring hazing efforts.

Potential impacts to vegetation are anticipated to be characterized as beneficial for maintenance of biological diversity in native plant communities (Knapp et al. 2009). Grazers tend to be important for recycling nutrients in grassland and some wetland plant communities (Frank and McNaughton 1993). Since bison do not naturally remain in specific locations for long periods of time, they allow plant communities to recover before being regrazed during the growing season.

The presence of year-round bison may expose additional bison to injuries or death by vehicles, landowners (i.e. imminent threat to personal safety or livestock), poaching, and hunters. Additionally, during the rut and periods of competition, bison-human conflicts may increase as the bulls become less tolerant to human presence. Efforts to minimize incidents may include additional signage, educational outreach, increased surveys on the locations and activities of bulls/bachelor groups, and requesting DOT to lower the highway speed limit in locations that bison frequent. Other measures such as hazing or fencing would be emphasized through educational efforts to reduce conflicts and the need for lethal control. Incidents of poaching would be investigated by FWP wardens per Montana statutes §87-1-501 through -514. See Section 3.7 for additional information regarding public safety issues.

Some changes in bison behavior are possible. As bison explore and learn the new habitat areas, they would likely use those areas based on productivity of the grassland and riparian resources available. Bison would likely avoid humans when harassed and seek locations where they are less disturbed. Furthermore, bison would likely become less tolerant of humans only if they were hunted and were taught to treat humans as predators (R. Wallen NPS, pers. comm. 2012).

FWP staff would be required to allocate time to bison-related concerns beyond the existing winter season which may impact their ability to complete other duties. Local law enforcement staff could be impacted as well in responding to bison-related conflicts. If additional staff could be dedicated to bison management, such as the bison technician as described in Section 2.8, the burden of responding to bison incidents could be alleviated for local law enforcement and FWP wardens.

The continuing implementation and documentation of habitat use and movements of bison within the Gardiner and Hebgen Basins would provide data needed to evaluate current management actions for effectiveness and information for any adaptive management adjustment in the future to ensure conformity with the goals of expanding bison tolerance, protecting against brucellosis transmission from bison to cattle, and ensuring public safety.

Alternative C, West Side - Horse Butte North to Buck Creek:

Under this alternative, YNP bison could use a larger portion of their historic range although the year-round habitat area is not as large as the one described for Alternative B. Bison would have access to the Cabin Creek Wildlife Management Area, the Monument Unit of the Lee Metcalf Wilderness, and the portions of the GNF including Horse Butte and the Taylor Fork drainage. This alternative would prohibit the year-round presence of bison within GNF in the areas known as the Madison Flats and Lionhead area that are north and west, respectively, of West Yellowstone.

The potential of comingling of bison and cattle is lessened because the geographic area of this alternative does not include a landowner who leases his pastures for seasonal cattle grazing or a livestock owner; both are located near the South Fork of the Madison River.

Many of the potential consequences of this alternative are identical to those described for Alternative B, such as:

- Bison would be hazed back onto year-round habitat lands as an initial management response, but if hazing effort were unsuccessful, lethal removal would be used.
- Availability of year-round habitat may facilitate earlier migrations of bison into the year-round habitat areas.
- Untested bison would be exposed to resident elk herds known to be infected with brucellosis.
- Reduction or elimination of seasonal hazing activities in the Hebgen Basin is expected to have a positive benefit to pregnant bison and newborn calves.
- Presence of year-round bison may expose additional bison to injuries or death by vehicles, landowners (i.e. eminent threat to personal safety or livestock), poaching, and hunters. Additionally during the rut and periods of competition, bison-human conflicts may increase as the bulls become less tolerant to human presence.

Methods to mitigate or decrease those impacts would be identical as those described for Alternative B.

Under this alternative, there would be no changes to bison management within the Gardiner Basin, as described under Alternative A.

Alternative D, West Side - Zone 2 Only:

Under this alternative, bison could use the available habitat within Zone 2 year-round. This alternative may increase the need for hazing or other management activities to reduce bison-human conflicts because the species would be restricted to the existing boundaries of Zone 2

while the species natural tendencies are to move about whole valley systems until it decides to move on to another area.

As predicted in Alternative B, the year-round presence of bison may contribute to an increase of vehicle-bison accidents along Highway 191 corridor, and incidents of collisions may be higher than described for alternatives A, B, or C because of the potential for a higher density of bison in a limited geographic area. In comparison to alternatives B and C, both those alternatives provide bison a greater area to roam away from traffic corridors than this alternative does. Efforts to minimize accidents may include additional signage, educational outreach, and lowering the highway speed limit in locations bison are known to use. Additionally, the monitoring and documentation of habitat use and movements of bison within Zone 2 would provide data needed to evaluate current management actions for effectiveness and information for any adaptive management adjustment in the future.

Also similar to Alternative B, the implementation of this alternative would give IBMP partner agencies the ability to gain greater insight into bison movements and habitat use within Zone 2 which would be used to evaluate the effectiveness of initial management actions and data for any future adaptive management adjustments.

FWP staff would be required to allocate time to bison-related concerns beyond the existing winter season which may impact their ability to complete other duties. Local law enforcement staff could be impacted as well in responding to bison-related conflicts. If additional staff could be dedicated to bison management, such as the bison technician as described in Section 2.8, the burden of responding to bison incidents could be alleviated for local law enforcement and FWP wardens.

Under this alternative, there would be no changes to bison management within the Gardiner Basin as described under Alternative A.

Alternative E, West Side - Horse Butte Only:

This is the most geographically restrictive of all the alternatives on the western boundary. Potential benefits of this option are bison would be able to remain on the peninsula during the spring to complete calving, remain until spring “green up” occurs within YNP, and possible reduction of hazing activities unless necessary to restrict bison movements or to ensure public safety. Bison may chose to migrate back into YNP on their own which could lessen the need to implement other mitigation strategies by FWP and DoL.

Potential challenges of this option include: 1) the possible need for additional oversight of bison activities and movements to ensure they do not move beyond the designated year-round habitat area, 2) a large congregation of bison on the peninsula may limit recreational activities and require management of actions by FWP and DoL that could impact bison and humans (i.e. hiking, camping, etc.), 3) a large congregation of bison may negatively impact the quality and quantity of vegetation/forage on the peninsula over time, and 4) effects bison may have on local residents (e.g. travel inconveniences, threats to public safety, personal property damage). Additionally, incidences of bison attempting to cross Madison Arm or the Narrows of Hebgén Lake may occur if water conditions are advantageous and overcrowding occurs at Horse Butte.

Under this alternative, the potential of comingling of bison and cattle is minimized the most because the geographic area of this alternative does not include any livestock owners or private landowners that lease out pastures for cattle grazing.

Bison would remain vulnerable to vehicle collisions along the Highway 191 corridor, although the length of Highway 191 corridor available to bison would be considerably less than under alternatives A, B, and C. Bison would be exposed to seasonal hunting and, possibly, poaching activities on the peninsula. Additionally, bison may be subjected to localized hazing activities to move them away from seasonal homes and camping areas on the peninsula to other locations on public lands.

Also similar to Alternative B, the implementation of this alternative would give IBMP partner agencies the ability to gain greater insight into bison seasonal use of bison on Horse Butte which would be used to evaluate the effectiveness of initial management actions and data for any future adaptive management adjustments.

FWP staff would be required to allocate time to bison-related concerns beyond the existing winter season which may impact their ability to complete other duties. Local law enforcement staff could be impacted as well in responding to bison-related conflicts. If additional staff could be dedicated to bison management, such as the bison technician as described in Section 2.8, the burden of responding to bison incidents could be alleviated for local law enforcement and FWP wardens.

Under this alternative, there would be no changes to bison management within the Gardiner Basin, as described under Alternative A.

Alternative F, Gardiner Basin – Bulls Only:

With the implementation of this alternative, YNP bull bison could have year-round access habitat in the Gardiner Basin. However, they would still be subject to seasonal hazing activities when all other bison in the Basin are moved back into YNP in early May. Bulls would be included in the hazing activities due to the logistical challenge of separating bulls less than 3 years of age from cow/calf pairs. When the seasonal hazing activities have ceased, bull bison migrating back into the Gardiner Basin could move independently unless issues of public and personal safety and livestock comingling arise. If those incidents occur, FWP staff would respond to those calls as they typically do during the winter when bison are present.

All bison can access and utilize the Eagle Creek and Bear Creek drainages east of the community of Gardiner year-round. The inclusion of the Gardiner Basin as year-round habitat would provide bulls additional areas to disperse to. Locations within the basin may see use by small fraternal groups of young bulls (up to 6 years of age) or older bulls (more than 10 years of age) which may also migrate into the year-round habitat. Bulls generally coexist peacefully with each other for most of the year, but as the rut approaches increased competition and fights for dominance occur (USDI et al. 2000a).

During the rut and periods of competition, bison-human conflicts may increase as the bulls become less tolerant to human presence. Steps to mitigate conflicts would include educational outreach, potential additional signage in areas where bulls are present to discourage human intrusions, hazing of bulls to other public lands away from the public, and increased monitoring surveys of the locations and activities of bulls.

Consistent with current season bison management practices, bulls would be prohibited north of Yankee Jim Canyon or the hydrological divide separating the Gardiner Basin from the Tom Miner Basin and Paradise Valley. Bulls would be hazed away from these boundaries as necessary, and lethal removal would be used if hazing actions were found ineffective.

FWP staff would be required to allocate time to bison-related concerns beyond the existing winter season which may impact their ability to complete other duties. Local law enforcement staff could be impacted as well in responding to additional bison-related conflicts. If additional staff could be dedicated to bison management, such as the bison technician as described in Section 2.8, the burden of responding to bison incidents could be alleviated for local law enforcement and FWP wardens.

Similar to the other alternatives, accessing and utilization of year-round habitat within the Gardiner Basin by YNP bull bison would provide data needed to evaluate current management actions for effectiveness and information for any adaptive management adjustments for bison in the future.

3.3 RECREATION

GNF encompasses 1.8 million acres which includes portions of the 920,365-acre Absaroka-Beartooth Wilderness and the 254,635-acre Lee Metcalf Wilderness. The majority of the areas north and west of YNP identified under consideration for year-round bison are within the GNF.

The entire GNF provided a total of 2,002,000 recreation visitor site visits in 2009 of which 20,000 were Lee Metcalf Wilderness visits (USFS 2010). GNF provides visitors with a wide range of seasonal recreation opportunities such as hiking, camping, skiing, hunting, fishing, snowmobiling, and viewing wildlife and natural features.

There are over 2,600 miles of hiking and riding trails throughout GNF (USFS 2012). Of those, there are approximately 125 miles of trails within the western boundary project area and 30 miles of trails within the Gardiner Basin bison-tolerant area.

Additionally, approximately 400 miles of groomed and ungroomed marked snowmobiling trails are within the GNF lands north and south of West Yellowstone (DOC 2010). West Yellowstone is known as one of the premier snowmobiling locations in Montana.

Table 7. Activity participation on GNF (FY 2009)(USFS 2010)

Activity	% indicating as their primary activity	Activity	% indicating as their primary activity
Hiking / Walking	27.3	Picnicking	0.9
Snowmobiling	12.3	Primitive Camping	0.8
Downhill Skiing	11.0	Other Non-motorized	0.8
Cross-country Skiing	11.2	Horseback Riding	0.7
Fishing	5.5	Non-motorized Water	0.6
Relaxing	4.0	Nature Center Activities	0.5
Developed Camping	3.6	Backpacking	0.4
Gathering Forest Products	3.3	OHV Use	0.3
Bicycling	3.1	Resort Use	0.3
Hunting	2.4	Motorized Water Activities	0.2
Viewing Natural Features	2.1	Nature Study	0.1
Driving for Pleasure	2.0	Visiting Historic Sites	0.1
Motorized Trail Activity	1.3	Other Motorized Activity	0.0
Viewing Wildlife	0.9	Some Other Activity	4.9
		No Activity Reported	0.0

Big-Game Hunting

Bison

There has been licensed bison hunting in the areas north and west of YNP since 2005. Bison hunting season is from November 15 to February 15. Montana’s bison license quota could change, but for the 2012-2013 hunting season it was 44 either-sex licenses (18 in HD 385 and 26 in HD 395) with 100 additional cow/calf licenses issued incrementally (54 in HD 385 and 46 in HD 395) if conditions warrant. Of the 44 either sex licenses, 16 are allocated to Montana’s Native American tribes. Bison hunting success rates have ranged from 2% in 2009 to 77% in 2007 for the FWP allocated licenses. Thirty- seven bison (21 cows and 16 bulls) were harvested by licensed hunters in 2012-13.

In addition to the bison hunting licenses issued by FWP, four tribes currently retain treaty rights to hunt Yellowstone bison on any open and unclaimed federal lands such as those owned by the USFS or Bureau of Land Management. Those tribes are Shoshone-Bannock Tribes, Nez Perce, Confederated Salish and Kootenai Tribes, and Confederated Tribes of the Umatilla Reservation. There is no defined limit on the number of bison the treaty tribes may harvest. Most treaty

hunting ceases after February 1 in consideration of cultural concerns for the bison (e.g. gestation of the fetus, overall health of the bison).

Northern Boundary: HD 385 encompasses all of existing bison-tolerant area north and west of Gardiner. This hunting district also extends north of YNP through the drainages of Hellroaring Creek and Slough Creek.

Western Boundary: HD 395 encompasses all of existing Zone 2 and the proposed expanded bison-tolerant area of the Monument Mountain Unit/Cabin Creek Recreation Area and a portion of HD 310 that is east of State Highway 191 south of Big Sky Village.

Elk

Northern Boundary (HD313):

Hunting District 313 encompasses winter range for the Northern Yellowstone elk herd, a migratory herd that summers primarily within Yellowstone National Park and the Absaroka-Beartooth Wilderness. This population peaked during the 1980's and 1990's with a 10-year average of 15,304 during 1986-1995 and has been in decline since the late 1990's. The highest number of elk observed during aerial surveys was 19,054 elk in 1994. The winter 2013 count resulted in 3,915 observed elk, a decline of 74% from the population average at its peak. The herd is counted cooperatively by Montana and Yellowstone National Park, and the portion of the herd that winters in Montana is managed with an objective of 4,000 elk. The 2013 count resulted in 3,000 elk wintering in Montana. The highest count of elk wintering in Montana was 8,626 in 1996 with a 10-year average of 5,444 during 1989-1998. Within HD 313 from 2004-2012, there has been an average of 1,344 elk hunters and 7,302 elk hunter days annually. The average number of elk harvested declined from 1,590 (average 2000-2006) to 259 (average 2007-2012). Hunting season structure is restrictive with antlerless harvest limited to 30 brow-tined bull/antlerless youth-only permits and unlimited permits for brow-tined bulls.

Western Boundary:

Taylor Fork/Porcupine/Buffalo Horn (HD 310)

Elk in hunting district (HD) 310 are nearly 75% below population objective and decreasing. The herd is aerially surveyed by FWP every winter and spring. From 2003 to present, the population has been decreasing on average at about 20% a year and winter counts now enumerate 400 or fewer. Current hunting season structure is an unlimited permit-only hunt for archery and rifle hunters for brow-tined bulls only with special 5-license availability for brow-tined bull elk in the Gallatin Special Management Area. This is a restrictive regulation type. Hunter numbers have declined from about 1,850 (average 1974-1996) to 1,138 (average 1998-2012), but hunter success has been steady at 14%.

Madison Valley, Big Sky, and Cabin Creek (HD 360 and 362)

Elk in hunting district (HD 360) are below FWP Elk Plan's population objective and perhaps decreasing; elk in HD 362 are at or above objective. FWP surveys have counted 3,500-4,500 elk, and the herds are aerially surveyed by FWP every winter. These units are currently in a standard regulation of 5-weeks of brow-tined bull only plus 450 cow licenses available for 1-week time periods to distribute hunting pressure. Previously there were many years of liberal regulation (unlimited second cow license offered) plus late season and game damage hunts

focused on reducing this elk herd due to game damage problems with local farmers and ranchers. The magnitude of game damage hunts would depend on the amount of game damage occurring. During 2007-2010, an average of 2,367 hunters in HD 360 and 978 in HD 362 harvested an average of 613 and 240 elk annually. Under the more restrictive regulations in 2011 and 2012, both numbers of hunters and harvested elk declined: an average of 1,632 and 788 hunters harvested an average of 236 and 127 elk in hunting districts 360 and 362.

Hebgen Basin (HD 361)

This elk population is not aerially surveyed. A small number of elk (100-300) winter around the Hebgen Basin and West Yellowstone, but this hunting district receives heavy snowfall and is a summer area for elk which may migrate into the Madison or the Gravelly Mountains. General hunting regulations are for brow-tined bull elk only with 50 elk B licenses, a standard regulation. Hunter harvest success has been stable at about 15% since the 1970's. The number of hunters has increased from an average of about 470 before 1997 to 560 after 1997. The number of elk killed has also increased from an average of 69 (1974-1996) to 85 (1998-2012).

Pronghorn Antelope

Northern Boundary (HD 313): There is a small, migratory population of antelope that use the Gardiner Basin which are largely restricted to the west side of the Yellowstone River. The population declined from a high count of 596 in the 1990s, and the population remained low in spite of protection from harvest with an average count of 229 during 1995-2012. The population appears to be increasing with 351 antelope observed during the 2013 survey. Migration and dispersal from the Gardiner population has resulted in a newly-established population in southern Paradise Valley where 105 pronghorn were counted in 2013. The primary migration route is along the west side of the Yellowstone River through Yankee Jim Canyon with a small number of animals occasionally using the west side of the river to travel along the highway corridor into the south end of Paradise Valley.

Western Boundary (no HD): There is no resident population of antelope in the western project area. Some individual animals may periodically travel from the western side of the Madison Mountains into the Hebgen Basin.

Mule Deer

Northern Boundary (HD 313):

Mule deer in HD313 has fluctuated between approximately 1,300-2,500 deer observed during aerial surveys between 1986 - 2013. Recent surveys indicate a declining population with low counts of 1,299 in 2012 and 1,382 in 2013 as compared to the previous 10-year average of 2,117 observed deer. Hunting season structure is restrictive with antlerless harvest limited to 85 B licenses and a 3-week season for antlered mule deer. Within HD 313 from 2004-2011, there was an average of 728 deer hunters and 4,226 deer-hunter days annually. Harvest of mule deer during 2004-2012 has ranged 159-482 with an average of 282 deer harvested annually.

Western Boundary:

Taylor Fork, Porcupine, and Buffalo Horn (HD 310)

Few deer winter in HD 310 due to heavy snowpack, so this is not necessarily a "destination" deer hunting unit. Mule deer harvest is restrictive with antlered buck mule deer only on the General

A license (either-sex for archery season). Mule deer harvests have ranged from an estimated 9 to 47 from 2004 to 2012. Harvest appeared to be declining, but may have rebounded somewhat in 2011 and 2012.

Madison Valley and Big Sky (HD 360 and HD 362)

The mule deer and white-tailed deer harvests in HD 360 and 362 predominantly come from the Madison County side of the districts. Mule deer appear to be on a downward trend, so restrictive season types are employed.

Hebgen Basin (HD 361)

Like district 310, HD 361 experiences deep snowpack, few deer winter in the area, and it is not a “destination” deer spot. Mule deer harvest is restrictive with antlered buck mule deer only on the General A license (either-sex for archery season). Harvest has ranged from 6 to 23 with no directional trend over 2004-2011. From 2004-2011, harvest has ranged from 6 to 19 with no directional trend.

White-tailed Deer

Northern Boundary (HD 313): There are no dedicated surveys for white-tailed deer in HD313, however small numbers are incidentally observed during mule deer surveys generally associated with agricultural fields and riparian areas. In spite of recent increases in numbers, white-tailed deer are sparse in comparison with mule deer in Gardiner Basin. Harvest regulations are liberal; either sex may be harvested with a general license, and additional antlerless harvest is permitted with an over-the-counter regional white-tailed deer license. During 2004-2012, annual white-tailed deer harvest in HD313 ranged from 12-84 deer with an average of 50 deer harvested annually.

Western Boundary (HDs 310, 360, 361, and 362):

White-tailed deer may be harvested on the General A license (either-sex) or on the Region 3 B license (antlerless), a generally standard regulation. Harvest estimates in HD 310 (2004-2012) have ranged from 8 to 45. White-tailed deer abound in HD 360 around Ennis and are harvested liberally. White-tailed deer are rare but present in HDs 361 and 362.

Bighorn Sheep

Northern Boundary (Gallatin - HD 305): HD305 includes the west side of the Yellowstone River from the Park boundary to Sphinx Creek. Based on annual aerial surveys, the number of sheep wintering in this district has ranged from 28-96 during 1991-2012. The bighorn sheep breeding season occurs in November, and over 100 sheep have been observed to congregate in the Cinnabar Mountain area in Corwin Springs during this time before dispersing to nearby wintering areas. The spectacle of rams butting heads and pursuing ewes is a popular attraction for photographers and wildlife watchers. The hunting season structure for this district consists of one license available through drawing valid for a mature ram with a three-quarter curl or greater. Bighorn sheep rifle season begins September 1 and ends October 31. Based on data from 2004-2012, one ram was harvested each year during 2004-2009, and no rams have been harvested during 2010-2012.

South Absaroka (HD 303)

HD303 includes the east side of the river from the Park boundary north to Dome Mountain, and east of Gardiner to Hellroaring Creek. Based on annual aerial surveys, numbers of wintering sheep in this district have ranged from 2-53 sheep during 1992-2013. The hunting season structure for this district is unlimited licenses available by application with a quota of two mature rams with three-quarter or greater curl. The season opens on September 1 and closes on October 31 or when the quota is filled, whichever occurs first. Based on data from 2005-2012 for HD303, there were on average 22 hunters and 183 hunter days annually. The number of sheep harvested each year has ranged between 0- 3 with an average annual harvest of two rams.

Western Boundary (Hilgards - HD302): A limited number of rams have been observed within the Monument Mountain Unit during winter. Up to 53 sheep have been recorded on the Sage Peak and Red Streak Peak during the summer which are within the project area. Hunter harvest of bighorn sheep has been limited over the past decade with four licenses issued in 2010 and 2011 resulting in the harvest of a total of three sheep. For the 2012 hunting season, the number of licenses issued increased to 4 rams and 20 ewes.

Gray Wolf

The minimum Montana wolf population estimate at the end of 2012 was 625 wolves, in 147 verified packs, and 37 breeding pairs throughout the state. Of those, there are an estimated 132 wolves in 24 verified packs, 8 of which qualified as a breeding pair in the Greater Yellowstone Experimental Area. The wolf population within YNP is a source of dispersing wolves which move north and west into the State of Montana. (Bradley et al. 2013)

In Montana, wolves are managed in 17 wolf management units (WMU) of which some have subunits. As of 2012, the following wolf hunting and trapping regulations have been implemented. Previously wolf hunting seasons have had harvest quotas for each unit and subunit quotas are assigned annually and have ranged from 4 to 20 wolves.

- The hunting seasons proposed are Sept. 7 for archery hunting with closure on Sept. 14, Sept. 15 the general rifle season. The archery season closed Oct. 14, and the general season ended March 31, 2014. Wolf trapping season was from December 15 through February 28, 2013. The dates for the 2013 season will be adopted at the July 2013 FWP Commission meeting.
- A statewide general season continues without specific quotas except in WMU 110 (quota of two) and WMU 316 (quota of seven). Each of these WMUs is adjacent to national parks.
- A maximum bag limit is set at five wolves per person using hunting or trapping.
- Trappers were able to purchase up to three licenses whereas hunters are permitted to purchase only one at the beginning of the 2012 season. New 2013 legislation raised the number of wolf hunter licenses to up to three prior to the end of the hunting season.

Northern Boundary: There are three known wolf packs within the existing bison-tolerant area as well as three YNP packs that frequent the Jardine/Eagle Creek area seasonally. The Quadrant pack uses the western side of Yellowstone River and the Slip n' Slide pack uses the east side of the river in the basin. The third pack is the 8-Mile which is a YNP border pack that mostly uses habitat inside YNP but may occasionally use areas as far north as the southern portion of the

Cinnabar Basin. In addition to the packs, a small group of 3-4 wolves has been documented using the Mulheron/Cinnabar Basin.

The existing bison-tolerant area is within WMU 390, subunit 313/316. During the 2012 hunting season, the quota for the subunit was 3 and two wolves were harvested. Within the WMU, a total of 26 wolves were harvested, 22 by hunters and 4 by trappers.

Western Boundary:

There are four known wolf packs in the project area; Cougar2, Hayden, Madison, and Toadflax. The Cougar2 and Hayden pack are considered border packs since they travel between Montana and Idaho. Additionally, members of the Cougar Creek wolf pack have been known to use portions of the Gallatin River corridor. The Cougar Creek pack's primary range is within YNP's western boundary. The existing seasonal bison-tolerant area is within WMU 310. During the 2012 hunting season, 22 wolves were harvested, 19 by hunters and 3 by trappers.

Moose

Northern Boundary (HD 314 and 328): Moose numbers in the Gardiner Basin declined after the 1988 fires and have not recovered. There are no dedicated moose surveys; however incidental observations during surveys for other species are rare. The hunting season was closed for HD328 on the east side of the Yellowstone River due to low numbers. HD 314 includes the west side of the Yellowstone River and extends north through Paradise Valley to Livingston. Moose that have been harvested in 314 in recent years were most likely taken from the Paradise Valley area north of Gardiner Basin. Harvest quotas for 314 were six antlered moose during 2001-2011 and were reduced to two antlered moose beginning in 2012 due to low hunter success.

Western Boundary (306, 307, 309, 310, 361, and 362): Moose are known to exist throughout the project area in limited numbers. During 2010-2011, HDs 306, 307, and 310 were closed, then re-opened in 2012 to 1 license opportunity. HDs 309, 361, and 362 have experienced some hunter harvest with the average success rate ranging from 50 to 75% depending upon the district.

Mountain Goat

Northern Boundary (HD 323): A healthy mountain goat population exists on the high elevation peaks of the Absaroka Range north of the Gardiner Basin. HD 323 has a population of approximately 200 mountain goats which has been increasing steadily since the late 1980s. Currently 38 licenses are available through drawing with an average success rate of 72%. Though hunters may use trailheads within the Gardiner Basin to access mountain goat habitat, there is no overlap in range between bison and mountain goats in this area.

Western Boundary (HD 314, 326, and 362): Mountain goats are scattered in limited numbers throughout the project area at higher elevations including the Henry Lake Mountains, Taylor Hilgards, and Monument Mountains. Hunter harvest rates over the past two seasons have averaged 79.1%.

Other Hunting Activities

Northern Boundary:

Black bear and mountain lion hunting also occur within portions of the GNF that are identified for the proposed action. There is a spring and fall black bear season in Gardiner Basin. Hunters have harvested 30 bears in the Gardiner Basin 2008-2012 for an average of 6 per year ranging from 3 to 11. There is no limit or quota on bears in this area.

There is a harvest quota of four mountain lions in combined HD's 313 and 316. There was a quota of 3 male mountain lions in this district until 2012 when the quota was increased to 4 and a subquota of 1 female was added. Since 2007, 3 lions have been harvested each year except for 2009 when only 2 were harvested, and 2012 when 4 were harvested. Lions may be hunted during the archery and general season, but hounds may not be used until the winter chase season which begins December 1. There are houndsmen that pursue lions in the Gardiner Basin, including the Eagle Creek and Bear Creek areas where bison have been tolerated year-round for some time. There have been no reports of conflicts between hounds and bison in these areas.

Western Boundary:

Similar to the northern boundary area, black bear and mountain lion hunting also occur within portions of the GNF. There is a spring and fall black bear hunt with no limit or quota. Two hundred and twenty bears were harvested 2007-2012 (within the portion of HD 341 which occurs in Gallatin County).

Mountain lion regulations for this side of YNP are the same as the northern boundary. The harvest quota is seven total for HD 310, 311, 360, 361, and 362. Lion hunters and houndsmen do not often hunt some of the proposed core bison habitat areas due to wolf presence. A limited number of houndsmen are known to use areas north of Hebgen Lake.

Trapping

Trapping of martens, bobcats, and prior to 2012-2013 occasionally wolverines, occur within portions of the GNF that are identified for the proposed action. The 2012 trapping seasons for those martens and bobcats was from December 1 to February 15. There was no wolverine season for 2012-2013 due to ongoing litigation concerning the species' status under the Endangered Species Act. Wolf trapping was approved as a legal means of take beginning in the 2012 season, and it is likely that wolf trapping would occur in the proposed bison-tolerant areas. Trapping season for wolves for the 2012 season was from December 15 to February 28.

Since the 1980's, beaver trapping has been limited in the Hebgen Basin and upper Gallatin drainage to restore and protect riparian communities. Beaver trapping in the Hebgen drainage is by permit only with 5-10 permits per year issued to 1-3 trappers. Beaver trapping in the upper Gallatin drainage is closed.

Access

Northern Boundary: Access within the bison-tolerant zone beyond the U.S. Highway 89 corridor and within the town of Gardiner is very limited for motorized vehicles. Forest Service road #617 north of Corwin Springs provides year-round access into the GNF and Yankee Jim Canyon recreation opportunities that includes roads to trailheads, river access, picnic areas, and

campgrounds (USFS 2006). There are also unimproved roads that are adjacent to Cedar Creek (Creek 8 Road) on the east side of the Yellowstone River and unimproved roads adjacent to Mol Heron and Cinnabar Creeks on the west side of the river. Motorized vehicle use is prohibited on all other USFS trails throughout the tolerance area.

The trailhead at Little Trail Creek also receives heavy use during both the fall and winter hunts. The Bear Creek and Palmer Mountain trailheads are also located in this district. They receive heavy use especially by outfitters and others during the early backcountry hunting season which runs from September 15 until the beginning of general rifle season.

Western Boundary: U.S. Highways 191 (north-south) and 287 (east-west) bisect the existing bison-tolerant area near West Yellowstone and Hebgen Lake. The expanded year-round bison-tolerant areas would include portions of the GNF bisected by U.S. Highways 20 (east-west) and additional acres adjacent to the Highway 191 corridor south of Big Sky Village.

There are numerous motorized routes into the GNF in the project area with some open year-round and others with seasonal designations (mostly closed between Dec. 1 through May 1) (USFS 2011). Numerous hiking trails traverse all portions of the proposed project area.

Recreational Services: Guest Ranches, Outfitters, and a Resort

There are five guest/dude ranches within the largest boundary of the project area on the west side of YNP. These include the Covered Wagon Ranch, 9 Quarter Circle Ranch, Elkhorn Ranch, 320 Ranch, and Parade Rest Guest Ranch. These ranches provide a variety of recreational opportunities for their guests such as guided horseback rides, fishing, and hiking. All the guest ranches are open during the summer and early fall season with the exception of the 320 Ranch which offers winter activities such as snowmobiling, sleigh rides, and skiing. See Section 3.5 Socioeconomics for additional information on the economics of the recreation industries.

There are no guest ranches within the Gardiner Basin project area.

Outfitters offer clients a variety of recreational opportunities along the northern and western boundaries of YNP including guided services for hunting, fishing, trail rides, mountain biking, and cross-country skiing. The number of permitted outfitters administered from the Gardiner and West Yellowstone GNF district offices is 24 and 29 respectively (K. Schlenker GNF, pers. comm. 2012). However, other district offices have the ability to issue permits for the proposed project areas, and an exact permit count was unable to be calculated in time for this analysis. See Section 3.5 on Socioeconomics for additional information for outfitting.

The Madison Arm Resort is located on the southern shoreline of Hebgen Lake on the Madison Flats. The resort is open from May 15 to October 1 and has camping, fishing, boating, and swimming opportunities as well as cabin rentals.

Alternative A, No Action Alternative (Status Quo):

No new impacts to existing recreational opportunities are expected to occur if the current IBMP strategies continued to be implemented in which YNP bison could naturally migrate during the winter within designated areas north and west of the Park.

IBMP partners would continue to annually haze bison back into YNP in May as well as maintaining temporal and spatial separation of cattle and bison and ensuring the public's safety. All other IBMP management tools would continue to be implemented. Winter recreational activities within the existing bison-tolerant zones (i.e. Zone 2) may continue to be inconvenienced by YNP bison in areas where snowmobiling, skiing, or snowshoeing occur.

Bison-related educational materials (See Appendix E) developed by CWG have been distributed to visitor centers and hotels in West Yellowstone and Gardiner to help visitors understand bison behavior and stay safe in bison country.

Alternative B, Year-Round Bison along Northern and Western Boundaries of YNP:

Both the project areas north and west of YNP are popular destinations for hunting, fishing, and a variety of other outdoor activities. Some minor impacts to outdoor experiences may occur if bison could access and remain within designated year-round habitat. The following is a summary of potential impacts and what mitigation may occur to decrease those impacts.

1. **Physical Inconveniences:** Individual bison or groups of bison may impede hunters and anglers progress on trails, along shorelines, or general movements in the GNF. Trail users, snowmobilers, and campers may be inconvenienced if large groups of bison congregate on trails or move through camping areas. Furthermore, within YNP bison are known to prefer to use established trails and roads when moving within heavy wooded areas or during winter in order to conserve energy, thus recreationalists may need to adapt with the addition of bison on the landscape.
To decrease the potential for bison-human conflicts, FWP would collaborate with the GNF to install informational signs at trailheads and campgrounds to inform visitors of the potential presence of bison. Educational materials would also be distributed to the public through FWP and GNF regional offices and be available at local outdoor equipment stores in West Yellowstone and Gardiner. See Appendix E for copies of the educational materials. If visitor safety is in jeopardy, FWP may haze bison away from one high-use location to another nearby location within the national forest. Another potential option would be for FWP to submit a request to the GNF district ranger for a short-term management action that could include trail or camp site closure until the bison move elsewhere. If an animal is determined to be high-level hazard to public safety, it would be lethally removed. Likelihood of incidences is moderate given the level of use in the project area.
2. **Physical Endangerment:** YNP reports bison encounters and related human injuries typically result from individuals attempting to approach, feed, pet, or be photographed with bison (Conrad and Balison 1994; Olliff and Caslick 2003). As previously noted, many other recreational activities occur within the GNF that would be designated year-round bison habitat. Personal safety may be threatened when bison are approached too close, when calves are present, during the rut, or if the animal is startled. Methods to be initiated to decrease such incidences would be the same mitigations efforts described for the previous section, Physical Inconveniences.

3. Additional Wolf and Grizzly Bear Sightings and Incidents: Although some wolves within YNP have been known to kill bison, this behavior is not universal. Wolves in YNP ecosystem specialize almost exclusively on elk (95% of their diet) and at times/places when elk availability is very low may occasionally take a bison. Wolf predation on bison has been more prevalent in the Madison-Firehole area of YNP than on the Northern Range. In recent years, elk have become very sparse in the Lamar Valley of Yellowstone. Bison are numerous, however, and may at times number near one thousand. Wolves appear to move out of the area as well during the time when elk are absent. Across the northern range as elk numbers have decreased in recent years and bison numbers have increased, NPS has documented a substantial drop in wolf numbers. Based on these observations, FWP does not think there is evidence to suggest that bison presence would result in an increased number of wolves. If wolves do exploit bison as a new food resource and the number of wolves increase, there is the potential for increased wolf hunting opportunities.

Within YNP, grizzlies have been known to kill bison and in one instance a bison was documented killing a grizzly. Grizzlies are omnivores but not known to actively hunt bison if given the opportunity to catch easier prey. However, grizzlies do scavenge carcasses when given the chance, and there are risks of encounters with grizzlies or black bears scavenging on elk, deer, or other carcasses in any bear inhabited areas for recreationalists and hunters. The Taylor Fork drainage, Gardiner Basin, and surrounding areas are known for their high densities of grizzlies. See Section 3.6 for additional information about grizzly populations. Hunters that use these areas should be aware of the presence of grizzlies and should take necessary precautions to protect their safety. Additionally, FWP posts bear warning signs at all trailheads. FWP does not believe the addition of year-round bison would appreciably change the risks posed by grizzlies to hunters or recreationalists. See Section 3.6 for additional information on Wildlife and Fisheries Resources.
4. Decrease Hunting Opportunities Due to Decrease in Available Forage for Ungulates: On the northern range, FWP staff has seen higher concentrations of all the wintering ungulates without documenting nutritional stress except during extreme winters. Given numbers of wintering ungulates that have inhabited Gardiner Basin in the recent past, FWP believes the lower current ungulate populations are below levels where forage would be limiting. FWP and USFS are currently designing a vegetation monitoring project to assess range quality and establish a baseline for future monitoring. If evidence arises that bull bison use of the basin during the growing season is impacting forage quantity/quality to the point where it could limit recovery of elk or stability of the other ungulate populations, FWP would address this using management tools such as habitat projects and/or population management.

On the western side of YNP, because elk numbers have dwindled so substantially in the area, forage would not be a limiting factor for elk even in

the presence of 500 bison. Other species are not expected to be limited by the presence of bison.

See Section 3.6 for additional information on Wildlife Resources.

Similar to other recreational activities in the proposed project area, some of the recreational activities offered by guest ranches may be impacted by the presence of bison such as horseback trail rides, hiking, snowmobiling, and cross-country skiing. As noted earlier, bison are known to prefer to use established trails and roads when moving within heavily wooded areas or during winter. Adaptations may include coordination and communication with FWP and GNF to decrease the potential for bison-human conflicts on established trails, the education of clients and ranch staff of bison behavior and conflicts avoidances, and potentially condition ranch horses to the presence of bison. Similar to conflict management within GNF, it may be necessary to haze bison away from guest ranches and high-use trails in order to decrease the potential of bison-human conflicts.

Within YNP, guided trail rides are available to visitors from the Mammoth, Canyon, and Roosevelt areas during the summer, as well as rides guided by permitted outfitters into the Park's backcountry. During 2010 and 2011, there were no reported incidents between bison and horses (D. Wenk NPS, pers. comm. 2012).

The presence of year-round bison within these two geographic areas is expected to be a positive impact for those who enjoy wildlife viewing and seeing bison on a larger portion of their historic range. However, there is the potential for new bison-human conflict to occur as well as incidences of threats to personal safety by bison.

Depending upon the number of bison that remain and use the new year-round habitats, bison hunting opportunities (license and treaty) may be expanded to provide for the additional harvest of animals. Simulations of migrations over the next decade suggest that a strategy of sliding tolerance, where more bison are permitted beyond Park boundaries during severe climate conditions, may increase hunting opportunities that could in turn decrease episodic, large-scale reductions to the Yellowstone bison population in the foreseeable future (USDA et al. 2010). Any adjustments to existing hunting district boundaries or seasons would require the approval of the FWP Commission and DoL Board and potentially the preparation of an environmental analysis document. The possibility for additional harvest levels of bison within Montana may assist in the overall bison population management goals.

No impacts are anticipated to trapping activities since furbearer trapping tends to occur at higher elevations than bison are expected to be during the trapping season. However, if a trapper uses a snowmobile to access their traps, the trapper may find bison using snowmobile routes too.

Alternatives C, West Side - Horse Butte North to Buck Creek:

Similar to impacts described for Alternative B, implementation of this alternative may impact recreation opportunities and recreationalists within the GNF in the expanded bison-tolerant habitat. Eighty-eight percent of the year-round habitat within this alternative's geographic boundaries is within the GNF.

Potential impacts include (see previous detailed descriptions): 1) physical inconveniences, 2) physical endangerment, 3) additional wolf and grizzly bear sightings and incidents, and 4) decreased hunting opportunities due to a decrease in ungulate forage. Additionally, this alternative's geographic boundaries do include guest ranches, and the presence of year-round bison is expected to be a positive impact for those who enjoy wildlife viewing and seeing bison on a larger portion of their historic range.

Methods used to decrease the likelihood of negative impacts to recreationists using the GNF and human-bison conflicts would be identical as those described for Alternative B. Distributing bison-related educational materials to visitor centers, hotels, and other locations in West Yellowstone and Gardiner may help visitors understand bison behavior better and thereby decrease human-bison conflicts.

Alternative D, West Side - Zone 2 Only:

The geographic boundaries of bison year-round habitat of this alternative encompasses a high density of seasonal recreational opportunities including cross-country skiing, snowmobile trails, hiking trails, fishing, and many other activities. This alternative's boundaries also encompass guest ranches, established campgrounds, and primitive camping on the Horse Butte peninsula.

With the potential of a higher concentration of bison within Zone 2 year-round, it is possible that the number of bison-human conflicts may increase as recreationalists and visitors engage in outdoor activities. Similar to Alternative B and C, potential impacts to those recreating may include physical inconveniences and physical endangerment. Methods used to decrease the likelihood of negative impacts to recreationists using the GNF and human-bison conflicts would be identical as those described for Alternative B. Distributing bison-related educational materials to visitor centers, hotels, and other locations in West Yellowstone and Gardiner may also help decrease human-bison conflicts by educating visitors of bison behavior.

Alternative E, West Side - Horse Butte Only:

Predicted impacts if this alternative were approved is expected to be nearly identical to those described for Alternative D because this alternative is a smaller component of the latter and encompasses many of the same recreation opportunities.

The majority of Horse Butte peninsula is owned by the USFS, and because of the peninsula's close location to West Yellowstone and the entrance to YNP it is a popular destination for camping, hiking, and wildlife viewing.

With the potential of a higher concentration of bison within a smaller year-round habitat area, it is possible that the number of bison-human conflicts may increase as recreationalists and visitors engage in outdoor activities. Similar to Alternatives B -D, potential impacts to those recreating may include physical inconveniences and physical endangerment. Methods used to decrease the likelihood of negative impacts to recreationists using the GNF and human-bison conflicts would be identical as those described for Alternative B. Distributing bison-related educational materials to visitor centers, hotels, and other locations in West Yellowstone and Gardiner may also help decrease human-bison conflicts by educating visitors of bison behavior.

Alternative F, Gardiner Basin – Bulls Only:

If this alternative were implemented, the agencies anticipate some minor impacts to recreational activities within the Gardiner Basin because bison could move to or use areas where anglers, campers, hikers, or floaters are present and require the recreationist to alter their plans (i.e. fishing spot, access point to the river for floating, etc.) to accommodate the bison. Some recreationalist may enjoy the opportunity to see the bison while other may find the bison a nuisance. The presence of year-round bull bison within the Gardiner Basin is expected to be a positive impact for those who enjoy wildlife viewing and seeing bison on a larger portion of their historic range.

Consistent with the other alternatives, FWP and DoL would implement bison management strategies, as previously described, to decrease the potential for bison-human conflicts, ensure the public’s safety, and to protect personal property.

3.4 LIVESTOCK OPERATIONS

Northern Boundary

As reported in the 2011-2012 IBMP Annual Report, there are two year-round and six seasonal livestock producers in and near the Gardiner Basin. The two year-round operators winter their cattle in the Gardiner Basin and move the cattle to the Cinnabar Basin to graze in the summer. The seasonal producers manage herds ranging in size of 100-600 cow/calf pairs on private lands. The seasonal arrival date of cattle on private lands is mid-May, and all are moved out of the northern management area by the end of December.

Some of the livestock operators have improved their existing fencing or installed new fencing with the DoL’s assistance in order to maintain spatial separation between cattle and bison.

Three active grazing allotments are within the existing bison-tolerant zone within the GNF. Use of the allotments range from mid-June until mid-October, and the allotments are only used by cattle. In addition to those allotments, there are three more allotments just north of the hydrological divide boundary of the bison-tolerant zone. The chart below summarizes the allotments within the project area. See Appendix F for a location map of all area allotments.

Table 7. Summary of Livestock Use and Time of Use per Allotment Along the Northern Boundary (C. Rock GNF, pers. comm. 2013)

Allotment Name	Livestock Type	Period of Use
Green Lake	46 cow/calf pairs	mid-June – mid-Oct.
Horse Creek	125 cow/calf pairs, 3 bulls, & 31 horses	early July - end of Sept.
Slip & Slide	30 cow/calf pairs	mid-June - mid Oct.
Tom Miner/Ramshorn	260 cow/calf pairs	Early July – mid-Oct.
Wigwam	56 cow/calf pairs	mid-June – end of Sept.

Western Boundary

Within the existing seasonal bison tolerant area there are two private landowners that lease out their pastures for cattle grazing and one livestock owner that leases one of the USFS allotments.

There are ten active grazing allotments within the GNF in the proposed year-round bison-tolerant zone. Use of the allotments range from mid-June until mid-October, and the allotments are used by either cattle or horses depending upon the location. The chart below summarizes the details of each allotment's use. See Appendix F for a location map of all area allotments.

Table 9. Summary of Livestock Use and Time of Use per Allotment Along the Western Boundary (S. Lamont GNF, pers. comm. 2013)

Allotment Name	Livestock Type	Period of Use
Basin	4 horses	July – mid-Oct.
Grayling	24 horses	July – mid-Sept.
Moose	4 horses	July – mid-Oct.
North Cinnamon	40 horses	late June – mid-Oct.
Sage Creek	129 horses	mid-June – mid-Oct.
Sheep/Mile	89 cattle	June – mid-Oct.
South Cinnamon	35 horses	late June – mid-Oct.
South Fork	15 cow/calf pairs	July – early Oct.
Taylor Fork	90 horses	June – late Sept.
Watkins Creek	55 cow/calf pairs	July – early Oct.

Designated Surveillance Area

In 2011, DoL established testing and vaccination requirements for cattle producers within a Designated Surveillance Areas (DSA) consisting entirely of Beaverhead, Gallatin, Madison, and Park Counties to provide assurance to trading partners as to the marketability of Montana livestock and meet the requirements of recent APHIS regulations. The DSA is also an area where brucellosis-positive elk are known or suspected to exist.

APHIS regulations now require that “States or areas that have not been Class Free for 5 consecutive years or longer or that have *Brucella abortus* in wildlife must continue to conduct the same level of surveillance testing as in the past.” Further, “any Class Free State or area with *Brucella abortus* in wildlife must develop and implement a brucellosis management plan approved by the administrator in order to maintain Class Free status.” The implementation of a DSA in Montana fulfills this requirement and therefore protects the State and its producers from a downgrade in status (DoL 2011).

The DSA vaccination requirement consists of an official calfhooed vaccination for brucellosis (bangs vaccination) and traceability requirements (individual identification) for animals within the DSA. Testing requirements for brucellosis are necessary for 12-month or older sexually intact cattle.

Alternative A, No Action Alternative (Status Quo):

There would be no adjustments to the existing bison management procedures; thus there would be no changes to livestock operations unless needed by the owner. Spatial and temporal separation between bison and livestock would continue to be a priority. DoL, with the assistance of FWP, would continue to assess and mitigate the risk of comingling. The hazing of bison from

non-tolerant areas and back into YNP in May would continue. Bison resistant to hazing would be subject to possible capture or could be lethally removed if necessary.

The DSA testing, vaccination, and identification requirements would remain in effect to ensure the Federal brucellosis surveillance requirements are met.

Seasonal bison movement may continue to be impacted by fences in place to constrain domestic livestock. Some of the GNF allotments are defined by 4-strand barbed wire fences.

Alternative B, Year-Round Bison along Northern and Western Boundaries of YNP:

The transmission risk is not expected to increase measurably. Birth synchrony and cleaning behavior of bison, along with scavenging of birth tissues and bacterial degradation, quickly remove infected tissue from the environment, and the viability of *Brucella* is reduced resulting in lower risk of transmission. Transmission risk to cattle is very low by June 1 and essentially non-existent by June 15 (Aune et al. 2007; Jones et al. 2010). Specifically regarding the proposed presence of bull bison within the Gardiner Basin, the risk of additional exposure of cattle to brucellosis is negligible because brucellosis is perpetuated naturally through growth in the female reproductive tract, particularly in membranes and fluids which surround a fetus (Cheville et al. 1998). Brucellosis is also perpetuated in the male reproductive organs though to a much lesser degree. The results of a recent study by USDA, “Shedding and Venereal Transmission of *Brucella abortus* by Bison Bulls in the Greater Yellowstone Area” found of the 50 bison tested for *Brucella*, a very small percentage (9%) of sero-positive bison were able to have brucellosis cultured in their semen though not at concentrations considered an infective dose for transmission to female bison (B. Frey APHIS unpublished results, 2012).

Kilpatrick et al. (2009) showed that areas of transmission risk from bison to cattle are localized in time and space. The current DSA requirements, DoL fencing program, and ongoing bison management protocols would continue to ensure spatial and temporal separation between bison generated *Brucella* and cattle on public lands.

When an expanded bison-tolerant area was originally analyzed in the 2000 DEIS as Alternative 2, the status of the State’s Class Free designation would have been jeopardized if brucellosis was found in cattle anywhere in the state. The threat of brucellosis to cattle was considered a risk to Montana’s entire livestock economy. In 2010, APHIS changed the regulations of state brucellosis status classification, and therefore Montana’s brucellosis-free status would not be threatened if cattle within the DSA tested positive for brucellosis. APHIS’s interim rule removes the provision for automatic reclassification of any Class Free State or area to a lower status if two or more herds are found to have brucellosis within a two-year period or if a single brucellosis-affected herd is not depopulated within 60 days. Under this new protocol, detection of brucellosis in domestic livestock within the DSA is dealt with on a case-by-case basis. As long as the outbreaks are investigated and contained, then state status does not change. In fact, brucellosis was detected in several domestic bison and cattle herds in Idaho, Montana, and Wyoming during 2009 to 2011 without a change in state status. The negative economic impacts of any transmission of *Brucella* from bison to cattle therefore would be less than described in the FEIS for the IBMP (USDA et al. 2011b).

If bison could access and utilize year-round habitat, the implementation of the proposed action could increase the perception of the risk of brucellosis transmission since untested bison could use habitat in a larger portion of their historic range for the first time. This may result in increased scrutiny of Montana's livestock industry by regulatory officials in other states, and those livestock owners grazing their cattle on private lands within the project area may choose to graze their cattle elsewhere to avoid the added scrutiny.

Spatial and temporal separation between bison and livestock would continue to be a priority. As previously noted, some fencing has been constructed by livestock operators with the assistance of DoL within the existing northern bison management area to deter bison from comingling with livestock. If requested, additional boundary fencing may be constructed at other locations in the future with some costs likely to be the responsibility of local livestock producers. FWP and DoL would continue to monitor the effectiveness of existing and new bison-related fencing and adjust design or construction materials as necessary to ensure spatial separation of livestock and bison. Monitoring fencing effectiveness is one of the management actions described in IBMP annual reports.

The DSA testing, vaccination, and identification requirements would remain in effect to ensure the federal brucellosis surveillance requirements are met.

Another existing management action seeks to ensure conflict-free habitat is available for livestock and bison grazing on public lands as per the management objectives of the IBMP. IBMP partners annually track the status (e.g. number of acres, location, etc.) of active and inactive cattle grazing allotments on public lands to find opportunities to increase spatial and temporal habitat for bison on national forest lands. The proposed action is consistent with this goal and, if implemented, the monitoring would continue.

There is the potential for comingling of bison and cattle on USFS allotments. As noted in the introductory section, most of the permitted livestock does not arrive on those allotments until June 1 or after. The timing for their arrival is after the typical bison calving season which begins by mid-April with most births occurring in May. To address any potential conflicts with wildlife, including bison, the USFS could modify conditions of grazing permits in any case to change livestock class and timing of allotment use.

The continuing implementation and documentation of use and movements of bison and cattle within the Gardiner and Hebgen Basins would provide data needed to evaluate current management actions for effectiveness and information for adaptive management adjustment in the future.

Alternatives C, West Side - Horse Butte North to Buck Creek:

Alternative C is anticipated to have slightly less impact on livestock operations than Alternative B because the geographic boundaries of this alternative excludes the three active USFS grazing allotments that are used by cattle south of Hebgen Lake. The lack of cattle within the year-round bison habitat may decrease the perception of a higher risk for the spread of brucellosis compared to Alternative B.

Identical to Alternative B, spatial and temporal separation between bison and livestock would continue to be a priority. As previously noted, some fencing has been constructed by livestock operators with the assistance of DoL within the existing northern bison management area to deter bison from comingling with livestock. If requested, additional boundary fencing may be constructed at other locations in the future with some costs likely to be the responsibility of local livestock producers. FWP and DoL would continue to monitor the effectiveness of existing and new bison-related fencing and adjust design or construction materials as necessary to ensure spatial separation of livestock and bison. Monitoring fencing effectiveness is one of the management actions described in IBMP annual reports.

Although, the size of year-round habitat accessible for the bison is smaller and lacks active cattle-used grazing allotments, the remaining seven horse-used allotments would be accessible to bison to utilize. Based upon information provided by NPS, the potential for horse-bison conflicts is low. However, either species could instigate a conflict on the open range depending upon the circumstances at the time.

No new impacts to livestock operations in the Gardiner Basin are expected with this alternative because bison management would not change in that area. As described for Alternative A, bison would continue to be hazed back into YNP in May, temporal and spatial separation of bison and cattle would be maintained, and FWP would continue to respond to bison-related concerns.

Alternative D, West Side - Zone 2 Only:

Alternative D is anticipated to have considerably less impacts on livestock operations than Alternative B or C because the geographic boundaries of this alternative excludes the three active USFS grazing allotments that are used by cattle south of Hebgen Lake and nearly all the allotments used by horses. The lack of cattle within the year-round bison habitat may decrease the perception of a higher risk for the spread of brucellosis compared to Alternative B.

There would be two USFS grazing allotments used by horses within the designated year-round bison habitat. The locations of the two allotments are north of Horse Butte. Based upon information provided by NPS, the potential for horse-bison conflicts is low. However, either species could instigate a conflict on the open range depending upon the circumstances at the time.

Identical to Alternative B, spatial and temporal separation between bison and livestock would continue to be a priority. As previously noted, some fencing has been constructed by livestock operators with the assistance of DoL within the existing northern bison management area to deter bison from comingling with livestock. FWP and DoL would continue to monitor the effectiveness of existing and new bison-related fencing and adjust design or construction materials as necessary to ensure spatial separation of livestock and bison. Monitoring fencing effectiveness is one of the management actions described in IBMP annual reports.

Identical to Alternative C, no new impacts to livestock operations in the Gardiner Basin are expected with this alternative because bison management would not change in that area. As described for Alternative A, bison would continue to be hazed back into YNP in May, temporal

and spatial separation of bison and cattle would be maintained, and FWP would continue to respond to bison-related concerns.

Alternative E, West Side - Horse Butte Only:

This alternative is predicted to have the least impact to livestock operations on the west side of YNP compared to Alternatives B-D because no USFS grazing allotments are included within its geographic boundary. The closest cattle operation is across the Madison Arm of Hebgen Lake as is the nearest cattle-used grazing allotment.

Identical to Alternatives C and D, no new impacts to livestock operations in the Gardiner Basin are expected with this alternative because bison management would not change in that area. As described for Alternative A, bison would continue to be hazed back into YNP in May, temporal and spatial separation of bison and cattle would be maintained, and FWP would continue to respond to bison-related concerns.

Alternative F, Gardiner Basin – Bulls Only:

Potential impacts of YNP bull bison accessing and utilizing year-round habitat within the Gardiner Basin are identical to those described for Alternative B as related to the potential of the transmission of brucellosis from bull bison to cattle and costs to livestock producers for boundary fencing.

3.5 SOCIOECONOMICS

This section describes both social and economic factors of the affected environment such as employment, income, social values, and recreation. Since an abundance of recreational opportunities occur within the project area, this topic has been separated into its own section. Similarly, the description and analysis of potential impacts to livestock and livestock producers has its own section because this subject has an elevated level of interest within the project area. For descriptions of recreation and livestock resources and predicted impacts to them, see Sections 3.3 and 3.4 respectively.

Northern Boundary

Established in 1880, the town of Gardiner emerged from the need to provide services and activities for visitors to Yellowstone National Park. At an elevation of 5,259 feet, the town is at the junction of the Gardner and Yellowstone Rivers and sandwiched between the Absaroka-Beartooth Wilderness to the North and the Gallatin Wilderness to the West (Gardiner Chamber of Commerce 2012). Gardiner is the only gateway community with year-round access to Yellowstone. In 2012, over 232,000 vehicles pasted through this entrance into YNP (NPS 2013).

Employment

The diversification of the economy in the Greater Yellowstone Area and the growth in the total number of jobs has helped keep unemployment in Park Counties at 6.8% in 2011 (DLI 2011).

Table 9. Employment by Economic Sector for Park County (DLI 2010)

Industry	Average Annual Employment
Accommodations & Food Services	1156
Administrative & Waste Services	74
Agriculture, Forestry, Fishing & Hunting	160
Arts, Entertainment & Recreation	229
Construction	326
Educational Services	94
Finance & Insurance	165
Government	734
Health Care and Social Assistance	627
Information	83
Manufacturing	426
Mining	3
Other Services	358
Professional & Technical Services	173
Real Estate & Rental and Leasing	44
Retail	687
Transportation & Warehousing	39
Wholesale	36

Income: Average annual wages per job within Park County is \$28,142 (DLI 2010).

Western Boundary

The town of West Yellowstone’s popularity as an entry point to the Park has deep roots. Starting in 1898, stagecoaches from Monida, Montana, 100 miles to the west, brought visitors to the area as they entered Yellowstone through the west gate. In June 1908, the first Union Pacific passenger train arrived in town as an improved means of travel to YNP (West Yellowstone Development Council 2009). In 2012, over 451,000 vehicles passed through the western entrance to YNP which is only open from April through November. During the Winter 2013, 10,124 snowmobiles and 1,690 snow coaches also passed through this gate into the Park (NPS 2013).

In the area of private lands surrounding West Yellowstone and Hebgen Lake, there are numerous seasonal homes. The Hebgen Lake Zoning District Development Plan noted there were more seasonal homes (1,304) in the West Yellowstone Census Division in 2000 than there were year-round occupied homes (1,276) (Gallatin County 2004). The number of seasonal homes in the area has likely increased since 2004.

Employment

Gallatin County is one of the fastest growing counties in the state bringing workers for employment opportunities in information technology industries and expanding local businesses. That expansion is not indicative of the economic environment of West Yellowstone. West Yellowstone principle businesses support the seasonal tourism industries of lodging, food services, and retail. During the summer, tourists visiting YNP often use West Yellowstone as a base for traveling within the Park. During the winter, the community changes into a premier snowmobiling destination.

Income: Average annual wages per job within Gallatin County is \$34,108 (DLI 2012).

Outfitting – Both Areas

Outfitters offer clients a variety of guided recreational opportunities along the northern and western boundaries of YNP that include hunting (bison, elk, deer, bighorn sheep, etc.), fishing (Gallatin River and Yellowstone River), skiing, mountain biking, and horseback riding. The number of permitted outfitters administered from the Gardiner and West Yellowstone GNF district offices are 24 and 29, respectively. However, other district offices have the ability to issue permits for the proposed project areas, and an exact permit count was unable to be calculated in time for this analysis.

The outfitting and guiding industry is an important economic sector within Montana, especially for local communities that have a high number of recreation-related businesses such as Gardiner and West Yellowstone. In 2007, the University of Montana’s Institute for Tourism and Recreation Research completed an economic analysis of Montana’s outfitting industry. Eighty-five percent of all guided clients were involved in hunting, angling, rafting/floating, horseback riding, or backpacking. The location for the majority of the outfitting occurred on USFS lands (55%). A summary of their economic results are below.

Table 11. Summary of Economic Impact of the Outfitting Industry for 2005

<u>Economic Impact of the Outfitting Industry in Montana</u>					
	<u>IMPACTS</u>	<u>Direct</u>	<u>Indirect</u>	<u>Induced</u>	<u>Combined</u>
All Guided Trips	Industry Output	\$110,438,000	\$27,174,000	\$30,021,000	\$167,633,000
	Employment (# jobs)*	1,956	276	358	2,590
	Employee Income	\$37,435,000	\$6,029,000	\$7,972,000	\$51,435,000
	Proprietors' Income	\$4,035,000	\$1,751,000	\$1,632,000	\$7,417,000
	State & Local taxes	\$8,471,000	\$1,283,000	\$1,881,000	\$11,635,000
<i>(Subset of above)</i>					
Guided Hunting Trips	Industry output	\$43,694,000	\$10,800,000	\$12,252,000	\$66,745,000
Guiding Fishing Trips		\$34,221,000	\$8,238,000	\$9,189,000	\$51,649,000
All other Guided Trips		\$32,298,000	\$8,096,000	\$8,513,000	\$48,907,000
Economic Impact based on visitors ONLY in MT because of their guided trip (28% of all trips but 50% of total impact)					
	Industry Output	\$54,638,000	\$13,452,000	\$15,063,000	\$83,153,000
Definitions: <u>Direct impacts</u> result from outfitted client purchases of goods and services; <u>Indirect impacts</u> result from purchases made by outfitter related businesses; and <u>Induced impacts</u> result from purchases by those employed in outfitter-related occupations.					
*Does not represent seasonal jobs					

Hunting – Both Areas

Big-game hunting is a major activity in Montana including the greater Yellowstone area, and elk and deer are the primary species hunted. Hunter expenditures for ungulates within FWP’s Region 3, which includes the entire proposed year-round bison habitat area, are summarized in the following table.

Table 12. Summary of Hunter Expenditures Per Day in FWP Region 3 (FWP 2012)

Per day expenditures	Elk	Deer	Moose	Bighorn Sheep	Mountain Goat
Resident	\$ 85.00	\$ 66.00	\$ 246.00	\$ 288.00	\$ 277.00
Non-resident	N/A	\$ 232.00	N/A	\$ 460.00	N/A

Bison hunting produce fees for licenses (\$125 for in-state and \$750 for out-of-state hunters [87-2-113 and 87-2-730 MCA]) and some local economic benefits when hunters purchase food, fuel, lodging, guiding services, and supplies. Specific expenditures by bison hunters have yet to be researched and quantified.

Social Values – Both Areas

This section describes general attitudes toward wildlife and the livestock industry that has been collected by FWP since 2000 through numerous public processes related to bison management and projects.

The general public has strongly-held divergent values and opinions on public policy issues concerning bison management. As an example, the 2011 draft environmental assessment concerning the translocation of 68 brucellosis-free bison received nearly 3,500 comments, more than the Montana’s wolf management environmental impact statement.

The general public also has strongly held divergent values and opinions on public policy concerning ranching. Since the mid-1890s, livestock ranching has been an integral part of Montana’s social character. Ranching and other agricultural activities continue to provide open range for wildlife. All 56 of Montana’s counties have livestock operations. As reported in the 2012 Agricultural Statistical Bulletin, agricultural industries (crops and livestock) remain Montana’s number one industry. Agriculture is valued at \$3.8 billion with the inventory of cattle valued at \$3.4 billion (NASS 2012). Value added to the U.S. economy by livestock production in Montana was \$1.4 billion in 2011, of that amount \$1.2 billion was contributed by meat animals (NASS 2012).

The social values at issue in the bison-brucellosis conflict in the greater Yellowstone ecosystem are as different as the participants. As Thorne, Meagher, and Hillman (1991) comment: “Whereas most people regard the GYE [Greater Yellowstone Ecosystem] and its wildlife as a world treasure, because of its reservoir of brucellosis, others regard the GYE as a threat to an important international industry and economy and a black eye to their efforts” (USDI et al. 2000a).

The public scoping effort in preparation for this environmental assessment reaffirmed the divergence of opinions for bison management within Montana with opinions ranging from “treat bison as wildlife” and “allow bison to roam free” to “bison should not be allowed to leave YNP because they are a threat to livestock interests.” Comments were submitted from local residents, Montana residents outside the project area, and from nearly every other state in the nation.

Management of bison in the Yellowstone area has become a matter of national attention and interest. In recent years, individuals and groups representing many viewpoints have challenged management practices, both in court and in a variety of public forums (USDI et al. 2000a).

Alternative A, No Action Alternative (Status Quo):

Implementing the No Action alternative would continue the current bison management protocols per the IBMP. The existing economic trends in the communities of Gardiner and West Yellowstone would continue with the seasonal tolerance of bison within Zone 2 at each boundary. FWP and DoL would continue to maintain spatial and temporal separation between bison and cattle to minimize the threat of brucellosis transmission.

The overall management of bison would continue to be scrutinized by the general public. Social values towards bison management are expected to be unchanged in that the broad spectrum of views and opinions would continue depending upon the intensity of bison management required to meet the objectives of the IBMP.

Alternative B, Year-Round Bison along Northern and Western Boundaries of YNP:

The local economies of the towns of Gardiner and West Yellowstone benefit from businesses tied to the area's high quality wildlife and wildland resources as well their proximity to YNP. Greater opportunities for viewing bison could lead to increased visitation to those communities which could increase visitor expenditures at local businesses. The probability and extent of any increased visitation and related expenditures is unknown. In addition to increased visitation related to wildlife viewing, if bison hunting seasons were adjusted to expand bison hunting opportunities local tourism-based businesses and outfitters could see a positive economic benefit with the presence of year-round bison.

Regarding livestock operators, economic consequences to those businesses could be negative because 1) additional fencing may be needed to keep cattle from comingling with bison, 2) additional maintenance to the fences may be required if bison cause damages, and 3) additional ranch staff time may be needed to haze bison from property. Some of these potential impacts can be mitigated by a case-by-case fencing assistance effort DoL manages. For additional information regarding livestock resources, see Section 3.4.

Some private landowners may choose to install fencing to deter bison from using their property which would be a financial burden to them.

The impacts on social values of this alternative would depend on the intensity of impact on a representative individual of some population and on the size of that population. Those who have championed the cause for the reintroduction of bison to Montana's landscape would likely see the proposed action for year-round bison as a positive impact. In June 2012 on behalf of the Wildlife Conservation Society and the National Wildlife Federation, Public Opinion Strategies conducted a survey of Montana resident's feelings about bison restoration. The telephone survey of 400 voters found that 68% supported restoring wild populations of bison on state and federal public lands (WCS 2012). For additional information regarding the survey methodology, see Appendix G.

However, those who want bison to remain within the boundaries of YNP and/or see the expansion of bison within Montana as a threat to livestock and agricultural industries would potentially view the implementation of this alternative as a major negative impact.

Another view is that with the availability of new year-round habitat the need for slaughter could be decreased, and bison using more of their historic range brings back a romantic image of the Old West.

Alternative C, West Side - Horse Butte North to Buck Creek:

If this alternative were approved, predicted impacts to socioeconomic resources would be similar to those noted above for the western boundary area including: 1) visitor expenditures in West Yellowstone may increase, 2) livestock operators may need to install additional fencing to deter livestock and bison from commingling, and 3) some private landowners may install fencing to deter bison from coming on their property and away from personal property. The geographic boundary of this alternative encompasses approximately half the number of privately-owned acres compared to Alternative B.

Predicted consequences of this alternative to social values would be identical to those described for Alternative B; mixed.

Alternative D, West Side - Zone 2 Only:

Zone 2 encompasses a higher percentage of privately-owned acres than Alternatives C and E and the western boundary component of Alternative B. This includes the town of West Yellowstone, and thus impacts to socioeconomic resources may be the highest under this alternative. The potential for a higher concentration of year-round bison near commercial and residential areas may necessitate the need for additional fencing to deter or redirect bison from accessing congested areas or for the protection of personal property. Most of those costs would be the responsibility of local government and individuals, although there is a NGO fencing assistance program to help with some of those costs.

Predicted consequences of this alternative to social values would be identical to those described for Alternative B; mixed.

Alternative E, West Side - Horse Butte Only:

Impact to socioeconomic resources are predicted to be the least under this alternative because active USFS grazing allotments, the town of West Yellowstone, and the majority of privately-owned lands are not included within this alternative's geographic boundary.

Private property owners and business owners on the Horse Butte peninsula may negatively impacted by year-round bison because they may congregate in higher concentrations since this alternative provides access to the smallest amount of year-round habitat. However, as reported in the Bozeman Chronicle (April 5, 2012), many Horse Butte residents support the potential for year-round bison on their property; thus the higher concentrations of bison and any impacts cause by them may be tolerated by residents.

Predicted consequences of this alternative to social values may be locally positive since tolerance is higher for year-round bison but continue to be mixed depending upon the personal preferences and locations of other people.

Alternative F, Gardiner Basin – Bulls Only:

Impacts for the implementation of this alternative would be identical to the descriptions of potential impacts to socioeconomic resources for the Gardiner Basin as described for Alternative B. The potential for additional bison viewing and bison hunting opportunities may translate into an increase in purchases for food, fuel, lodging, guiding services, and supplies in Gardiner and may provide a positive impact to those businesses by providing additional sources of revenue.

Impacts to social values would also be similar to those described for Alternative B. Although those who support free-ranging bison may not fully support the project since only bull bison could access and utilize year-round habitat in the Gardiner Basin and the bulls would continue to be subjected to hazing activities by IBMP partner agencies in the spring. However, livestock operators may view the implementation of this alternative as not as much a threat to their businesses because the potential of the transmission of brucellosis from bulls is negligible, but bulls have more of a risk of injuring and/or killing cattle and cross-breeding with cattle.

3.6 WILDLIFE & FISHERIES

Both proposed project areas adjacent to YNP provide habitat to a compliment of wildlife species including predators, scavengers, furbearers, small mammals, game birds, waterfowl, raptors, nongame birds, amphibians, and reptiles occurring in suitable habitats.

This section summarizes the presence of key species within the northern and western boundaries and the potential consequences to them if bison could access habitat year-round. Descriptions are for both areas unless identified otherwise.

Threatened Species

Grizzly Bear

The 2010 grizzly bear (*Ursus arctos*) population was estimated at 602 bears for the Greater Yellowstone Ecosystem that includes the northern and western boundary areas.

In September 2009, grizzly bears in the Yellowstone region were relisted as threatened under the Endangered Species Act (ESA). Grizzly bears use a wide variety of habitats and have a highly diverse diet including various plants and animals. Riparian areas, snow chutes, meadows, subalpine forests, alpine tundra, boulder fields, mixed shrub fields, seeps, grasslands, timbered side hill parks, and burns are used for feeding and resting. Dense-timbered habitats are often used for denning and daytime bed sites. In summary, moist open-land habitats in combination with timbered areas are essential for optimum grizzly bear habitat. In winter, grizzly bears hibernate in dens at higher elevations where snow depth serves as insulation. Male grizzly bears usually emerge from the den in March or April while females emerge in late April and May.

Bears are omnivores that have relatively unspecialized digestive systems similar to those of carnivores. The primary difference is that bears have an elongated digestive tract, an adaptation

that allows bears more efficient digestion of vegetation than other carnivores (Herrero 1985). Unlike ruminants, bears do not have a cecum and can only poorly digest the structural components of plants (Mealey 1975). To compensate for inefficient digestion of cellulose, bears maximize the quality of vegetation, typically only foraging for plants in the phenological stages that are highly nutritious and digestible (Herrero 1985).

Grizzlies can be effective predators, especially on such vulnerable prey as elk calves, small mammals, insects (e.g. ants and army cutworm moths), and spawning cutthroat trout. They also eat a wide variety of plants including whitebark pine nuts, berries, sedges, grasses, glacier lilies, dandelions, yampas, biscuitroots, horsetails, and thistles (NPS 2012). They also scavenge meat when available from winter-killed or depredated carcasses of elk and bison, road-killed wildlife. From March through May, ungulates, mostly elk and bison carrion, are the most important food in the grizzly bear's diet (Mattson et al. 1991).

Canada Lynx

Lynx (*Lynx Canadensis*) have been sighted in the GNF infrequently. A search of the Montana Natural Heritage Program (MNHP) database reported less than 10 reported observations of lynx in the project area over the past forty years. Portions of the GNF have been designated as lynx critical habitat by USFWS.

Prey availability, especially snowshoe hares, appears to be a primary limiting factor for lynx in the Northern Rockies. Primary forest types that support snowshoe hare are subalpine fir, Engelmann spruce, and lodgepole pine (Ruediger et al. 2000). Secondary foraging habitat includes aspen, willow, and moist, cool, Douglas fir stands (Ruediger et al. 2000). A 2007 Forest Service survey reported the main cause of lynx mortality is starvation. Lynx habitat conservation measures are therefore currently focused on maintaining adequate quantities of winter snowshoe hare habitat (Tyers 2008a).

Lynx would not prey on bison but may consume bison as carrion. This is expected to happen only rarely as lynx, to the extent they are present, normally consume snowshoe hares and occupy lodgepole pine forests in the winter where bison are not typically found.

Sensitive Wildlife Species

Sensitive species do not receive the same degree of protection as endangered or threatened species although decreasing numbers or loss of habitat makes them of concern to federal and state land management agencies.

Table13. Sensitive species in the Gardiner Basin
(Tyers 2008b & NYCWWG aerial surveys, March-May 2011)

Wildlife Species	Occurrences and Habitat Comments
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	There are four bald eagle nests that have been active in recent years. Bald eagles use the area for foraging year-around.
Black-backed Woodpecker (<i>Picoides arcticus</i>)	High quality habitat created by recent fires is in the Gardiner Basin.
Peregrine Falcon (<i>Falco peregrinus</i>)	Peregrines have been known to nest and forage in the Gardiner Basin.
Townsend's Big-eared Bat (<i>Corynorhinus townsendii</i>)	Snags, bridges and buildings provide roosting habitat and wetlands provide feeding habitat.
Wolverine (<i>Gulo gulo</i>)	See following analysis.
Trumpeter Swan (<i>Cygnus buccinator</i>)	Wintering and nesting habitat is not found in the Gardiner Basin.
Boreal Toad (<i>Bufo boreas boreas</i>)	This species is relatively common on the Forest. Breeding habitat is found in lakes, ponds, slow streams, and ditches.
Northern Leopard Frog (<i>Rana pipiens</i>)	This species is very rare in Western Montana. No reports of occurrence in or near the Gardiner Basin have been made, although it may have been found in the area historically.

Wolverine

Wolverines are considered rare in the proposed year-round bison habitat areas. However, observations have been recorded by biologists, and some trappers have harvested wolverines within the proposed western project area.

Hash (1987) reported wolverines in the Northern Rocky Mountains were associated with fir, pine, and larch. Aspen stands were also used as were cottonwoods in riparian areas. Wolverines inhabit mid or lower elevations in winter. Wolverines tend to avoid large open areas which are typically preferred by bison. The wolverine is an opportunistic carnivore and will eat whatever is available (Hash 1989). They feed on a wide variety of roots, berries, small mammals, birds' eggs and young, fledglings, and fish (Hatler 1989). Small and medium size rodents and carrion (especially ungulate carcasses) often make up a large percentage of the diet. This species may occasionally use a bison carcass, but bison are not a major food for the wolverine. Wolverines den at high elevations and are very susceptible to human disturbance.

Table 14. Sensitive species in the West Yellowstone and Hebgen Lake Area (MTNHP 2012)

Wildlife Species	Occurrences and Habitat Comments
Bald Eagle	There have been numerous observations bald eagles near Hebgen Lake, including Horse Butte. Birds use the area for foraging year-around. On Horse Butte, GNF has closed an area near an established eagle nest.
Black-backed Woodpecker	There have been limited observations of the species in the project area. One in 1996 near West Yellowstone and one in 2008 north of Hebgen Lake.
Cassin's Finch (<i>Haemorhous cassinii</i>)	Observations have been limited to Horse Butte and the Lionhead areas.
Clark's Nutcracker (<i>Nucifraga columbiana</i>)	Numerous observations have been recorded within the project area.
Long-billed Curlew (<i>Numenius americanus</i>)	Observations in 2001 and 2003 have been recorded only along the West Fork of the Madison River, south of Hebgen Lake for this species.
Peregrine Falcon	Peregrines have been limited observed on the north side of Hebgen Lake and near West Yellowstone.
Trumpeter Swan	Swans have been observed numerous times in both the Madison and Grayling Arms of Hebgen Lake.
Hoary Bat (<i>Lasiurus cinereus</i>)	One observation in 2008 has been recorded for this species in the project area, which was south of U.S. Hwy 20.
Preble's Shrew (<i>Sorex preblei</i>)	One observation has been recorded near Hebgen Dam in 1968 of this species.
Western Spotted Skunk (<i>Spilogale gracilis</i>)	One observation was recorded in 1963 of this species which was in the Monument Mountain Unit.
Wolverine	See following analysis.
Boreal Chorus Frog (<i>Pseudacris maculata</i>)	This species is relatively common along the shores of Hebgen Lake and inlets for the Madison River, Grayling Creek, and the South Fork of the Madison River. Breeding habitat is found in lakes, ponds, slow streams, and ditches.
Plains Spadefoot Toad (<i>Spea bombifrons</i>)	Numerous observations have been recorded along the Madison Arm of Hebgen Lake.
Western Toad (<i>Anaxyrus boreas</i>)	The western toad is known to exist throughout the project area.
Common Sagebrush Lizard (<i>Sceloporus graciosus</i>)	General habitat is available but no observations of this species have been recorded.

Wolverines are classified as a furbearer in Montana. However, due to the FWS's pending proposed listing rule for wolverines under the ESA, the status of wolverine trapping in Montana is uncertain. In recent years, trapping regulations divided the state into several wolverine management units and set a trapping quota in each with a statewide quota of five wolverines. FWP Region 3, which encompasses the various alternatives in this document, contains parts of three different wolverine management units. Two of the units had a quota of one wolverine. The other unit was closed entirely to wolverine trapping. Thus, when trapping was taking place, a maximum number of two wolverines could have been trapped in FWP Region 3. Carcasses of trapped wolverines must be turned in to designated FWP staff in the trapping district in which the animal was taken within five days of harvest.

Ungulates

Seven other large ungulate species exist in the affected area: bighorn sheep (*Ovis canadensis*), elk (*Cervus canadensis*), moose (*Alces alces*), mountain goat (*Oreamnos americanus*), mule deer

Table 15. Comparison of Ungulate and Bison Habitat and Food Habits (USDI 2000a)

Species		Winter	Summer	Areas of Competition
Bison	Habitat Use	Open valleys, swales and sedge bottoms; snow may limit areas; wide variety of sites	Follow plant phenology, rest rotation grazing; open valleys-always on move, nomadic	
	Food Habits	Grass/Sedge - 99% Forbs - Trace amounts Browse -1%	Grass/Sedge - 91% Forbs - 6% Browse - 2%	
Mule Deer	Habitat Use	Semi-open rugged foothills, sagebrush steppe, Douglas fir interspersed with sage and juniper bunchgrass	Open to moderately dense canopy montane forest; follow green-up to higher elevation from wintering	Some habitat overlap but no evidence of competition for food
	Food Habits	Grass - 20% Forbs - 15% Browse - 65%	Grass - 5% Forbs - 80% Browse -15%	
White-tailed Deer	Habitat Use	Agricultural/riparian	Intermittent wooded hardwood drainages	No evidence of competition for food; some overlap in habitat use, especially in bison movements out of park displacement
	Food Habits	Grass-Negligible Forbs-Negligible Browse-High Detritus-High	Grass-Negligible Forbs-May 30 – July Browse-Deciduous species leaves	
Pronghorn Antelope	Habitat Use	Sagebrush shrublands-flats	Open grasslands, shrubfields, and forest edges at all elevations	Winter range overlap in Stephens Creek area; sagebrush in winter, distinct from bison food preferences
	Food Habits	Grass - 4% Forbs - 14% Browse - 82% (Rabbitbrush, winter fat, greasewood)	Grass - 7% Forbs - 38% Browse - 54%	
Bighorn Sheep	Habitat Use	Lower open grasslands near rocky outcrops	Open grassland-edge of timber at higher elevations	Some spatial overlap, but separated by diet, tolerance of snow
	Food Habits	Grass - 55% Forbs - 10% Browse - 35%	Grass - 50% Forbs - 36% Browse - 14%	
Elk	Habitat Use	Open grassland	Open to dense forest by August and September	Mixture of habitat types, similar to bison; low to moderate food overlap
	Food Habits	Grass - 80% Forbs - 10% Browse - 10%	Grass - 60–65% Forbs - 30% Browse - 5–10%	

(*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), and white-tailed deer (*Odocoileus virginianus*). A synopsis of each species' use and population levels within the proposed year-round bison habitat follows. A comparison of ungulate habitat and food habits to those of bison is summarized in Table 15.

Bighorn Sheep

Northern Boundary: Gardiner Basin provides winter range for approximately 100 bighorn sheep. A resident herd of approximately 20-25 bighorn sheep remain in Gardiner Basin through the summer. The sheep population has been increasing since 2005. However, it is still below population levels observed prior to a die-off in 1981-82 related to a pink-eye disease event. Bighorn sheep congregate for breeding season during November-December in the Corwin Springs area, and then disperse into 5-6 smaller herds that winter throughout the basin. Most sheep leave Gardiner basin and begin their migration back to high elevation summer range in May.

Western Boundary: The Quake Lake herd primarily winters near Quake Lake, however a limited number of rams have been observed within the Monument Mountain Unit during winter. Up to 53 sheep have been recorded on the Sage Peak and Red Streak Peak during the summer which are within the project area.

Elk

Northern Boundary: A small number of resident elk inhabit the upper elevations of Gardiner Basin throughout the summer and fall, and occasionally small groups of elk may be observed in the lower elevations of Gardiner Basin during summer. Resident elk are joined by larger numbers of migratory elk in late fall and early winter as thousands of elk use Gardiner Basin as a migratory corridor between summer ranges in and adjacent to YNP and winter range in Gardiner Basin and upper Paradise Valley. Elk migration begins in late November with the majority of migrant elk moving north through the area in December and January. Migrant elk remain on their winter ranges until late April or early May, then migrate south through the Gardiner Basin as they return to summer range. The number of elk wintering in Gardiner Basin over the past decade (2002-2012) has averaged 742 with a range of 500 -1,176 elk. Though the Northern Yellowstone elk herd has declined by 75% since the mid 1990s, the number of elk wintering in Gardiner Basin shows no declining trend. Elk use of Gardiner Basin as winter range varies with winter severity with larger numbers of elk occurring during mild winters. During more severe winters, larger numbers of elk continue the migration to upper Paradise Valley and fewer elk remain within Gardiner Basin.

Western Boundary:

Taylor Fork/Porcupine/Buffalo Horn

Elk in these areas are nearly 75% below FWP's population objective and decreasing. The herd is aerially surveyed by FWP every winter and spring. Elk in this herd have decreased from their long-time average of 1,603 elk in the winter surveys and estimates (1948-1985) to an average of 844 (1998-2012). From 2003 to present, the population has been decreasing on average at about 20% a year, and winter counts now enumerate 400 or fewer. Once a site of liberal late-season hunts targeted to maintain the wintering elk population within the resource carrying capacity, cow hunting opportunity and late hunts virtually ceased in 2004. Since 2002, there was an

average of 13 calves per 100 cows, indicative of a declining population. Current hunting season structure is an unlimited permit-only hunt for archery and rifle hunters for brow-tined bulls only with special 5-license availability for brow-tined bull elk in the Gallatin Special Management Area.

This area was one of the intensive study areas in the Montana Wolf-Ungulate research (Hamlin et al. 2009). In general, this research demonstrated the importance of grizzly bears and drought on summer calf survival, and snowpack and wolves on winter calf survival. In 2005 in the Gallatin, 80% of all summertime mortality on newborn elk calves was attributable to bears (grizzly and black), with 7% attributable to coyotes. Of 51 female and 13 male elk radio-collared and tracked for survival 2002-2007, one cow and four bulls were killed by hunters, 1 cow and 1 bull were killed by wolves, and three cows were killed by bears. By tracking wolves daily to estimate their kills (2000-2001), wolf kill rate was estimated to be 15 elk per wolf per 181-day winter period (Nov 1-Apr 30). This is an intermediate kill rate to what was reported in the nearby Madison Valley (22 elk per wolf per winter) and the Northern Yellowstone (seven elk per wolf per winter). During winters 2000-2006, MSU researchers found 118 wolf kills in the Gallatin (114 elk and four moose). Wolves strongly selected for young-of-the-year (6-8 month old calves), selected for bull elk in the portions of the study area dominated by bull elk winter ranges, and killed adult cow elk less than expected by chance. Lack of recruitment may be the major reason for the Gallatin elk herd declines.

Radio collar work has demonstrated an increased proclivity for Gallatin elk to migrate into the Madison Valley and may contribute to elk losses in these drainages.

Madison Valley, Big Sky, and Cabin Creek

Elk in some of these areas are below population objectives of FWP's Elk Management Plan. The herds are aerially surveyed by FWP every winter. Although they generally calve and summer in Gallatin County, these elk spend winter in the Madison Valley. Game damage problems with local farmers and ranchers have led to many years of liberal hunting through the general and late seasons deliberately focused at reducing this herd. The reductions appear successful: from a 2008 high count of nearly 6,200 elk, FWP surveys have counted 3,500-4,000 elk. These units have seen the most liberal license structures: brow-tined bull or antlerless elk throughout the general season, plus unlimited second cow licenses available over the counter for public or private lands. The units are in a standard regulation of five-weeks of brow-tined bull only plus 450 cow licenses available for one-week time periods to distribute hunting pressure. Game damage hunts in the post-season are expected, but the magnitude of these hunts would depend on the amount of game damage occurring. With a long-term average of 20 calves per 100 cows, this is indicative of a stable population when adult female mortality is minimal.

Hebgen Basin

This elk population is not aerially surveyed. A small number of elk (100-300) winter around the Hebgen Basin and West Yellowstone, but this hunting district receives heavy snowfall and is a summer area for elk which may migrate into the Madison or the Gravelly Mountains. Elk winter range is available on the south-facing slopes of the mountains north of Hebgen Lake. Given overall consistent hunter harvest, the herd appears to be stable.

Moose

Northern Boundary: Moose numbers in the Gardiner Basin declined after the 1988 fires and have not recovered. There are no dedicated moose surveys and observations of moose during surveys for other species are rare. There are occasional reports of moose sightings in Jardine.

Western Boundary: Moose are known to exist throughout the project area in limited numbers. The river and creek drainages are used as winter range, especially along Sage Creek and Taylor Creek where observations of moose has ranged from 20-40 animals. Duck Creek, Cougar Creek, and Red Canyon Creek provide tall willow communities for forage. Additionally, moose are known to use Cash, Wapiti, Lightening, Eldridge, and Buffalo Horn Creeks as movement corridors. Moose were historically much more numerous in these areas, often with more than 100-200 animals recorded in a single survey (J. Cunningham, FWP pers. comm. 2012).

Mountain Goat

Northern Boundary: There are not mountain goats in the existing bison-tolerant zone because they typically live at elevations above 9,000 feet. There are excellent opportunities for mountain goat hunting along the Absaroka Crest, and some hunters access this area through the trailheads in upper Jardine.

Western Boundary: Mountain goats are scattered in limited numbers throughout the project area at higher elevations including the Henry Lake Mountains, Taylor Hilgards, and Monument Mountains. The population is presumed to be at a healthy level based upon hunter survey feedback and wildlife biologist observations. Formal FWP surveys are not kept to a set schedule.

Mule Deer

Northern Boundary: The Gardiner Basin is important winter range for a large migratory mule deer population that occupies the Basin from late November/December to early May. Based on radio-telemetry research sponsored by the NYCWWG, mule deer move from a large area including the Absaroka-Beartooth Wilderness, Cooke City, Mill Creek, Big Sky, and Yellowstone Lake, to winter in Gardiner Basin.

Based on annual spring helicopter surveys since 1986, mule deer numbers have ranged from 1,299-2,544 within the Gardiner Basin. Recent surveys indicate a declining trend in mule deer numbers. During winter, the high mule deer use areas occur in the sagebrush-covered foothills throughout the basin. With the beginning of green-up in April, large numbers of mule deer concentrate on the low elevation flats and agricultural fields. Over the years, mule deer use of the Gardiner Basin has been tolerated, and this habitat is very important to the health of the mule deer population.

Western Boundary:

Mule deer do inhabit the project area in limited numbers. Based on hunter harvest data, in some locations mule deer populations is either declining or there is no directional trend.

Pronghorn Antelope

Northern Boundary: There is a small, migratory population of antelope that use the Gardiner Basin, largely restricted to the west side of the Yellowstone River. The Yellowstone antelope population is a genetically distinct remnant of a population that numbered in the thousands in the 1800s. The NYCWWG began surveying this population in 1989. The population declined from a high count of 596 in the 1990s, and the population has remained low in spite of protection from harvest with an average count of 229 during 1995-2011. There have been indications of population recovery in recent years including recent dispersal from this population to the southern Paradise Valley where 81 pronghorn antelope were counted during 2011. Antelope can be observed travelling along the west side of the Yellowstone River and through Yankee Jim Canyon on their fall and spring migrations. They are only occasionally observed on the east side of the Yellowstone River.

Western Boundary: There is no resident population of antelope in the western project area. Some individual animals may periodically travel from the western side of the Madison Mountains into the Hebgen Basin.

White-tailed Deer

Northern Boundary: Whitetails have been observed in small numbers in the Gardiner Basin often associated with thicker “habitat edge vegetation” in riparian areas or along field edges. Compared to the hundreds of mule deer counted, FWP typically observes only 10-20 whitetails during spring aerial deer surveys. Though white-tailed deer numbers have increased slightly in recent years, they are a minor wildlife component in the Gardiner Basin.

Western Boundary:

White-tailed deer are rare but present in areas north of Hebgen Lake.

Gray Wolf

The minimum Montana wolf population estimates at the end of 2012 include 625 wolves, in 147 verified packs, and 37 breeding pairs throughout the state. Of those, there is an estimated 132 wolves in 24 verified packs, 8 of which qualified as a breeding pair in Montana’s portion of the Greater Yellowstone Experimental Area. This represents a consistent minimum count compared to 134 wolves in 2011 (Bradley et al. 2013). The wolf population within YNP is a source of dispersing wolves which move north and west into the State of Montana and the Paradise Valley.

Northern Boundary: There are two known wolf packs within the existing tolerance area: the Quadrant pack on the western side of Yellowstone River, and the Slip n’ Slide pack on the east side of the river. The Quadrant pack is known as a border pack because it moves in and out of YNP.

The Slip n’ Slide drainage is an important corridor for migratory elk, the primary prey for wolves in the Yellowstone ecosystem. Thus, wolves are likely to use this area to forage on elk and to travel to and from elk wintering grounds in Paradise Valley. Resident wolf packs and transient, dispersing individual wolves will continue to exist in the Gardiner Basin with the Slip n’ Slide drainage likely part of a resident wolf territory or used as a travel corridor.

Western Boundary:

There are four wolf packs known in the project area: Cougar2, Hayden, Madison, and Toadflax. The Cougar2 and Hayden pack are considered border packs since they travel between Montana and Idaho. Additionally, members of the Cougar Creek wolf pack have been known to use portions of the Gallatin River corridor. The Cougar Creek pack's primary range is within YNP's western boundary.

Nongame Species

Northern Boundary: The Gardiner Basin ecosystem provides appropriate habitat for an abundance of nongame wildlife species. The following is a representative list of common nongame species that are likely to occur in the Gardiner Basin. This is not meant to be a complete list of nongame species that inhabit the area:

Mammals: coyote, badger, long-tailed weasel, mountain cottontail rabbit, white-tailed jack rabbit, Richardson's ground squirrel, deer mouse, meadow vole, montane vole, long-tailed vole, and little brown myotis.

Birds: western meadowlark, Brewer's blackbird, American robin, vesper sparrow, mountain bluebird, black-billed magpie, raven, American kestrel, red-tailed hawk, golden eagle, and osprey.

Reptiles: gopher snake, terrestrial garter snake, common-garter snake, and western rattlesnake.

Western Boundary:

The following is a representative list of common nongame species that are likely to occur in the West Yellowstone and Hebgen Lake basin. This is not meant to be a complete list of nongame species that inhabit the area:

Mammals: coyote, badger, bobcat, long-tailed weasel, deer mouse, long and short-tailed weasel, marten, mink, porcupine, northern pocket gopher, striped skunk, montane and red-backed voles, snowshoe hare, yellow-bellied marmot, ground squirrel, and little brown myotis.

Birds: various water-associated species such as ducks (mallard, pintail, gadwall, redhead, teals, etc.), osprey, Canada geese, sandhill crane, great blue heron, killdeer, long-billed curlew, American avocet and merganser, white pelican; conifer species – woodpeckers, chickadees, pine siskin, owls, northern goshawk, and many others; grassland species – kestrel, sparrows, warblers, and many others.

Reptiles: Gopher snake, terrestrial garter snake, common-garter snake, and western rattlesnake.

Fisheries

Northern Boundary: Fisheries species located in the Yellowstone River include Yellowstone cutthroat, rainbow and brown trout, mountain whitefish, white and longnose sucker, and mottled

sculpin. The Yellowstone cutthroat trout is designated a species of concern in Montana due to hybridization and decreasing distribution range. Pure, unhybridized populations are limited to some headwaters streams and YNP.

FWP staff conducted trout abundance surveys in the Yellowstone River in 2010. In the Corwin Springs section of the river which is within the proposed year-round bison habitat area, the Yellowstone cutthroat trout abundance was estimated at 296 fish per mile. The reproduction and recruitment of larger fish (4-9 inches in length) was attributed to good water conditions during 2009 (Opitz 2011). Since good water conditions have continued, reproduction and recruitment of the species is expected to persist.

The existing bison-tolerance area also includes the drainages of Mol Heron and Cinnabar Creeks on the west side of Yellowstone River and the drainages of Bassett, Cedar, and Slip n' Slide Creeks, as well as the headwaters of Bear Creek on the east side of the river. With the exception of Slip n' Slide Creek, all the others creeks merge into the Yellowstone River and support populations of Yellowstone cutthroat trout, rainbow, trout, brown trout, and in headwaters areas, brook trout. Slip n' Slide Creek does not reach the Yellowstone River because of agricultural diversions.

Western Boundary:

All streams in the Hebgen Basin are managed as wild trout streams, each sustaining its native and non-native fish stocks through natural reproduction. Hebgen Reservoir supports wild populations of brown trout, rainbow trout, and mountain whitefish. Waters of the Hebgen Basin and adjoining area also support native populations of westslope cutthroat trout, a species of special concern and candidate for listing under the Endangered Species Act. These populations are generally isolated in high elevation reaches of streams.

The Madison River, the South Fork Madison, Black Sands Spring Creek, Cougar Creek, Duck Creek, and Grayling Creek support resident introduced trout, native nongame species such as longnose dace and mottled sculpin, and provide vital spawning and rearing for trout and mountain whitefish (Gallatin County 2004). In addition, Denny Creek, Watkins Creek, and Trapper Creek each support some level of spawning for salmonids of Hebgen Lake.

Additionally, high elevation lakes, such as Coffin Lake and Heart Lake, also provide substantial recreational fisheries in the area.

The Gallatin River supports populations of brook trout, brown trout, longnose dace, longnose sucker, mottled sculpin, mountain sucker, mountain whitefish, rainbow trout, white sucker, whitefish, and Yellowstone cutthroat trout. Yellowstone cutthroat trout is a species of special concern in Montana.

In recent years, Elkhorn (WSCT) and Specimen (WSCT) Creeks have been location for the reintroduction of westslope cutthroat trout. Grayling Creek is under consideration for the reintroduction of Arctic grayling for a fisheries restoration project.

Alternative A, No Action Alternative (Status Quo):

The continuation of hazing activities in the Gardiner Basin and Hebgen Basin are likely to displace some wildlife species in the short term. No impacts are anticipated to wildlife habitat, use, or overall movements of those areas. No disturbances to fisheries habitat or fish populations are expected from this alternative. Ongoing seasonal hazing activities directed at bison might disturb and displace some wildlife species during periods of action. Displacement and stress would be short term and localized.

The current protocol of the installation and maintenance of fencing to restrict bison movement and minimize bison-cattle comingling would continue. Some of the existing fences, such as the jackleg fence on the GNF right-of-way at Jim Yankee Canyon which was installed for previous bison management, were later augmented to improve bighorn sheep passage between the canyon and the basin. FWP would continue to monitor existing bison-related fencing and the design of new bison fencing to minimize impact to resident and transient wildlife that use the Gardiner Basin and Hebgen Basin. Other fencing that has been used in the effort to manage bison movements and reduce bison-cattle comingling is a 5-foot wood rail and smooth wire configuration built so that small wildlife could move below the wire and ungulates could jump over the top rail.

Alternative B, Year-Round Bison along Northern and Western Boundaries of YNP:

The implementation of this alternative would meet the wildlife-related goals of the GNF as stated in the *Gallatin National Forest Plan* (1987) include the following: (1) provide habitat for viable populations of all indigenous wildlife species and for increasing populations of big game animals, and (2) provide sufficient habitat for recovered populations of threatened and endangered species.

Presence of year-round bison in designated portions of the GNF would not likely affect ungulate species based on the following:

- Bighorn sheep and bison diets are not significantly associated with each other (Singer et al. 1994). Furthermore, traditional bighorn sheep range in much of North America typically is located in terrain not associated with bison use (Reynolds et al. 2003).
- Pronghorn antelope are highly selective feeders (Schwartz et al. 1977) whereas bison are more flexible in choice of diet. The theory that large and small ruminants will not compete with each other for food resources (Bell 1971) is further affirmed by similarity in sheep and pronghorn diets and dissimilarity to bison diets (Peden 1972).
- Moose and bison habitats of the plains do not overlap (Reynolds et al. 2003). Moose forage on willows and other woody browse, particularly when preferred forage is of poor quality (Larter et al. 1994). Furthermore, because of the difference in height, moose are able to take advantage of taller browse than bison. In general, moose are primarily browsers and bison are primarily grazers and therefore are considered to be more complimentary than competitive in feeding habits (Reynolds et al. 2003).
- Elk have a low to moderate diet overlap but high habitat overlap with bison; however at much higher ungulate densities, these species did not have to compete for either in the analysis area (Singer et al. 1994).
- As for deer species, there appears to be little, if any, habitat or diet overlap between white-tailed deer and bison. Although bison and mule deer experience some degree

of overlap in habitat use, there appears to be little or no competition between these two species because of differing diet preferences (Singer et al. 1994). Competition may also be precluded by seasonal distribution differences and by the limited ability of deer to deal with deep snow (Barmore 1980).

Increased distribution of bison outside YNP might result in increased distribution of carcasses providing food for scavengers in areas where this food source was not previously available. An additional food source for scavenger species, including wolves and grizzly bears, could have the potential to create both positive and negative impacts on certain scavenger species. The additional food source would be beneficial for those species but could be offset by bringing those scavengers, particularly bears, wolves, and coyotes, into conflict with humans. Measures requiring removal of gut piles or carcasses from areas near human habitation might mitigate these effects.

Habitat disturbances, such as tree rubbing, trails, and wallowing, occur in certain locations favored by bison and would likely be unaffected by all but the most dramatic reductions or increases of bison numbers (Meagher 1973). Therefore, species associated with these features, such as small mammals and birds, would not be affected by this alternative.

Although bison periodically cross the Yellowstone River and would be expected to cross bodies of water within the western year-round bison habitat (e.g. Gallatin and Madison Rivers, Graying and Watkins Creeks, etc.), they do not measurably disturb fisheries by these movements. Bison are known to graze sedges and willows along the perimeters of wetland habitat. Bison do not remain in specific locations for long periods of time so that they allow plant communities to recover before being regrazed in the growing season. Although short-term impacts are likely to occur to wetland vegetation, no long-term impacts are expected to fish habitat. Benefits to fisheries are likely indirect in the context of bison falling through ice in the spring and thereby providing large amounts of protein to aquatic systems which aquatic insects feed upon. Thus, bison become food for the detritivores, and these insects are food for fish in the system (R. Wallen NPS, pers. comm. 2012). This is likely a minor effect relative to the larger system being evaluated. Potential negative impacts are limited to bank destabilization and soil erosion (generally on a small scale). Their trails cross streams, but bank erosion is limited to small areas associated with these stream crossings. The amount of soil erosion is negligible to minor relative to the effects of high flow erosion processes (R. Wallen NPS, pers. comm. 2012).

Identical to the No Action alternative, continuation of seasonal hazing activities in the Gardiner Basin is likely to displace some wildlife species in the short term. However, the decrease or possible elimination of seasonal hazing activities in the Hebgen Basin would likely have a positive benefit to wildlife species because they would not be disturbed or their movements disrupted.

Also, identical to the No Action alternative, the installation of fencing to minimize bison-cattle comingling would continue and DoL may provide assistance to livestock producers on a case-by-case basis. There is the potential that new fencing would be installed in order to restrict bison movements to protect private property. New bison fencing would likely be designed to be as wildlife friendly as possible while deterring bison movements. Typically, a 4-foot wood rail and

smooth wire configuration is built so that small wildlife could move below the wire and ungulates could jump over the top rail. Other fencing designs may be considered depending upon the location where it needed to be constructed. FWP would monitor any new bison-related fencing to evaluate its effectiveness to restrict bison and its ability to allow wildlife movements.

Closing fencing gates and maintaining the cattle guard across U.S. 89 at Yankee Jim Canyon year-round could have negative impacts on wildlife movements during spring and fall migration. One option to mitigate impacts to wildlife near Yankee Jim Canyon is to leave the fencing gates open and cattle guard covered when bison cows/calves are not outside YNP and manage any migrating bull bison near the canyon on an individual basis, given bulls pose minimal brucellosis risk to livestock. FWP would adjust new fencing on private lands if necessary to minimize impacts to ungulate movements as long as bison management goals are met. There is currently temporary fencing adjacent to the cattle guard across U.S. 287 near Hebgen Dam to deter bison moving toward the Madison Valley. The temporary fencing currently does not impede other wildlife movements.

Since the actual number of bison using the year-round habitat and the duration of bison use in that habitat is unknown, FWP would continue ongoing wildlife survey and research efforts and use that information to assess whether the year-round presence of bison is having unforeseen impacts on wildlife species and their habitats. Use of adaptive management adjustments would assist in the identification of problems and possible bison management alternatives that may be necessary to implement in order to minimize impacts to wildlife.

Alternative C (West Side - Horse Butte North to Buck Creek):

FWP and DoL predict the consequences to wildlife and fisheries resources for Alternative C would be the same as were described for Alternative B since similar species occur within their respective geographic boundaries. Identical to Alternative B, FWP would continue ongoing wildlife survey and research efforts and use that information to assess whether the year-round presence of bison is having unforeseen impacts on wildlife species and their habitats. Use of adaptive management adjustments would assist in the identification of problems and possible bison management alternatives that may be necessary to implement in order to minimize impacts to wildlife.

Under this alternative, the cattle guard at Yankee Jim Canyon at the northern boundary of the bison-tolerant zone could be have its grate top replaced with a concrete top and its fencing gates opened to provide a barrier-free passage for ungulate movements, which would be beneficial for those species.

This alternative would also meet the wildlife-related goals of the GNF as stated in the *Gallatin National Forest Plan* (1987) include the following: (1) provide habitat for viable populations of all indigenous wildlife species and for increasing populations of big game animals, and (2) provide sufficient habitat for recovered populations of threatened and endangered species.

Alternatives D (West Side - Zone 2 Only) and E (West Side - Horse Butte Only):

Similar to both Alternatives B and C, these two alternatives are not expected to impact wildlife species for reasons previously described. Because Zone 2 and Horse Butte have higher densities

of residences and human presence, densities of wildlife is likely not as great as in other areas of the GNF that are included in the year-round habitat for Alternatives B and C.

Under this alternative, the cattle guard at Yankee Jim Canyon at the northern boundary of the bison-tolerant zone could be have its grate top replaced with a concrete top and its fencing gates could be opened to provide a barrier-free passage for ungulate movements, which would be beneficial for those species.

Implementation of either of these alternatives would also meet the wildlife-related goals of the GNF as stated in the *Gallatin National Forest Plan* (1987) include the following: (1) provide habitat for viable populations of all indigenous wildlife species and for increasing populations of big game animals, and (2) provide sufficient habitat for recovered populations of threatened and endangered species.

Alternative F, Gardiner Basin – Bulls Only:

Alternative F is identical to the No Action alternative. Continuation of seasonal bison hazing activities in the Gardiner Basin is likely to displace some wildlife species in the short term. The return of bull bison to the designated year-round habitat in the Basin is not expected to negatively impact resident and transient wildlife and fisheries species for the reasons acknowledged in the narrative for Alternative B. Challenges regarding the placement and design of bison-restrictive and wildlife-friendly fencing would continue within the Basin with or without the year-round presence of bull bison. FWP and DoL would continue with the evaluations of fencing activities and determine how to minimize impacts to area wildlife while meeting the objectives of the IBMP.

Implementation of this alternative would require the cattle guard at Yankee Jim Canyon at the northern boundary of the bison-tolerant zone to remain and its fencing gates would be required to remain closed to prohibit bison movements north toward the Paradise Valley. The year-round closure of the fencing gates would be a negative effect to seasonal ungulate movements. FWP would monitor and evaluate those impacts and may consider the redesign of those boundary fences to mitigate effects to ungulates.

Identical to alternative B-E, implementation of this alternative would meet the wildlife-related goals of the GNF as stated in the *Gallatin National Forest Plan* (1987).

3.7 PUBLIC SAFETY & PRIVATE PROPERTY

In 2002, FWP, DoL, and other IBMP partner agencies approved and signed the initial document defining the operating procedures of the IBMP. The operating procedures identified FWP, with assistance of DoL, as the responsible agency tasked with responding to property damage issues on private lands.

Since 2008, bison-related human safety and property damage concerns have been reported in IBMP annual reports and reflect that FWP staff have responded to residents' concerns regarding a broad range of issues including damage to landscaping (trees), damage to fences, damage to lawn ornaments, comingling of bison and livestock (cattle and horses), removal of bison from

school grounds and business areas, and reports of bison movements beyond approved zones. Between November 2011 and August 2012, FWP staff responded to over 440 calls related to public safety, property damage, and hazing activities not related to the seasonal hazing of bison back into YNP.

There are two programs currently supported by different entities which assist landowners with fencing in order to minimize damage to private property and comingling of bison and livestock.

1. The Yellowstone Bison Coexistence Project is supported by Horse Butte Neighbors of Buffalo, Yellowstone Basin Inn, Defenders of Wildlife, Greater Yellowstone Coalition, Natural Resources Defense Council, National Parks Conservation Association, and Sierra Club. The 2012 program offers landowners in the Gardiner and Hebgen Basins up to \$1,000 to help pay for fencing to mitigate concerns about free-roaming bison. Past projects have included fencing wetlands, private yards by homes, trees and shrubs, cattle pasture, and a spring box.
2. DoL's program assists livestock owners in the Gardiner and Hebgen Basins on a case-by-case basis with fencing projects to minimize bison-cattle contact.

As abundance of recreational opportunities occurs within the proposed project area, this topic has been separated into its own Section, 3.3, which describes the existing resources and potential impacts to those resources for the alternatives. It also describes public safety issues related to recreational activities.

Highway Safety

The Montana Department of Transportation (MDT) has access to two databases containing information on wild animal vehicle collisions. The MDT Carcass Database contains information on carcasses collected by MDT maintenance personnel; however, not all carcass collection is reported consistently or on a regular schedule. This makes the information provided by the Carcass Database useful for pattern identification over space and time, but not statistically valid. This makes it difficult to match a carcass report to a crash report to ensure the carcass is not counted twice in a detailed study.

MDT also has access to wild animal vehicle collisions reported by or through the Montana Highway Patrol (MHP). This dataset is limited by the fact that many wild animal vehicle collisions are not reported, or if they are reported it may be well after the accident occurrence. Additionally, the reporting officer may note in the narrative what type of animal was impacted; however, the crash form does not have a data field for the type of animal so this information is not provided consistently.

Since there is no clear connection between the two data sets, some of the following data could be duplicative or inconclusive. As an example, a MHP-reported accident could have happened on April 1 and the carcass picked up the same day; however, the carcass may not be picked up by MDT until April 20 or not picked up at all if it is beyond the highway right-of-way. Or, a carcass may be recorded near the location of an accident that was not actually involved in that accident at all. Because of the differences in the statistics reported, a summary of wildlife

collisions and carcasses, in particular those involving bison, are summarized for both potential project areas. Also included is data for the level of traffic use of the area's highways.

The number of wildlife carcasses removed by MDT staff exceeds the number of wildlife-vehicle collisions reported by MHP. An assumption could be made that a large number of wildlife-vehicle collisions go unreported to MHP. This may be especially true of wildlife collisions involving large trucks where vehicle damage is negligible.

Northern Boundary: The existing bison-tolerance zone encompasses areas on both sides of U.S. Highway 89, the only north-south route between Livingston and YNP (Gardiner). The average number of vehicles traveling on Highway 89 on an annual daily basis for 2012 was approximately 2,000 (P. Jerstad, MDT, per. comm. 2013).

The total number of wildlife carcasses MDT staff removed along Highway 89 from the community of Gardiner to Yankee Jim Canyon between 2007 and 2012 was 275; of those only one was a bison, recorded in 2011. The majority of carcasses removed within this road segment each year were mule deer. In comparison, the total number of MHP reported wildlife-vehicle accidents was 33 during the same 6-year period. The number of bison involved in the MHP accidents was two that occurred in 2011 during the months of February and March. Both of those accidents occurred at night.

There is currently an expanded cattle guard across U.S. Highway 89 at the southern entrance of Yankee Jim Canyon, installed in 2011, that is exposed during the winter in order to deter bison movements north into Paradise Valley and the Tom Miner Basin. The surface of the cattle guard is switched to a concrete surface after May 15th when bison have been hazed back to YNP.

Western Boundary: The proposed year-round habitat areas west of YNP are sliced by three U.S. Highways: 20, 191, and 287. Highway 20 runs east-west and connects West Yellowstone with the Idaho border. Highway 191 runs north-south and connects West Yellowstone with Bozeman. Finally, Highway 287 intersects Highway 191 near Hebgen Lake and travels east to the community of Ennis and locations further north.

The average number of vehicles traveling these routes on an annual daily basis for 2012 was 2,900 for Highway 20, 2,000 for Highway 191, and 680 for Highway 287 (P. Jerstad, MDT, per. comm. 2013).

The total number of wildlife carcasses MDT staff removed along Highway 20 between West Yellowstone and the Idaho border (12 miles) between 2007 and 2012 was 7, and no bison were identified. In comparison, the total number of MHP reported wildlife-vehicle accidents was 6 during the same 5-year period and involved deer, elk, and moose.

Highway 191 has the longest length of highway within the proposed project area on the western boundary (25 miles); from West Yellowstone north to Buck Creek. The total number of wildlife carcasses removed by MDT during the 6-year period was 121 which included a total of 24 bison (4 in 2008, 15 in 2009, 3 in 2011, and 2 in 2012). All of the bison carcasses were removed within 10 miles of West Yellowstone during the months of April and June. The total number of

MHP wildlife-related accidents reported during that period was 32 that included 14 bison (1 in 2007, 3 in 2008, 2 in 2009, 6 in 2011, and 2 in 2012). Thirteen of the 14 bison-related accidents occurred at night and between the months of December and June.

The total number of wildlife carcasses MDT staff removed along Highway 287 between its intersection with Highway 191 and Hebgen Dam (13 miles) between 2007 and 2012 was 34, and no bison were identified. In comparison, the total number of MHP-reported wildlife-vehicle accidents was 2 during the same 6-year period and involved deer and moose.

There is currently an expanded cattle guard across U.S. Highway 287 near Hebgen Dam, installed in 2012, that is exposed during the winter in order to deter bison movements west into the Madison Valley. The surface of the cattle guard is switched to a concrete surface after May 15 when bison have been hazed back to YNP.

Brucellosis

Brucellosis is an infectious disease caused by the bacteria of the genus *Brucella*. Various *Brucella* species affect sheep, goats, cattle, deer, elk, pigs, dogs, and several other animals. *Brucella abortus* is the species of *Brucella* that infects cattle, bison, and elk.

The bacterium is concentrated in the lymph nodes, reproductive organs, and udder. Aborted fetuses, placental membranes or fluids, and other vaginal discharges present after an infected animal has aborted or calved are all highly contaminated with infectious *Brucella* organisms (CDC 2010).

Brucellosis is not very common in the United States where 100 to 200 cases occur each year (CDC 2010). There have been 32 reported cases of brucellosis in Montana since 1960 (M. Zaluski DoL, pers. comm. 2012). Of those reported cases, at least two hunters identified with the disease; one in 1986 and one 1995 (DoL 2012). Regionally, there were five confirmed cases reported to the Wyoming Department of Health from 1995 to 2005, and 17 confirmed cases reported to the Idaho Department of Health and Welfare from 1980 to 2003, though none of these cases were attributed to wildlife (White et al. 2011).

Humans are generally infected in one of three ways: eating or drinking something that is contaminated with *Brucella*, breathing in the organism (inhalation), or having the bacteria enter the body through skin wounds. The most common way to be infected is by eating or drinking contaminated milk products (CDC 2010). Hunters may be infected through skin wounds or by accidentally ingesting the bacteria after cleaning deer, elk, moose, or wild pigs that they have killed (CDC 2010). In humans, brucellosis is called undulant fever and can cause a range of symptoms that are initially similar to the flu and may include fever, sweats, headaches, back pains, and physical weakness.

As a preventive measure, FWP recommends that bison hunters follow these general precautions to minimize the risk of any disease transmission to humans: 1) always wear protective gloves when dressing carcasses, 2) minimize contact with animal fluids and brain and spinal tissue, 3) avoid contact with milk or material from the reproductive tract, and 4) wash hands and

instruments thoroughly after field dressing or processing (FWP 2011d). Cooking destroys the bacteria that may be present in the meat.

Alternative A, No Action Alternative (Status Quo):

IBMP partners, including FWP, would continue to respond to public safety and property owner concerns. Priority would continue to be given to complaints involving public safety issues. FWP and DoL would continue to document bison-human conflicts per the IBMP management action 1.3b outlined in the 2009 and 2010 IBMP annual reports. This action item focuses on efforts to work with landowners who have human safety and property-owner concerns to provide a conflict-free habitat in the Gardiner Basin. Furthermore, FWP would continue working with members of the Yellowstone Bison Coexistence Project to coordinate information regarding potential applicants to their program that helps to decrease damage to private property.

During periods of episodic bison migration, such as winter of 2010-2011, the agencies' ability to respond to bison-related incidents immediately was diminished because of the spike in the number of calls to IBMP agency staff, and responses were prioritized to address incidents involving the public's safety first. This protocol would remain in place in the event another episodic migration occurs.

The movements and presence of bison along the highway corridor would continue to be a traffic hazard to motorists. The intensity of the hazard would depend upon the number of bison present at one time at a given location. Furthermore, incidents of private property damages caused by the seasonal presence of bison would also likely occur.

The current risk of infection to humans by brucellosis would remain unchanged if the status quo was maintained and bison were could migrate into the existing bison-tolerant areas on the north and west sides of YNP.

As is the current practice, the cattle guards crossing U.S. Highways 191 and 287 would continue have their grate tops replaced with concrete ones after the bison are hazed back into YNP which are safer for motorcycles and bicycles to travel across.

Alternatives B (Year-round Bison along Northern and Western Boundaries of YNP):

Identical to the No Action alternative, IBMP partners including FWP and DoL would continue to respond to public safety and property damage concerns within the year-round bison habitat areas. Response to bison incidents would be on a first-come, first-served basis and, when necessary, prioritized to which incident presents the most immediate threat to public safety. FWP would also continue working with members of the Yellowstone Bison Coexistence Project to coordinate information regarding potential applicants to their program that seeks to increase tolerance for bison in areas surrounding YNP. This is often through efforts to help decrease damage to private property. Individual members of the Coexistence Project have also completed other projects to increase bison tolerance, such as the installation of fencing around rural bus stops.

Comments received during the scoping period for the proposed action revealed an elevated concern by some local residents for their personal safety if bison could remain year-round in either the Gardiner or Hebgen Basins. FWP and other IBMP staff have responded to numerous

landowner calls related to the seasonal presence of bison since 2000, and there have been no reported incidents of injuries to the general public. FWP and DoL acknowledge the potential for reports of personal injuries to increase with the presence of year-round bison.

A main contributing factor for bison-human incidents is that a person moves too close to the bison. Incidents of wildlife and human conflicts, bison included, have been documented in YNP as early as 1963. In a 2003 article by Olliff and Caslick, the authors summarized the frequency of bison-human incidents and the details of those encounters. During 1980-1999, bison charged and made contact with humans 79 times, an average of 3.95 per year (the number of incidents each year ranged from 0 to 13) with every incident occurring in Yellowstone's developed areas or along roads. During that 20-year period, the average annual number of visitors to the Park was 2.7 million (NPS 2012). There were no injuries reported in 18 (23%) of the incidents (Olliff et al. 2003). Some of the injuries were caused by people being thrown into the air by bison for distance of 15 feet. Nearly half of the injuries were sustained after a visitor approached a bison for a photograph or to view the bison more closely. The average distance between the bison and the human when the bison charged was 28.5 feet as estimated by reporting YNP rangers (Olliff et al. 2003).

More recent data on bison-human incidents revealed 2 reports of bison making contact with humans during 2010, one of which resulted in a non-life threatening injury, and no reported incidents of contact in 2011 (D.Wenk NPS, pers. comm. 2012). In 2010, there were 5 reported incidents of bison charging vehicles and 4 such incidents in 2011(D. Wenk NPS, pers. comm. 2012).

Statistics for bison-human incidents in YNP for 2010 and 2011 that were reported to rangers was two incidents in 2010 and none reported in 2011.

The research completed by Taylor et al. (2003) investigated the perceptions of hikers and mountain bikers to the responses of wildlife, including bison, on Antelope Island in Utah. The results of their study showed that most recreationists felt that it was acceptable to approach wildlife at a much closer distance than was tolerated by the wildlife. On average, bison approach tolerance was approximately 103 yards versus the recreationist perception of 64 yards. Both studies noted that the distance that bison tolerate humans could vary depending on the season, time of day, herd size, and presence of calves.

Comments received during the scoping period and the MDT statistics on bison-vehicle collisions on U.S. Highway 191 support the hypothesis that some of those collisions occur during the seasonal hazing of bison back into YNP. With the elimination of seasonal hazing activities, the number of bison-vehicle collisions may decrease. However, some hazing activities may be necessary to move bison away from roadways and populated areas to designated year-round habitat on public lands.

As described in the introductory portion of this section, the number of bison-related accidents on highways within the project areas was 5% of all wildlife-related collisions in the Gardiner Basin and 16% of all wildlife-related collisions in the Hebgen Basin over the last five years. In comparison, within YNP the number of reports of bison being struck by motor vehicles in 2010

and 2011 was less than 1% of all reported motor vehicle accidents during both those years (D. Wenk NPS, pers. comm. 2012). As the exact number of bison that would use the year-round habitat is unknown and as the number of vehicles using the highways in the Hebgen Basin and Gardiner Basin increases during tourist season, there is the potential that the number of bison-vehicle collisions may increase.

Vehicular traffic has varying levels of impact to bison. Borkowski et al. (2006) studied the behavioral responses of bison to over snow vehicles (OSV) inside YNP. For bison, 81% of the responses to vehicles and associated human activity were categorized as “no response” while a combined <9% of the responses resulted in “travel,” “flight,” or a “defensive” reaction.

The risks of vehicle collisions and personal injuries could be minimized through educational efforts which may include the following:

- distribution of educational materials at local hotels and venues to inform the public to be aware of the presence of bison (see Appendix E for copies of the brochures)
- addition of wildlife crossing signs along highways
- publication of press releases focused on the addition of year-round bison, and
- if necessary, the agencies would submit a request to MDT for lowering the speed limit on highways in location where the bison are known to be active.

Based on the known data regarding the transmission of brucellosis to humans, FWP and DoL deem there to be a low risk in general, as well as no additional risk of infection of brucellosis to humans, if this alternative were implemented. Bison hunters should use the handling precautions previously described to minimize the risk of bacterial infection when handling bison meat. Additionally, while horses can be infected with brucellosis, the likelihood is relatively small based on DoL’s experience.

An abundance of recreational opportunities occur within the proposed project area. Public safety issues related to recreational activities may range from physical inconveniences to threats of bodily harm. Options to minimize those public safety risks include installation of additional signage, closure of trails or campsites, hazing of bison to another location on public lands, and lethal removal of bison. See Section 3.3 for additional information regarding existing recreation resources and potential impacts of year-round bison to those activities.

Since the exact number of bison using the year-round habitat and the locations within the year-round habitat is unknown, FWP and DoL would continue to document bison-related incidents. Incident reports would be used to evaluate if initial protocols to minimize public safety risks are effective or not and if adjustments are necessary to bison management or educational outreach efforts to improve public safety.

Implementation of this alternative would require the continued use of the expanded cattle guards near Hebgen Dam (U.S. Highway 287) and Yankee Jim Canyon (U.S. Highway 89) year-round to prohibit bison movements beyond the designated year-round habitat areas. Continued use of the guards may be a hazard to motorcycles and bicycle riders because the spaces of the grates are larger than what is used for a typical cattle guard. Electronic caution signs that are placed on the

highways prior to the guards during the winter season would remain year-round to warn cyclist of the upcoming hazard.

Alternative C (West Side - Horse Butte North to Buck Creek):

Implementation of this alternative would require the continued use of the expanded cattle guard near Hebgen Dam (U.S. Highway 287) year-round to prohibit bison movements beyond the designated year-round habitat area. Continued use of the guards may be a hazard to motorcycles and bicycle riders because the spaces of the grates are larger than what is used for a typical cattle guard. Electronic caution signs that are placed on the highways prior to the guards during the winter season would remain year-round to warn cyclists of the upcoming hazard.

The grate cattle guard top across U.S. Highway 89 at Yankee Jim Canyon would be replaced with a concrete top after the bison are hazing back to YNP from the Gardiner Basin. The concrete top does not pose a hazard to cyclists.

Alternative D (West Side - Zone 2 Only), E (West Side - Horse Butte Only):

Since both of the geographic boundaries of both these alternatives are more restrictive than the other alternatives considered for the western boundary, the grate cattle guard top across U.S. Highway 287 near Hebgen Dam would be replaced with a concrete top. Additionally, since bison would continue to be hazed back to YNP from the Gardiner Basin, the top of the cattle guard across Highway 89 would also be replaced with a concrete top after the bison have been hazed back to YNP from the Gardiner Basin. The concrete top does not pose a hazard to cyclists.

Alternative F (Gardiner Basin – Bulls Only):

Implementation of this alternative would require the continued use of the expanded cattle guards near Hebgen Dam (U.S. Highway 287) and Yankee Jim Canyon (U.S. Highway 89) year-round to prohibit bison movements beyond the designated year-round habitat areas. Continued use of the guards may be a hazard to motorcycles and bicycle riders because the spaces of the grates are larger than what is used for a typical cattle guard. Electronic caution signs that are placed on the highways prior to the guards during the winter season would remain year-round to warn cyclists of the upcoming hazard.

The grate cattle guard top across U.S. Highway 287 near Hebgen Dam would be replaced with a concrete top after the bison are hazing back to YNP from the Gardiner Basin. The concrete top does not pose a hazard to cyclists.

3.8 CULTURAL & HISTORIC RESOURCES

Bison are significant to the cultural and spiritual lives of many Native American tribes. The specific significance of bison in tribal life varies from tribe to tribe (USDI et al. 2000a). Bison provide food, clothing, shelter, and the materials for a variety of tools for Native Americans. Bison are also considered a strong spirit power within many tribes' religious belief system.

There are over 900 recorded historical and archaeological sites within the GNF (USFS 2006). However, only a small percentage of the national forest has been archeologically surveyed.

The following is a brief history of both boundary areas.

Northern Boundary:

Prehistoric people, Native American tribes, explorers, miners, and early visitors to YNP used the Yellowstone River corridor from Gardiner north to Yankee Jim Canyon. Remnants of those travelers and residents have been found through numerous cultural resource surveys completed over the past two decades.

In the 1860s, placer mining for gold began to affect the corridor and with it miners and settlers began to reside along the river. In 1871, James George (AKA “Yankee Jim”) built a cabin and road at a narrow canyon along the Yellowstone River and began charging a toll to travelers headed for the towns of Cinnabar, Gardiner, and areas further south. When the Northern Pacific Railroad reached the area in 1883, the railroad purchased the right-of-way from Yankee Jim to expand their lines south to Cinnabar and then to Gardiner in 1902.

By 1903 when President Roosevelt visited the area for the cornerstone-laying ceremony for the entrance of YNP, Gardiner’s population had grown from 200 in 1883 to over 400 in 1922. The nudge for expansion into the area occurred in 1915 when the Yellowstone Trail Road was completed between Livingston and YNP was opened to automobile traffic. The population of the area has expanded and contracted over the years following mining efforts.

Some relics are still visible within Zone 2 near the RTR Ranch such as the brick coke ovens from 19th century gold and coal mines. Other remnants from prehistoric and historic occupants, including lithic scatter, fire hearths, building foundations, railroad beds, stage routes, and antique trash dumps, have been located through cultural resource inventory reports completed by Fredlund (1987) and Deaver (1989).

Western Boundary:

Similar to the Gardiner Basin, Native Americans have been visiting and traveling through the areas around Hebgen Lake for several generations. The earliest available mention of prehistoric evidence located in the project area was recorded by Wayne Replogle, Jr. in which field work was undertaken in the 1940s and published in 1956, *Yellowstone’s Bannock Indian Trails*. The trails were used by the tribe in the 1800s to travel to and from bison hunting grounds between the Camas Meadows over Targhee Pass to the Absaroka Mountains (Haines 1964). Portions of the Bannock Trail were located by Mr. Replogle north and south of Hebgen Lake near the western end of the lake; its connecting section was lost when the Hebgen Dam was built in 1906.

In 1973, an archeological survey was completed in the Red Canyon Creek drainage for the Ski Yellowstone Environmental Study. That survey collected artifacts (projectile points, scrapers, and other lithic debris) in the vicinity of Hebgen Lake indicating the presence of historic indigenous people using the area.

Alternative A, No Action Alternative (Status Quo):

Little to no impacts to cultural or historic areas may continue to occur where existing sensitive sites are exposed to bison using existing bison-tolerant areas (Zone 2 and Bear Creek/Eagle

Creek). Archeological resources can be at risk from development, natural occurrences, and human activity (USDI et al. 2000a).

Alternatives B (Year-round Bison along Northern and Western Boundaries of YNP) and C (West Side - Horse Butte North to Buck Creek):

Bison could inhabit a larger portion of their historic range outside YNP within each alternative's designated boundaries for the first time and would promote a greater understanding of the seasonal movements of bison in and around the western Yellowstone area.

Bison could access year-round habitat within the alternatives' boundaries which may put some historic/cultural resources at risk because the protection of snow cover and frozen soils would be gone during the warmer months. Bison would have the ability to establish wallows in new locations, which can be 15 feet wide and one foot deep, remove localized vegetation, remove top soil, and compact lower soil layers. Furthermore, historic structures may be at risk of being used as horning or rubbing objects. Ways of mitigating impacts may include excavation of the site, primarily done for prehistoric sites, and/or installation of fencing around a historic site to manage any impacts bison may inadvertently cause (M. Pablo NPS, pers. comm. 2012).

The presence of year-round bison on a larger landscape is anticipated to be a minor to major positive impact to tribes and those who view free ranging bison as culturally important.

The presence of bison year-round within the GNF may provide tribal treaty hunters with additional hunting opportunities during the summer and falls seasons. Currently, some tribal hunters are not allowed to hunt after February 1 due to tribal rule or out of respect to the bison, especially pregnant cows. Some tribes do hunt through the end of March, and others do not identify a limited season. Historically, tribes hunted bison during the summer months when the "buffalo had firm flesh, with plenty of fat, needed in the Indian's diet" (Whealdon et. al. 2001). Additionally, during the summer bison's hair becomes very thin so the pelts that are taken can be dressed on both sides and be made into a variety of articles such as clothing and teepee covers. Winter hides are thicker and show the stress of winter conditions. Any changes to the state's current bison hunting season could require FWP Commission and DoL approval. The implementation of additional hunting opportunities could assist in the bison population objectives.

Alternatives D (West Side - Zone 2 Only) and E (West Side - Horse Butte Only):

Both these alternatives restrict bison movements to within existing IBMP seasonal management boundaries. Bison could access year-round habitat within the alternatives' boundaries which could put some historic/cultural resources at risk because the protection of snow cover and frozen soils would be gone during the warmer months. Bison would have the ability to establish wallows in new locations, which can be 15 feet wide and one foot deep, remove localized vegetation, remove top soil, and compact lower soil layers.

The presence of year-round bison on the landscape is anticipated to be a minor to major positive impact to tribes and those who view free ranging bison as culturally important.

Similar to Alternatives B and D, additional bison hunting opportunities may be a possibility in the future which could be a positive benefit for tribal hunters.

Alternative F (Gardiner Basin – Bulls Only):

Similar to the other alternatives, implementation of this alternative may put some recorded historic/cultural resources at risk because the protection of snow cover and frozen soils would be gone during the warmer months. Bison would have the ability to establish wallows in new locations and use accessible historic structures as horning/rubbing objects.

The presence of year-round bull bison on a larger landscape is anticipated to be a minor to major positive impact to tribes and those who view free-ranging bison as culturally important. Some of the public may find the exclusion of cow and calf bison year-round in the Gardiner Basin diminishes the value of tolerance and presence to the bulls.

Similar to the analysis of the previous alternatives, additional bull bison hunting opportunities may be a possibility in the future which could be a positive benefit for tribal hunters.

3.9 VISUAL RESOURCES

Visual resources consist of landform (topography and hydrology) and land cover (buildings, roads, etc.). A general description of the types of vegetation present in the project area is noted in Section 3.1. A brief summary of plant species are included in the northern and western subsections below.

National forest land is managed to maintain specific visual quality objectives or a level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area. The year-round bison habitat areas are predominantly National Forest lands with visual quality objectives ranging from preservation to maximum modification. The following relevant paragraphs are taken from the 2000 FEIS.

“Preservation” allows only ecological changes; “retention” means that human activities are not evident to the casual visitor; “partial retention” allows evidence of human activity if it is subordinate to the characteristic landscape; “modification” means that human activity may dominate the land but should appear as a natural occurrence, and “maximum modification” allows human activity to dominate, yet it should appear natural when viewed as background. In the Gardiner area, forest lands are managed for recreation, livestock, big game winter habitat, timber harvest, and wilderness within which the visual quality objectives are primarily focused on preservation, partial retention, and modification. The West Yellowstone lands also support recreation, livestock, and timber harvest as well as forest operations, electrical corridors, heavily used public areas, and research areas. The visual quality objectives accommodate modification, partial retention, and retention. (USDI et al. 2000a)

Various hazing activities affect visual resources and quality for residents and visitors in the Yellowstone area. Hazing is visible from roads and lands near

areas where bison leave the Park and enter other public or private lands. Most hazing activities occur outside the Park as needed. Capture and test facilities are visible from the county road in the Stephens Creek area and from a few residences in the West Yellowstone area. (USDI et al. 2000a)

Current seasonal bison management activities in the Gardiner Basin and Hebgen Basin include hazing activities such as herding bison by helicopter, by vehicle, and on horseback or foot. These actions typically take place in May and sometimes as late as June when all bison are moved back into YNP. Hazing is often visible from roads. Observers of these activities may feel hazing activities have an adverse impact on the visual landscape of a given area while other observers may enjoy the spectacle of seeing large groups of bison being moved.

Summary of Plant Species

The bison-tolerant area includes elevations ranging from 5,100 feet above sea level at the valley floor to approximately 10,500 feet at the crest of the hydrological divide. Because of the broad elevational range, there are a diverse number of plant species present. Within the valley, vegetation is best described as bunchgrass steppe or shrub-steppe communities which includes Idaho fescue, junegrass, blue grass, and occasionally bluebunch wheatgrass and sagebrush. Within the forested areas species include quaking aspen, bluegrass, Douglas-fir, pine grass, mountain brome, timothy, lodgepole pine, grouse whortleberry, and whitebark pine.

Several large wetlands and riparian areas are found along Cinnabar and Mol Heron Creeks on the west side of the river with smaller riparian areas following Cedar, Slip n' Slide, and Bassett Creeks on the east side. Plant species represented include cottonwood, various willow species, alder, chokecherry, rose, yarrow, and various grasses.

Special Concern Plant Species

Seven special concern plants have been identified by the Montana Natural Heritage Program to occur within the existing bison-tolerant area. The following table identifies those species and habitat where they can be found.

Western Boundary

Summary of Plant Species

Most of the area near West Yellowstone area is found on a 7,000- foot plateau which primarily supports lodgepole pine. The Horse Butte area rises about 300 feet in elevation and supports a subalpine fir-pinegrass forest habitat type on northerly exposures, grasses such as Idaho fescue and Ross's sedge on southern exposures, and distinctive aspen groves on the small area of flat terrain (USDI et al. 2000a). Many riparian and wetland areas occur along the Madison and Gallatin Rivers as well as following the drainages of Cougar, Duck, Grayling, and Specimen Creeks (FWS 2012). Plant species present in the river and creek corridors are various willows, sedges, reedgrasses, and birches, with the potential for fireweed, cow parsnip, and various forb species to be present (MTNHP 2010).

Lands north of Hebgen Lake up to and adjacent to the southern boundary of the Cabin Creek Recreation and Wildlife Management Area are open meadow mixed.

Table 16. Sensitive Plant Species Within the Northern Boundary

Plant Species	Occurrences and Habitat Comments
Annual Indian Paintbrush (<i>Castilleja exilis</i>)	Moist alkaline meadows in the valley zone.
Beaked Spikerush (<i>Eleocharis rostellata</i>)	Wet, often alkaline soils, associated with warm springs or fens in the valley and foothills zones.
Five-leaf Cinquefoil (<i>Potenilla nivea var. pentaphylla</i>)	Five-leaf cinquefoil is sparsely distributed in Montana on dry, gravelly soil of exposed ridges and slopes in the montane to alpine zones.
Letterman's Needlegrass (<i>Stipa lemmonii</i>)	Letterman's needlegrass can be found in limestone talus and dry fescue grassland in the valley and foothill zones.
Slender Indian Paintbrush (<i>Castilleja gracillima</i>)	A perennial species of paintbrush that occur in mid-elevation wetland and riparian habitats. Reported populations in the GNFForest were reported as apparently stable in 1989. However, they may be subject to natural disturbance regimes, since cycles of disturbance and re-establishment occur at relatively frequent intervals in the stream and river bank habitats where this species grows.
Spiny Hopsage (<i>Grayia spinosa</i>)	Dry shrublands in the valleys and foothills usually on sandy-textured, alkaline soils at elevations below 5,000 ft (5,600 ft near Gardiner). As the plant is highly palatable, negative impacts associated with heavy grazing are possible.
Thick-leaf Whitlow Grass (<i>Draba crassa</i>)	The thick-leaf whitlow grass is scattered across southwest Montana where it has been located on cool, shady alpine slopes in several mountain ranges. However, its overall abundance and distribution is poorly known.

There is a wide variety of vegetation within the Cabin Creek Recreation and Wildlife Management Area and the adjoining Monument Mountain Unit of the Lee Metcalf Wilderness. This variety is associated with elevations that range from 7,200 to 10,600 feet (Sage Peak). These forested areas are dominated by mixed conifer stands of lodgepole pine, Englemann spruce, and subalpine fir. Whitebark pine is generally the dominant tree species above 8,400 feet. Aspen is not a significant component of the forested habitats. Douglas-fir exists at the lower elevations on southern aspects. The grass/forb associations within the forested areas consist of pine grass, tufted hairgrass, Idaho fescue, sedge, trisetum, huckleberry, and arnica. Forbs include mountain dandelion, lupine, and clover. Shrubs include purple mountain heath. Moss and lichen are found in these high elevation areas with some purple mountain heath found in some of the rock crevices (USDI et al. 2000a).

Special Concern Plant Species

Nine special concern plants have been identified by the Montana Natural Heritage Program to occur within the year-round bison habitat. The following table identifies those species and habitat where they can be found.

Table 17. Sensitive Plant Species Within the Western Boundary

Plant Species	Occurrences and Habitat Comments
Annual Indian Paintbrush	Moist alkaline meadows in the valley zone.
Dwarf Onion (<i>Allium simillimum</i>)	Moist, often gravelly soil of meadows and grasslands in the montane or lower subalpine zone.
Dwarf Purple Monkeyflower (<i>Mimulus nanus</i>)	Dry, open, often gravelly or sandy slopes in the valleys and foothills. Populations are generally small.
Large-leaved Balsamorhiza (<i>Balsamorhiza macrophylla</i>)	This species is found in sagebrush and grasslands, in the montane zone. In the GNF, it occurs most often on open, east-facing slopes (8-15%), with loamy soils, in a sagebrush-forb community.
Rocky Mountain Twinpod (<i>Physaria saximontana var. dentate</i>)	Typically found in limestone-derived talus, fellfields, and gravelly slopes at moderate to high elevations.
Slender Indian Paintbrush	A perennial species of paintbrush that occur in mid-elevation wetland and riparian habitats. Reported populations in the GNF were reported as apparently stable in 1989. However, they may be subject to natural disturbance regimes, since cycles of disturbance and re-establishment occur at relatively frequent intervals in the stream and river bank habitats where this species grows.
Small-winged Sedge (<i>Carex microptera</i>)	Dry, often rocky soil of grasslands and open forests in the montane and subalpine zones, and moist soil along streams in the valleys. Very little data are available for the species in Montana, as the sites are known only from specimen collections with sparse information.
Whipple's Beardtongue (<i>Penstemon whippleanus</i>)	This species inhabits open, rocky slopes in meadows and scattered timber of the subalpine and alpine zones. The only recently documented population in Montana was found in an open meadow and adjoining forest along an avalanche chute and lower scree slopes near the headwaters of a small stream.
Whitestem Goldenbush (<i>Ericameria discoidea</i>)	Rare in Montana where it is only known from a couple of sites in the southwest corner of the state. Current population levels and trends are unknown. One site is relatively inaccessible and not likely to be threatened by human impacts. Observed in rocky, open, sparsely wooded slopes or coarse talus near or above tree line.

Alternative A, No Action Alternative (Status Quo):

The seasonal presence of bison within existing bison-tolerant areas on the northern and western boundaries of YNP would continue and provide some positive aesthetic value to the landscape.

Hazing and other bison management activities per the existing IBMP procedures would still occur and continue to have a negative impact on those who are offended by this management action. Hazing activities would continue as previously discussed to move bison out of non-tolerant areas. Those activities would be visible to the public and could have a negative impact on those who are offended by this management action. Such hazing activities may be required on a daily basis as was the case during the 2010-2011 winter when an episodic migration occurred.

The existing capture facilities at Stephens Creek would continue to be part of the viewshed with a minor to moderate negative impact (USDI et al. 2000a).

No impacts are expected on the viewshed if the No Action alternative was chosen because no changes to the viewshed would occur.

No impacts to sensitive plant species are anticipated because they would be dormant and likely under snow cover when bison are present.

Alternatives B (Year-round Bison along Northern and Western Boundaries of YNP), C (West Side - Horse Butte North to Buck Creek), D (West Side - Zone 2 Only), and E (West Side - Horse Butte Only):

Since the geographic area of Alternative B encompasses the geographic areas of Alternatives C-E, the following discussion of potential impacts to visual resource for all these alternatives is provided in this section. Impacts specific to an individual alternative will be identified as such.

The presence of bison within new year-round habitats is expected to have some impacts upon existing vegetation. The level of those impacts is difficult to specify or analyze since it is unknown how many bison would utilize the new areas available to them and how long the bison would remain in a geographic area before moving elsewhere. The analysis of potential impacts is based on 500 bison remaining within the year-round habitat on the west side which is based upon the number of bison typically hazed back into YNP by FWP, DoL, and other IBMP partners in May each year.

Bison evolved through natural selection as a “dominate grazer” on complex landscapes (Fuhlendorf et al., 2010), and historically occupied a variety of habitats. Bison were found throughout the prairies, arid plains and grasslands, meadows, river valleys, aspen parklands, coniferous forests, woodlands, and openings in the boreal forests (Long 2003; Burde and Feldhamer 2005; FWP and MNHP,2010a). Bison utilize the woodlands in the summer for shade and in the winter when the accumulation of snow prevents feeding in more open terrain (Meagher 1978; Burde and Feldhamer, 2005).

The diet of the plains bison consists primarily of grasses though bison will consume forbs and woody vegetation when their preferred vegetation is not readily available (Nowak and Paradiso 1983; Foresman, 2001; Long, 2003; Burde and Feldhamer, 2005; Picton 2005). On the National Bison Refuge, 88% of the bison’s diet is made up of Idaho and rough fescue, and blue bunch wheatgrass (Foresman 2001). Meagher (1973) found in an analysis of rumen samples that sedges were the most important forage for bison in YNP with sedges, rush, and grasses making up 96% of their diet throughout the year.

Potential impacts to vegetation are anticipated to be mixed with impacts characterized as beneficial for maintenance of biological diversity in native plant communities but detrimental to goals of monoculture type communities as managed by many agricultural interests (R.Wallen NPS, pers. comm. 2012). Grazers tend to be important for recycling nutrients in grassland plant communities. Bison probably perform this function in some of the wetland communities they forage in as well. Since bison do not remain in specific spots (locations) for long periods of time, they allow plant communities to recover before being regrazed during the growing season.

YNP bison have been observed to graze in upland habitats during the growing season for upland shrub and grassland habitats. As the uplands mature late in the summer, YNP biologists have observed the bison move in to wetland habitats to graze more frequently on the sedges that grow around the perimeter of wet pothole habitats and in oxbows that have been either cut off from stream flow or only carry water during the high flow period each summer. These sedge habitats provide important food resources for bison. While foraging in the riparian communities, bison would browse on early growth portions of willow and cottonwood stems.

During a study of bison in Theodore Roosevelt National Park, Norland (1984) observed that bison were not centering foraging activities on permanent water sources but were instead highly mobile to utilize different water sources. Bison also used temporary water sources, went without water for at least one day, and utilized snow instead of water when available. Van Vuren (2001) found that the location of bison foraging was relatively unaffected by the availability of water in comparison to cattle, and that bison were less likely to graze close to water. During his observations of the free-ranging herd of bison in the Henry Mountains, Utah, Nelson (1965) observed that, “very little time was spent at the water hole. As soon as their water needs were satisfied, they immediately began grazing and moving away from the water and did not show a tendency to hang around the area as is common with cattle”.

Bison have evolved with the ability to remove up to 18 inches of snow with their large low-hanging head in order to access the underlying vegetation (Meagher 1978; Picton 2005). This adaptation allows bison to effectively feed on natural sources during the winter season in conditions that may limit the forage ability of other wild ungulates and may require the diet of domestic livestock to be supplemented (Meagher 1978).

Some sensitive plant species may be impacted by consumption or destruction by trampling, wallowing, or general movements within the year-round bison habitat depending upon the timing of life cycle the plant is in and the location of bison at a given time.

Horning and rubbing on trees can create negative effects to forested areas by damaging or killing saplings or mature trees. Bison of all age and sex classes engage in this behavior which involves the rubbing of an object with its head, horns, neck, or shoulders (McHugh 1958; Coppedge and Shaw 1997). Horning is believed to be associated with relief from insect irritation though it may also be a behavioral display or associated with coat shedding (McHugh 1958; Coppedge and Shaw 1997; Gates et al. 2010). Bison prefer to horn aromatic shrubs, sapling, and treated utility poles which may contain insecticidal or insect deterring properties to gain relief from insects (Coppedge and Shaw 1997).

Wallowing is another behavior that creates disturbance to plant communities but provides adequate sites for re-colonization of early seral stages of plant communities and adds to the diversity of the community. The size of a wallow can vary but range near 15 feet wide and one foot deep. The soil within a wallow becomes exposed and compacted from use. This compacted shallow bowl collects rainwater and creates a microenvironment in which seeds can sprout. The seedlings of sedges and rushes occur in wallows that are otherwise absent in the prairie (Coppedge et al. 1999; Knapp et al. 1999; Lott 2002). Wallowing is associated with the relief of insect and parasite irritation, shedding, and potentially as a means of thermoregulation as bison

may lower their body temperature through contact with cooler soil (Nowak and Paradiso 1983; McMillan et al. 2000; Lott 2002; Reynolds et al. 2003; Picton 2005). Wallowing is also associated with reproduction. Bulls will urinate in a wallow, and then both the bull and cows will roll in the urine. The pheromones in the urine induce the cows to come into estrus helping to coordinate the estrus cycle of the females within the herd (Bowyer et al. 1997; Picton 2005). The urine may also advertise a bull's fitness level to other competing bulls (Bowyer et al. 1997; Lott 2002).

Wallowing behavior also has the potential to spread seeds, both native and invasive. Many seeds have adaptations such as hooks, awns, and/or barbs that increase efficiency of seed dispersal by animals (Mori et al. 1998). When bison wallow, they embed plant seeds into their fur and later release the seeds into the environment as they wallow elsewhere (Stoneburner 2012). The addition of bison within the GNF may have positive benefits to some plant species in the dispersion of their seeds. Rosas et al. (2008) concluded that bison were potentially important dispersers of forbs and graminoids. The ongoing weed management efforts by the GNF is expected to help mitigate potential negative impacts of bison by decreasing the spread of noxious weeds through a combination of techniques including herbicides, biological control agents, mechanical treatments, and cultural treatments (e.g. re-seeding or grazing) (USFS 2005).

DoL and FWP have the ability to mitigate some livestock operator concerns of detrimental impacts to vegetation by installing new fencing where needed as does a cooperative effort by a group of non-government organizations (NGO) to help with fencing to decrease concerns about damage to private property and protection of public safety. Impacts from new fencing are expected to be negligible with limited and localized disturbance to vegetation.

New or ongoing USFS forest treatments may be influenced by the year-round presence of bison in terms of how those projects are implemented and what, if any, mitigation is necessary to minimize impacts to bison and habitats used by them. It is difficult to predict what those impacts may be at this time. However, methods to decrease the possibility of threats to FS or contracting staff may include distribution of educational materials about bison behavior to staff, additional warning signage in the project area frequented by bison, temporary fencing to deter bison within the project area when practical, hazing of bison from the project area, and lethal removal if necessary.

The need for additional wildlife caution signs to alert drivers to the potential presence of bison on and near roadways may be necessary to decrease bison-vehicle collisions. The addition of caution signs would increase the number of human-related objects visible within the highway corridor thus potentially diminishing the aesthetic quality of the viewshed for some people.

Alternative F (Gardiner Basin – Bulls Only):

The presence of bison within new year-round habitats is expected to have some impacts upon existing vegetation as previously described for alternatives for the western boundary of YNP. The level of those impacts is difficult to specify or analyze because it is unknown how many bull bison would return to the year-round habitat after the seasonal hazing back into YNP in May. However, impacts to existing vegetation are expected to be minimal based on an estimate of a maximum of 100 bull bison returning to the Gardiner Basin after hazing activities have ceased.

This estimate is based upon the average number of bull bison observed in the Basin during the winter. If the number of bull bison does increase to the estimated maximum of 100, then there may be localized negative impacts to vegetation depending upon the density of bulls at a location.

DoL and FWP have the ability to mitigate some livestock operator concerns of detrimental impacts to vegetation by installing new fencing where needed as does a cooperative effort by a group of NGOs to help with fencing to decrease concerns about damage to private property and protection of public safety. The potential impacts from new fencing are expected to have localized disturbance to vegetation.

The need for additional wildlife caution signs to alert drivers to the potential presence of bison on and near roadways may be necessary to decrease bison-vehicle collisions. The addition of caution signs would increase the number of human-related objects visible within the highway corridor thus potentially diminishing the aesthetic quality of the viewshed for some people.

3.10 CUMULATIVE EFFECTS

The nearly all resources within the geographic boundaries of Alternatives B-F under consideration are located within the GNF under the jurisdiction of the USFS with the exception of wildlife and fisheries which FWP manages. As such, management of the vegetation, access, wildlife, and other features is directed by the 1987 GNF Forest Plan, the 2006 GNF Travel Plan, and the 1964 Wilderness Act that directs the management of the Lee Metcalf Wilderness. In addition to those broad plans, numerous other activities have taken place in the forest in the past such as timber harvests, weed management, controlled burns, land exchanges, and grazing which have altered vegetation levels in some manner and contributed to the existing vegetation resources. The presence of bison on public lands may influence future projects within the forest in terms of how those projects are implemented and what, if any, mitigation is necessary to minimize impacts to bison and habitats used by them. Because it is unknown how many bison would remain within the year-round habitat at a given time and the actual locations of use, it is difficult to describe the potential impacts to future GNF projects may be. Additionally, any future timber or vegetation treatment projects on public lands may influence bison movements and alter available bison forage in a specific area. One such example is the Lonesome Wood Vegetation Management 2 project that will initiate forest treatments on approximately 2,900 acres south of Hebgen Lake including approximately 2,575 acres of forest thinning and 325 acres of small tree slashing followed by prescribed burning. Beyond the extraction of timber and prescribed burning, other activities for this proposal may include the construction of and rehabilitation of skid trails, landings, and temporary roads, all of which may assist bison to use the project area (e.g. treeless movement corridors and grazing locations) after its completion.

Recreation, approved and self-initiated, is another activity that has been occurring for many years within the GNF and will continue under the guidance of the current forest plan. Recreational activities and trails may also be influenced by the presence of bison and be reflected in updates to the forest plan in the future.

No Action Alternative:

If the No Action Alternative were chosen, there would be no opportunity for IBMP partners to gather multi-year analysis of bison migration, and the cumulative effect would be a negative impact for the loss of data gathering and loss of research opportunities. Current observation and documentation of bison would continue within the confines of the existing bison-tolerant zones within the Gardiner and Hebgen Basins.

The number of bison migrating into Zone 2 areas may continue to increase as the YNP bison herd populations increase. This influx of the number of bison may require additional management activities by FWP, DoL, and other IBMP partner agencies to ensure public safety limit property damage, and minimize comingling incidents between bison and cattle. Increased management activities also may include higher number of bison captured and held at the Stephens Creek and Horse Butte facilities until released back into YNP, additional hazing activities, use of lethal removal in the field more often, and/or capture and slaughter of bison.

As previously described, severe winter conditions, snow pack depth, and bison population levels within YNP contribute to the likelihood of bison migrating to lower elevation ranges outside of YNP. If an episodic migration should happen, bison movements would be limited to within the existing Zone 2 areas and Eagle Creek/Bear Creek boundaries. Based on experiences from Winter 2010-11, the number of bison-human conflicts would likely be numerous and potentially reduce local social tolerance toward the presence of bison and future IBMP adjustments.

No cumulative impacts are anticipated to vegetation, water resources, soils, or cultural sites if the No Action Alternative were chose because many of those resources are typically protected from bison by snow cover and frozen soil during the winter season.

The continuation of the use of fencing as a bison management tool could limit the movement of other wildlife species. Such is the case at the Yankee Jim Canyon cattle guard where FWP continues to monitor and adjust fencing designs to minimize impacts.

Alternatives B (Year-round Bison along Northern and Western Boundaries of YNP):

This alternative would provide the maximum potential for bison to freely range beyond YNP boundaries onto other public lands and private lands where they would be tolerated. Knowledge and experience gained by the implementation of this alternative would assist IBMP partners in future decisions regarding bison management within the Greater Yellowstone Area and provide additional opportunity for research and data gathering on other topics related to bison.

The year-round presence of bison is likely to have both positive and negative moderate impacts to recreation. Bison viewing opportunities would be an added benefit for recreationalists where other activities were taking place. The exact level of negative impacts to recreation depends upon bison behavior and density, density of human presence and activity, and management response necessary to minimize bison-human conflict. These impacts would be location specific and opportunities available to recreationalists, including motorized access, within the entire GNF would be unchanged unless USFS decided otherwise.

Implementation of this alternative may increase the perceived risks for the spread of brucellosis between bison and cattle. However, those risks are minimized by the vaccination and monitoring of cattle within the project area, which is in the DSA, as well as the timing of cattle turned out to the project area. Ongoing brucellosis risk management by DoL through the DSA program diminishes the threat of change to Montana's standing as a "Class-free State." With additional bison management experience within the DSA over time, the implementation of this alternative may lead to a change in the perceived risks of year-round bison if no transfers of brucellosis from bison to cattle are recorded.

Enforcement of the late arrival of cattle to grazing allotments would also assist in decreased exposure of cattle to bison birthing materials which can carry *Brucella* bacteria. If bison-livestock conflicts arise, GNF has the ability to change the terms of use for the allotment. Any changes may have short term and/or long term negative consequences to livestock owners.

The economies of Gallatin and Park Counties have benefited from growth tied to the area's high quality wildlife, wildland resources, and direct access to YNP. The addition of year-round bison to a larger portion of their historic range would benefit visitors and others who desire to view bison thus becoming an incentive for additional visitors to the communities of Gardiner and West Yellowstone year-round. Businesses open during the fringe seasons (spring and fall) may enjoy the economic benefits from increased spending by visitors and hunters if an expanded bison hunting season were approved.

Similar to the discussion of impacts of the No Action Alternative, livestock, structures, and residents can be at risk when bison leave the Park. If bull bison were able to access and use the Gardiner Basin and mixed bison were able to access and use a greater portion of the GNF in the Hebgen Basin, an increased number of property owners could experience property damage by bison, and there could be an increase in bison-related accidents. Increases in residential and commercial development in the Gardiner and Hebgen Basins may also contribute to increased incidents of bison-related damage to private property. Efforts to decrease property damage and accidents by FWP and other IBMP partner agencies would continue through the hazing of bison, signage, educational outreach, fencing collaborations with NGOs, and lethal removal.

In comparison to the No Action Alternative, wildlife resources would have none to minor effects on wildlife resources within the project area. Many species would not be affected by the presence of bison such as birds, fisheries, and many small mammals. Grizzly bears and wolves may experience a minor positive benefit in that a new source of food (live or carrion) would be available. Ungulate species may be negatively affected by the construction of new bison-resistant fencing to either prohibit comingling with livestock or deter their movements beyond the bison-tolerant areas. Also, some competition for forage between bison and elk is possible, but the negative relationships have yet to be proven. The elimination or reduction of hazing activities would mean fewer disturbances thereby positively benefiting all wildlife species.

This alternative could result in minor to major impacts to individual social values and visual resources. Some might view the management actions of this alternative as being in conflict with agricultural interests, while others might view the management actions as a major positive benefit to the species, the GYE, and for the cultural values bison embody.

The only cumulative impact to visual resources would be the addition of bison to the landscape year-round. Many of the current bison management activities such as hazing, capture, and lethal removal would continue and may be visible depending upon the location of activity.

Alternatives C (West Side - Horse Butte North to Buck Creek), D (West Side - Zone 2 Only), or E (West Side - Horse Butte Only):

Cumulative impacts of these alternatives would be identical to those described for Alternative B for bison in that IBMP partner agencies would gain a greater understanding of bison behavior if they are allowed access to year-round habitat outside YNP.

Many of the cumulative impacts previously described for Alternative B for other resources would be applicable for Alternatives C-E since their individual geographic boundaries are within Alternative B's. However because of their spatial differences, cumulative impacts may be less intense or null to wildlife under Alternatives D and E because of the limited number of acres involved compared to Alternative C.

While affects to vegetation are anticipated by ongoing and future projects by the USFS, cumulative impacts from bison to vegetation would be minor to moderate depending upon the density of bison present given the alternative. For example under Alternative F, higher density of bison on Horse Butte would likely have greater negative impact to the vegetation than the same number of bison spread on a wider landscape such as the number of acres available under Alternative C.

Alternative F (Gardiner Basin – Bulls Only):

While most of the cumulative impacts to wildlife would be similar to those described for Alternative B, impacts from new fencing would likely affect wildlife to a higher degree within the Gardiner Basin than at other locations because of the higher density of existing fences already shown to negatively impact some wildlife species such as bighorn sheep. New fencing in the basin may further disrupt wildlife movements.

There are some similarities of impacts within the Basin to those previously described for Alternative B related to socioeconomics, social values, livestock, and public safety since the boundaries of both alternatives encompass established communities, livestock operations, and main highway arteries.

CHAPTER 4.0: ENVIRONMENTAL IMPACT STATEMENT DETERMINATION

FWP and DoL have evaluated the alternatives considered for the proposed action and determine an environmental impact statement is not warranted because the agencies have proposed and described mitigations that would reduce the impacts to the human environment. Furthermore, predicted impacts to physical resources are largely considered to be negligible to moderate and can also be managed and minimized by adaptive management adjustments by FWP, DoL, and other IBMP partner agencies as the components of year-round bison project are evaluated.

The geographic scope of the proposed action under Alternative B, which could have YNP bison in the largest area year-round, still restricts bison to a specific geographic boundary within Montana where they would be actively monitored and managed. The bison-tolerant boundary of Alternative B represents 0.4% of Montana's 147,200 square miles.

There is a reasonable probability that some resource impacts will occur and continue to occur if any one of the alternatives were chosen. The difference between the impacts per alternative, including the No Action Alternative, depends upon the density of bison, the size of the bison-tolerant area available to them, and human activities in an area.

The year-round presence of bison would contribute a native species to the landscape adjoining Yellowstone National Park. Impacts to other resident species are anticipated to be negligible to moderate depending upon the species and if new fencing to manage bison movements are necessary.

Bison are considered an important cultural species for Native American tribes as well as an important wildlife resource to the State and society in general. Providing naturally migrating bison the ability to roam a larger portion of their historic range could be considered a positive management step for greater tolerance of the species.

No less important to Montana is its livestock industry. The proposed action would not conflict with any state or federal laws that require the management of bison and brucellosis. The IBMP management activities would continue to ensure the risk of spreading of brucellosis by bison to cattle is minimized under all the alternatives. The various other steps, as described in Section 3.4, help to decrease exposure of cattle to brucellosis in birthing matter to a low risk. The project area is within the brucellosis Designated Surveillance Area (DSA), and as such all cattle within the DSA will continue to be required to meet the vaccination and testing conditions of the program. The current and ongoing brucellosis risk management efforts by DoL would make certain Montana's Class Free status is maintained thus protecting the state's entire cattle industry.

CHAPTER 5.0: PUBLIC PARTICIPATION AND COLLABORATION

5.1 PUBLIC INVOLVEMENT

The public will be notified in the following manners to comment on this EA, the proposed action and alternatives:

- Two public notices in each of these papers: *Helena Independent Record*, *Livingston Enterprise*, and *The Bozeman Chronicle*;
- One statewide press release;
- Direct mailing to interested parties in the project area and other locations in Montana;
- Public notice on the Fish, Wildlife & Parks web page: <http://fwp.mt.gov>; and
- Copies will be available for public review at FWP Region 3 Headquarters and Helena Headquarters.

The public comment period will extend for (30) thirty days. Written comments will be accepted until 5:00 p.m., August 13, 2013 and can be mailed to the address below:

Year-round Bison Habitat
Montana Fish, Wildlife & Parks
1400 S. 19th Ave
Bozeman, MT 59718
Or email comments to: YearRoundBison-EA@mt.gov

5.2 COLLABORATORS - OTHER AGENCIES/OFFICES THAT CONTRIBUTED TO THE EA

Defenders of Wildlife, Bozeman MT
Gallatin National Forest, Bozeman MT
Idaho Department of Agriculture, Boise ID
Montana Department of Livestock, Helena MT
Montana Fish, Wildlife and Parks
 Enforcement Bureau, Bozeman MT
 Fisheries and Wildlife Division, Bozeman MT
 Legal Bureau, Helena MT
Montana Department of Transportation, Helena MT
 Planning Division
 Traffic and Safety Bureau
Montana State Library, Helena MT
 Base Map Service Center
National Park Service, Yellowstone National Park, WY

CHAPTER 6.0: ANTICIPATED TIMELINE OF EVENTS

Public Comment Period on EA: mid-July until mid-August
Decision Notice Published: Fall of 2013

CHAPTER 7.0 EA PREPARERS

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REFERENCES:

- Aguirre, A.A. and Starkey, E.E. 1994. Wildlife diseases in U.S. national parks; historical and coevolutionary perspectives. *Conservation Biology* 8:654-661.
- Aune, K., Rhyan, J., Roffe, T., 2007. Environmental persistence of Brucella organisms in natural environments of the greater Yellowstone area – a preliminary analysis. *United States Animal Health Association* 110, 205–212.
- Barmore, W.J. 1980. Population Characteristics, Distribution, and Habitat Relationships of Six Ungulates in Northern Yellowstone Park. Final report. Yellowstone National Park, WY: National Park Service.
- Bell, R.V. 1971. A grazing ecosystem in the Serengeti. *Scientific American* 225:86-93.
- Borkowski, J. J., P. J. White, R. A. Garrott, T. Davis, A. R. Hardy, and D. J. Reinhart. 2006. Behavioral responses of bison and elk in Yellowstone to snowmobiles and snow coaches. *Ecological Applications*, 16(5).
- Bowyer, R.T., X. Manteca., and A. Hoymork. 1998. Scent marking in American bison: Morphological and spatial characteristics of wallows and rubbed trees. In L. Irby and J. Knight (Eds.), *International Symposium on Bison Ecology and Management in North America*, pp. 283-302. Bozeman, MT: Montana State University.
- Bradley L., J. Gude, N. Lance, K. Laudon, A. Messer, A. Nelson, G. Pauley, M. Ross, T. Smucker, and J. Steuber. 2013. Montana Gray Wolf Conservation and Management 2012 Annual Report. Montana Fish, Wildlife & Parks. Helena, Montana.
- Bruggeman, J. E., R. A. Garrott, P. J. White, F. G. R. Watson, and R. W. Wallen. 2009b. Effects of snow and landscape attributes on bison winter travel patterns and habitat use. Pages 623-647 in R. A. Garrott, P. J. White, and F. G. R. Watson, editors. *The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies*. Elsevier, San Diego, California.
- Burde, J.H. and G.A. Feldhamer. 2005. *Mammals of the National Parks*. Baltimore: The Johns Hopkins University Press.
- Canadian Bison Association (CBA). 2012. Bison Frequently Asked Questions. Retrieved from: http://www.canadianbison.ca/producer/about_bison/faq.htm
- Centers for Disease Control. 2000. Suspected Brucellosis Case Prompts Investigation of Possible Bioterrorism. *MMWR Weekly* 49(2): 509-512. Retrieved from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4923a1.htm>
2010. Brucellosis: General Information. Retrieved from: <http://www.cdc.gov/nczved/divisions/dfbmd/diseases/brucellosis>

- Cheville N.F., D.R. McCullough, and L.R. Paulson. 1998. Brucellosis in the Greater Yellowstone Area. Washington, DC: National Academy Press.
- Citizens Working Group (CWG) on Yellowstone Bison. 2011. Presentation of Recommendations to IBMP Partners at the Interagency Bison Management Plan meeting on February 24, 2012. Retrieved from: http://www.ibmp.info/Library/20120224/022412_Agenda_process_CWGrecomendations.pdf.
- Conrad, L. and J. Balison. 1994. Bison goring injuries penetrating and blunt trauma. *Journal of Wilderness Medicine* 5:371-381.
- Coppedge, B.R. and J.H. Shaw. 1997. Effects of horning and rubbing behavior by bison (*Bison bison*) on woody vegetation in a tallgrass prairie landscape. *American Midland Naturalist* 138:189-196.
- Davis, D.S. 1990. Brucellosis in Wildlife. In: K. Nielsen and J. R. Duncan (eds.), *Animal Brucellosis*, pp.321-334. CRC Press, Boca Raton, Florida.
- Davis, D.S., Templeton, J.W., Ficht, T.A., Williams, J.D., Kopec, J.D. and Adams, L.G. 1990. *Brucella abortus* in Captive Bison; I. Serology, Bacteriology, Pathogenesis and Transmission to cattle. *Journal of Wildlife Diseases* 26:360-371.
- Davis, D.S., Templeton, J.W., Ficht, T.A., Huber, J.D., Angus, R.D. and Adams, L.G. 1991. *Brucella abortus* in bison. II. Evaluation of strain 19 vaccination of pregnant cows. *Journal of Wildlife Diseases* 27:258-264.
- Deaver, Sherri and Ken et al. Cultural Resource Inventory and Testing of MPC Carabella to Gardiner Transmission Line Route, Park County, Montana. June 1989.
- Fortin, Daniel and M. Andruskiw. 2003. Behavioral response of free-ranging bison to human disturbance. *Wildlife Society Bulletin* 31(3): 804-813.
- Frank, D. A., and S. J. McNaughton. 1993. Evidence for the promotion of aboveground grassland production by native large herbivores in Yellowstone National Park. *Oecologia* 96:157-161.
- Frank, D.A., S.J. McNaughton., and B.F. Tracy. 1998. The ecology of the earth's grazing ecosystems: Profound functional similarities exist between the Serengeti and Yellowstone. *BioScience* 48:513-521.
- Fredlund, L.. Cultural Resource Inventory and Assessment of Royal Teton Ranch Developments. April 1987.

- Fuhlendorf, S.D., B.W. Allred, and R.G. Hamilton. 2010. Bison as keystone herbivores on the great plains: Can cattle serve as proxy for evolutionary grazing patterns? *ABS Working Paper No. 4*: 1-40.
- Gallatin County. 2004. Hebgen Lake Zoning District Development Plan. Retrieved from: http://www.gallatin.mt.gov/public_documents/gallatincomt_plandept/1zoning/districts/HL_Plan.pdf
- Gardiner Chamber of Commerce. 2012. Gardiner's History. Retrieved from: <http://www.gardinerchamber.com/index.html>
- Gates, C.C., C.H. Freese., P.J.P. Gogan., and M. Zotzman (Eds. and Comps.). 2010. *American Bison: Status Survey and Conservation Guidelines 2010*. Gland, Switzerland: IUCN.
- Geremia, C., P. J. White, R. L. Wallen, F. G. R. Watson, J. J. Treanor, J. Borkowski, C. S. Potter, and R. L. Crabtree. 2011. Predicting bison migration out of Yellowstone National Park using Bayesian models. *PLoS ONE* 6:e16848.
- Greenblatt, J., C. Hopkins, A. Barry, A. Demaria. 2000. "Suspected Brucellosis Case Prompts Investigation of Possible Bioterrorism- Related Activity—New Hampshire and Massachusetts, 1999". *Morbidity and Mortality Weekly Report* 49(23); 509-512. Retrieved from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4923al.htm>
- Haines, Aubrey L. 1964. *The Bannock Indian Trail*. Yellowstone Library and Museum Association.
- Hamlin, K. L. and J. A. Cunningham. 2009. Monitoring and assessment of wolf-ungulate interactions and population trends within the Greater Yellowstone Area, southwestern Montana, and Montana statewide: Final Report. Montana Department of Fish, Wildlife, and Parks, Wildlife Division, Helena, Montana, USA.
- Hash, H. S. 1987. Wolverine. in: M. Novak, J. Baker, M. Obbard and B. Malloch (eds). *Wild furbearer management in North America*. Ministry Nat. Res., Ontario.
- Hash, H.S.1989. "Wolverine (*Gulo gulo*)." In *Rare, Sensitive, and Threatened Species of the Greater Yellowstone Ecosystem*, edited by T. W. Clark, A. H. Harvey, R. D. Dorn, D. L. Genter, and C. Groves, 117–18. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services.
- Hatler, D. F. 1989. A wolverine management strategy for British Columbia. British Col. Ministry of Environment, Victoria. *Wildlife Bulletin* B-60. 124 pp.
- Herrero, S.M. 1985. *Bear Attacks-Their Causes and Avoidance*. Winchester Press, Piscitaway, NJ: New Century Publishing, Inc.

- Jones, J.D., Treanor, J.T., Wallen, R.L., White, P.J., 2010. Timing of parturition events in Yellowstone bison—implications for bison conservation and brucellosis transmission risk to cattle. *Wildlife Biology* 16, 333–339.
- Knapp, A.K., J.M. Blair., J.M Briggs., S.L. Collins., D.C. Hartnett., L.C. Johnson., and E.G. Towne. 1999. The keystone role of bison in North American tallgrass prairie. *BioScience* 49:39-50.
- Kilpatrick, A.M., Gillin, C.M., Daszak, P., 2009. Wildlife–livestock conflict: the risk of pathogen transmission from bison to cattle outside Yellowstone National Park. *Journal of Applied Ecology* 46, 476–485.
- Larter. C.C. and C. Gates. 1994. Home-range size of wood bison: Effects of age, sex, and forage availability. *Journal of Mammalogy* 75:142-49.
- Long, J. 2003. *Introduced Mammals of the World: Their History, Distribution, and Influence*. Collingwood VIC Australia: CSIRO Publishing.
- Lott, D.F. 2002. *American Bison. A Natural History*. Los Angeles: University of California Press.
- Marcus, W. Andrew, J.E. Meacham, A.W. Rodman, and A.Y. Steingisser. 2012. *Atlas of Yellowstone*. University of Oregon Press.
- Mattson, D.J., B.M. Blanchard, and R.R. Knight. 1991. “Food Habits of Yellowstone Grizzly Bears, 1977–87.” *Canadian Journal of Zoology* 69: 1619-29.
- McHugh, T. 1958. Social behavior of the American Buffalo (*Bison bison bison*). *Zoologica: New York Zoological Society* 43:1-40.
- McMillan, B.R., M.R. Cottam., and D.W. Kaufman. 2000. Wallowing behavior of American bison (*Bison bison*) in tallgrass prairie: an examination of alternate explanations. *American Midland Naturalist* 144:159-167.
- Meagher, M. 1973. *The Bison of Yellowstone National Park*. Science Monograph Series, No.1.
1978. Bison. In J.L Schmidt and D.L. Gilbert (Eds.), *Big Game Of North America Ecology and Management*. pp.123-134. Harrisburg, PA: Stackpole Books.
- Meagher, M.M. and Meyer, M.E. 1994. On the origin of brucellosis in bison of Yellowstone National Park: A review. *Conservation Biology* 8:645-53.
- Mealey, S.P.1975. *The Natural Food Habits of Free-Ranging Grizzly Bears in Yellowstone National Park, 1973–1974*. M.S. thesis, Montana State University, Bozeman.

- Montana Department of Commerce, Census and Economic Information Center (CEIC). 2009. Resident Population for Incorporated Places in Montana. Retrieved from: <http://ceic.mt.gov/Demog/estimate/pop/County/CO-EST2009-01-30.htm>
- 2010a. County Populations. Retrieved from: <http://ceic.mt.gov/Demog/estimate/pop/County/CO-EST2009-01-30.htm>
- Montana Department of Commerce (DOC), Travel Montana. 2010. Snowmobiling in West Yellowstone. Retrieved from: http://wintermt.com/Snowmobiling_and_Snowcoaches/snowmobiling/westyell.htm
- Montana Department of Labor and Industry (DLI). 2010. Demographic and Economic Information for Park County. Retrieved from: http://www.ourfactsyourfuture.org/admin/uploadedPublications/3485_CF09_Park.pdf
2011. October 2011 County Labor Force Statistics. Retrieved from: <http://www.ourfactsyourfuture.org/cgi/databrowsing/?PAGEID=4&SUBID=205>
2012. Demographic and Economic Information for Gallatin County. Retrieved from: http://www.ourfactsyourfuture.org/admin/uploadedPublications/3370_cf-gallatin.pdf
- Montana Department of Livestock (DoL) and Montana Fish, Wildlife, and Parks (FWP). 2000. Interagency bison management plan for the state of Montana and Yellowstone National Park. Record of Decision. December 22, 2000. Helena, Montana. Retrieved from: http://www.ibmp.info/Library/IBMP_State_ROD_preamble.pdf
2011. Designated Surveillance Area Economic Impact Statement. Retrieved from: http://liv.mt.gov/brucellosis/default.mcp#DSA_Regs
2012. Brucellosis Epidemiology. Retrieved from: <http://liv.mt.gov/ah/diseases/Brucellosis/incidence.mcp>
- Montana Fish, Wildlife, & Parks (FWP). 2011a. Late-winter 2010/2011 Northern Yellowstone Elk Survey North of YNP, June 2011.
- 2011b. Northern Yellowstone Cooperative Bighorn Sheep Survey. June 2011.
- 2011c. Northern Yellowstone Cooperative Spring Mule Deer Survey. June 2011.
- 2011d. 2011 Montana Hunting Regulations, Bison. Retrieved from: <http://fwp.mt.gov/hunting/planahunt/huntingGuides/bison/default.html>
2012. Statewide and Regional Hunter/Angler Use and Expenditure Fact Sheet.

- Montana Fish Wildlife and Parks and Montana Natural Heritage Program (FWP and MNHP). 2010a. *Bison — Bos bison. Montana Field Guide*. Retrieved from: http://FieldGuide.mt.gov/detail_AMALE01010.aspx
- Montana Natural Heritage Program (MTNHP), Field Guide. 2011. Species of Concern Reports. Retrieved from: <http://mtnhp.org/SpeciesOfConcern/Default.aspx>
- 2012 Wolverine - *Gulo gulo. Montana Field Guide*. Retrieved from http://FieldGuide.mt.gov/detail_AMAJF03010.aspx
- Mori S.A. and J.L. Brown. 1998. Epizoochorous dispersal by barbs, hooks, and spines in a lowland moist forest in central French Guiana. *Brittonia* 50:165-173.
- Nelson, K.L. 1965. Status and habits of the American Buffalo (*Bison bison*) in the Henry Mountain area of Utah. Utah State Department of Fish and Game Publication No. 65-2.
- Nez Perce Tribal Web Site. 2011. Tribal history. Retrieved from: <http://www.nezperce.org/Official/history.htm>
- Nickerson, Norma, C. Oschell, L. Rademaker, and R. Dvorak. 2007. Montana's Outfitting Industry: Economic Impact and Industry-Client Analysis. University of Montana Institute for Tourism & Recreation Research. Research Report 2007-1. Retrieved from: <http://www.itrr.umt.edu/research07/OutfitterGuideReport.pdf>
- Norland, J.E. 1984. Habitat use and distribution of bison in Theodore Roosevelt National Park. M.S Thesis, Montana State University, Bozeman, MT.
- Nowak, R.M. and J.L. Paradiso. 1983. *Walker's Mammals of the World* (4th ed.). Baltimore: The Johns Hopkins University Press.
- Olliff, T. and J. Caslick. 2003. Wildlife-human conflicts in Yellowstone: when animals and people get too close. *Yellowstone Science* 11:18-22.
- Opitz, Scott. 2011. Fisheries Investigations in the Yellowstone and Shields River Basins, Park County, Montana. Montana Fish, Wildlife & Parks, Bozeman MT
- Peden, D. G. 1972. The trophic relations of *Bison bison* to the shortgrass plains. Ph.D. Dissertation, Colorado State University, Fort Collins.
- Picton, H.D. and T.N. Lonner. 2008. *Montana's Wildlife Legacy: Decimation to Restoration*. Bozeman, MT: Media Works Publishing.
- Proffitt, K. M., P. J. White, and R. A. Garrott. 2010. Spatio-temporal overlap between Yellowstone bison and elk – implications for wolf restoration and other factors for brucellosis transmission risk. *Journal of Applied Ecology* 47:281-289.

- Reynolds, H.W., Glaholt, R.D. and Hawley A.W.L. 1982. Bison. In: J.A. Chapman and G.A. Feldhamer (eds.), *Wild Mammals of North America: Biology, Management, and Economics*, pp.972-1007. The Johns Hopkins University Press, Baltimore and London.
- Reynolds, H.W., C.C. Gates, and R.D. Glaholt. 2003. Bison. In: G.A. Feldhamer, B.C. Thompson, and J.A. Chapman (Eds.), *Wild Mammals of North America: Biology, Management, and Conservation Second Edition*, pp.1009-1059. Baltimore: The Johns Hopkins University Press.
- Rhyan, J.C., Aune, K., Ewalt, D.R., Marquardt, J., Mertins, J.W., Payeur, J.B., Saari, D.A., Schladweiler, P., Olsen, S.C. and Cheville, N.F. 1997. Survey of free-ranging elk from Wyoming and Montana for selected pathogens. *Journal of Wildlife Diseases* 33:290-298.
- Ruediger, Bill, J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada Lynx Conservation Assessment and Strategy. USDA-Forest Service, USDI-Fish and Wildlife Service, USDI-Bureau of Land Management and USDI-National Park Service, Missoula, Montana.
- Schwartz, C.C., J. Nagy, and R. Rice. 1977. Pronghorn dietary quality relative to forage availability and other ruminants in Colorado. *Journal of Wildlife Management* 41:161-68.
- Sime, C. A., V. Asher, L. Bradley, N. Lance, K. Laudon, M. Ross, A. Nelson, and J. Steuber. 2011. Montana gray wolf conservation and management 2010 annual report. Montana Fish, Wildlife & Parks. Helena, Montana.
- Singer, Frances. 1995. Effects of Grazing by Ungulates on Upland Bunchgrass Communities in the Northern Winter Range of Yellowstone National Park. *Northwest Science* 69(3): 191-203.
- Singer, F.J., and J.E. Norland. 1994. Niche Relationships within a Guild of Ungulate Species in Yellowstone National Park, Wyoming, Following Release from Artificial Controls. *Canadian Journal of Zoology* 72:1383-4.
- Ski Yellowstone Incorporated. 1973. Ski Yellowstone Environmental Study.
- Stoneburner, Lauren. 2012. Santa Catalina: the Bison's Makeshift Home. Retrieved from: <http://dornsife.usc.edu/enst-320a/water-and-soil/?p=348>
- Taylor, Audrey and R.L. Knight. 2003. Wildlife Responses to Recreation and Associated Visitor Perceptions. *Ecological Applications* 13(4): 951-963.
- Tessaro, S.V. 1989. Review of the diseases, parasites and miscellaneous pathological conditions of North American bison. *Canadian Veterinary Journal* 30:416-422.

- Tessaro, S.V., Gates, C.C. and Forbes, L.B. 1993. The brucellosis and tuberculosis status of wood bison in the Mackenzie Bison Sanctuary, Northwest Territories, Canada. *Canadian Journal of Veterinary Research* 57:231-35.
- Thein, T. R., F. G. R. Watson, S. S. Cornish, T. N. Anderson, W. B. Newman, and R. E. Lockwood. 2009. Vegetation dynamics of Yellowstone's grazing system. Pages 113-133 in R. A. Garrott, P. J. White, P.J., and F. G. R. Watson, editors. *The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies*. Elsevier, San Diego, California.
- Trails.com. 2012. Western Yellowstone & Gallatin River Valley Hiking. Retrieved from: <http://www.trails.com>
- Tyers, Dan. 2008a. Biological Assessment for Terrestrial Wildlife Species: Gardiner Basin Bison Fence Construction. Gardiner Ranger District, Gallatin National Forest. September 2008.
- 2008b. Biological Evaluation for Effects to Forest Service Sensitive Species: Gardiner Basin Bison Management Fence Construction and Maintenance. Gardiner Ranger District, Gallatin National Forest. September 2008.
- United Nations (UN). 2009. Agenda 21. Retrieved from: <http://www.un.org/esa/dsd/agenda21>
- U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service; USDI, National Park Service; Montana Fish, Wildlife & Parks; USDA, Forest Service; Montana Department of Livestock; Confederated Salish & Kootenai Tribes; InterTribal Buffalo Cooperative; and Nez Perce Tribe. 2009. Interagency Bison Management Plan Annual Report July 1, 2008 - June 30, 2009. Retrieved from: <http://www.ibmp.info/library.php>
2010. Interagency Bison Management Plan Annual Report July 1, 2009 - June 30, 2010. Retrieved from: <http://www.ibmp.info/library.php>
- 2011a. Interagency Bison Management Plan Annual Report August 1, 2010 - October 31, 2011. Retrieved from: <http://www.ibmp.info/library.php>
- 2011b. Adequacy of Montana Environmental Policy Act Determination.
- 2012a. Interagency Bison Management Plan Annual Report November 1, 2011 - October 31, 2012. Retrieved from: <http://www.ibmp.info/library.php>
- 2012b. Interagency Bison Management Plan Operating Procedures. Retrieved from: http://www.ibmp.info/Library/OperationsPlanIBMP_Dec2012_final.pdf
- U.S. Department of Agriculture, Forest Service (USFS). 1987. Gallatin National Forest Land and Resource Management Plan. Retrieved from: <http://www.fs.usda.gov/detail/gallatin/landmanagement/?cid=stelprdb5130417>

2005. Record of Decision for the Gallatin National Forest Noxious and Invasive Weed Treatment Project.
2006. Final Environmental Impact Statement for the Gallatin National Forest Travel Management Plan. Retrieved from:
<http://www.fs.usda.gov/detail/gallatin/landmanagement/?cid=stelprdb5134091>
2010. National Visitor Use Monitoring Results. Gallatin NF and Hyalite Porcupine Buffalo Horn WSA.
2011. Over-Snow Vehicle Use Map, Gallatin National Forest – Effective dates 12/1/11-11/30/12. Retrieved from:
http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5338988.pdf
2012. Gallatin National Forest – Hiking. Retrieved from:
<http://www.fs.usda.gov/activity/gallatin/recreation/hiking>
- U.S. Department of Agriculture, National Agricultural Statistics Service (NASS). 2012. Montana Agricultural Statistics: 2010-2011 County Estimates. Retrieved from:
http://www.nass.usda.gov/Statistics_by_State/Montana/Publications/Annual_Statistical_Bulletin/2012/2012_Bulletin.pdf
- U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA). 2011. Monthly and Seasonal Total Snowfall Amount for Gardiner MT. Retrieved from:
<http://www.ncdc.noaa.gov/ussc/USSCAppController>
- U.S. Department of the Interior (USDI), National Park Service, and United States Department of Agriculture, Forest Service, Animal and Plant Health Inspection Service. 2000a. Final environmental impact statement for the interagency bison management plan for the State of Montana and Yellowstone National Park. Washington, D.C. USDI and USDA. Retrieved from: <http://www.ibmp.info/library.php>
- 2000b. Record of decision for final environmental impact statement and bison management plan for the State of Montana and Yellowstone National Park. Washington, D.C. Retrieved from: <http://www.ibmp.info/Library/1%20-%20IBMP%20EIS%20Record%20of%20Decision.pdf>
- U.S. Department of the Interior, National Park Service (NPS). 2009. Yellowstone’s Summer 2009 Bison Population Estimate. Yellowstone National Park WY. Retrieved from:
<http://www.nps.gov/yell/parknews/09081.htm>
2012. “Grizzly Bears” from the Yellowstone Resources and Issues Handbook. Yellowstone National Park, WY. Retrieved from:
<http://www.nps.gov/yell/planyourvisit/resourceandissues.htm>

2013. Yellowstone National Park Reports. National Park Service Public Use Statistics Office. Retrieved from: <https://irma.nps.gov/Stats/Reports/ReportList>
- U.S. Department of the Interior (USDI), U.S. Department of Agriculture, and the State of Montana. 2008. Adaptive adjustments to the interagency bison management plan. National Park Service, Yellowstone National Park, Wyoming. Retrieved from: <http://www.ibmp.info/Library/2008%20IBMP%20Adaptive%20Management%20Plan.pdf>
- U.S. Department of the Interior, U.S. Fish & Wildlife Service (FWS). 2012. National Wetlands Inventory. Wetlands Mapper Database. Retrieved from: <http://www.fws.gov/wetlands/Wetlands-Mapper.html>
- Van Vuren, D.H. 2001. Spatial relations of American bison (*Bison bison*) and domestic cattle in a montane environment. *Animal Biodiversity and Conservation* 24:117-124.
- West Yellowstone Development Council. 2009. Community Information. Retrieved from: <http://www.wyed.org/community.htm>
- Wildlife Conservation Society (WCS). 2012. "Montanas Voice Overwhelming Support for Restoring Bison". Retrieved from: www.wcs.com/press/press-releases
- Whealdon, Bon I and others. 2001. "I Will Be Meat for My Salish": The Montana Writers Project and the Buffalo of the Flathead Indian Reservation. Salish Kootenai College Press and Montana Historical Society Press.
- White, P.J., J.T. Treanor, and R.L. Wallen. 2011a. Balancing Brucellosis Risk Management and Wildlife Conservation. *Yellowstone Science* 19(1): 15-21.
- White, P. J., R. L. Wallen, C. Geremia, J. J. Treanor, and D. W. Blanton. 2011b. Management of Yellowstone bison and brucellosis transmission risk- Implications for conservation and restoration. *Biological Conservation* 144:1322-1334.

