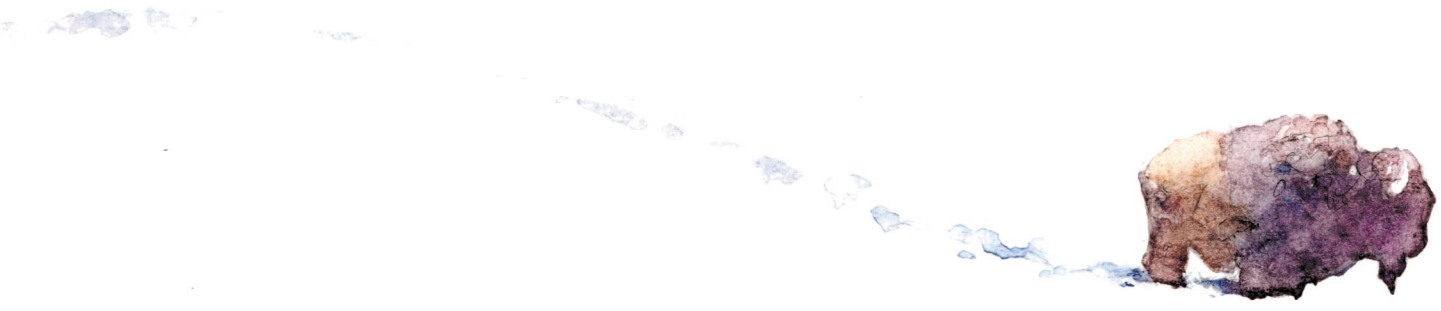
Bison Management Plan

for the State of Montana

and Yellowstone National Park



EXECUTIVE SUMMARY

SUMMARY
FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE INTERAGENCY BISON MANAGEMENT PLAN FOR THE STATE OF MONTANA AND YELLOWSTONE NATIONAL PARK

AUGUST 2000

This summary documents the additions and changes made to the *Draft Environmental Impact Statement* released to the public in June 1998 that are now contained in volume 1 of the final environmental impact statement. Original text from the *Draft Environmental Impact Statement* is shown in black, while changes and additions to the draft are shown in green. The exception to this is headings. Both original and new headings are shown in black.

Bison are an essential component of Yellowstone National Park because they contribute to the biological, ecological, cultural, and aesthetic purposes of the park. However, Yellowstone National Park is not a self-contained ecosystem for bison, and periodic migrations into Montana are natural events. Some bison have brucellosis and may transmit it to cattle outside the park boundaries in Montana. Left unchecked, the migration of brucellosis-infected bison from Yellowstone National Park into Montana could have not only direct effects on local livestock operators, but also on the cattle industry statewide. The cooperation of several agencies is required to fully manage the herd and the risk of transmission of brucellosis from bison to Montana domestic cattle.

The purpose of the proposed interagency action is 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 the state of Montana.

The U.S. Department of the Interior, National Park Service, and the U.S. Department of Agriculture, Forest Service, are the federal lead agencies. The U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS), is a cooperating agency. Until December 1999, the state of Montana was the state lead agency in the preparation of the environmental impact statement.

In 1992, the National Park Service, U.S. Forest Service, APHIS, and the state of Montana executed a Memorandum of Understanding to establish an understanding regarding the roles and responsibilities of those agencies in the preparation of a long-term bison management plan and environmental impact

The purpose of the proposed interagency action is to maintain a wild, free-ranging population of bison and address the risk of brucellosis transmission…

statement for the Yellowstone area. This Memorandum of Understanding is included in volume 1, appendix C of the final environmental impact statement. The Memorandum of Understanding identified the National Park Service, the U.S. Forest Service, and the state of Montana as joint-leads for the project and identified APHIS as a cooperating agency. The agreement provided that the joint-lead agencies must agree on the planning procedures and plan contents at each stage of the planning process. Finally, the agreement provided that any agency could terminate the agreement by providing a 30-day notice to the other parties that the agency would withdraw from the agreement.

In 1995 the state of Montana sued the National Park Service and APHIS, claiming, among other things, that their actions were delaying the completion of the environmental impact statement and long-term bison management plan. To resolve that case, the parties signed a settlement agreement that provided a schedule for the completion of the bison management plan. The settlement agreement incorporated the Memorandum of Understanding and expressly recognized that the termination provision of the Memorandum of Understanding would continue to apply to the process. The settlement agreement also required that if a party were to withdraw from the Memorandum of Understanding process, it must provide a written explanation of the reasons for the withdrawal. Finally, the settlement agreement provided that the court would dismiss the suit if a party terminated the Memorandum of Understanding.

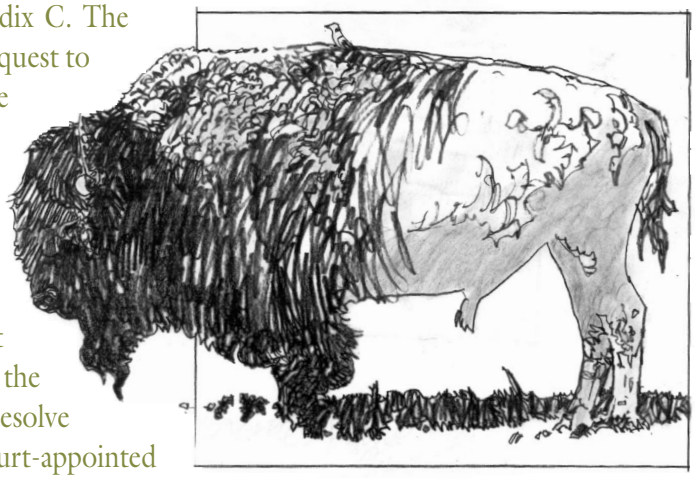
Following the receipt and analysis of public comments on the *Draft Environmental Impact Statement* (the review period for which ended in October 1998), the federal agencies developed a strategy for bison management that they presented to the state as a possible modified preferred alternative for the final environmental impact statement. The new strategy would allow greater tolerance for bison outside the park under stringent conditions that would continue to control the risk of transmission of brucellosis from bison to cattle. The strategy would also provide for a larger bison population than the preferred alternative in the *Draft Environmental Impact Statement*. The federal agencies and the state discussed aspects of the strategy over a period of several months. In November 1999, the federal agencies and the state's governor agreed that the agencies were at an impasse. Several items were at issue, including

- a population limit for bison in the preferred alternative
- the ages and classes of bison to be vaccinated

the criteria used to decide whether and when bison would be allowed outside the park north of Reese Creek and in the western boundary area

the federal agencies' support of an adaptive management approach to bison management using spatial and temporal separation as its primary risk management feature. This approach is explained in detail in the alternatives chapter as the modified preferred alternative.

In December 1999, the federal agencies wrote to the state of Montana declaring that they were withdrawing from the Memorandum of Understanding. This action terminated the Memorandum of Understanding and dismissed the 1995 Montana lawsuit. A copy of the 30-day notice is included in appendix C. The state objected to the federal agencies' request to dismiss the case. In February 2000, the court agreed with the position of the federal agencies that they could withdraw from the Memorandum of Understanding and cause the dismissal of the suit. The federal and state agencies agreed, however, that before the court would formally dismiss the suit, the agencies would attempt to resolve their differences with the use of a court-appointed mediator. That mediation occurred in April and May 2000; however, the termination of the Memorandum of Understanding remains in effect as of the date of the release of this final environmental impact statement.



Cowbird resting on the back of a bison.

The primary purpose of revisions in volume 1 and responses to comments in volume 2 is to update factual information and to present and analyze the modified preferred alternative. The withdrawal by the federal agencies from the Memorandum of Understanding has had little effect, therefore, on the content of the final environmental impact statement, and much of the text remains unchanged from the draft. In addition, the state supplied information and some responses to comments on the *Draft Environmental Impact Statement* before the withdrawal by federal agencies from the Memorandum of Understanding.

The final environmental impact statement examines eight alternative means of minimizing the risk of transmitting the disease brucellosis from bison to domestic cattle on public and private lands adjacent to Yellowstone National

Park. These alternatives each include a full range of management techniques, although they focus on one or two in particular. For instance, alternative 3 manages the bison herd primarily through hunting but includes provisions for quarantine. Alternative 5 proposes an extensive capture, test, and slaughter of bison that test positive for brucellosis. Alternative 6 is similar to alternative 5 but requires 10 years of vaccination before the test and slaughter phase begins. Alternative 1 is the no-action alternative. It continues the present plan of capture and slaughter of all bison crossing the north end and most bison crossing the west boundary of the park. Alternative 4 is similar to alternative 1, but would add quarantine, so that bison testing negative for brucellosis would not be slaughtered. Alternative 2 centers on changes in cattle operations and allows bison to range over the largest portion of their historic range. Alternative 7, the agencies' preferred alternative identified in the *Draft Environmental Impact Statement*, focuses on maintaining the bison population below about 2,500 animals to minimize migration into Montana. Alternatives 2, 3, 7, and the modified preferred alternative also include a framework for considering the use of lands acquired from willing sellers as winter range and for other bison management activities. Decisions to implement management actions on acquired lands will be or have already been supported with additional National Environmental Policy Act and/or Montana Environmental Policy Act analyses.

Adult bison.

Implementing the modified preferred alternative would result in no moderate or major adverse impacts compared to the no-action alternative (alternative 1). Both the long-term bison population size and seroprevalence would be very similar to alternative 1. However, unlike alternative 1, bison would be allowed into management zones outside the park under certain conditions. In step 3 of the modified preferred

alternative, bison would not be tested or marked before they exit the park, leading to major benefits to those groups and individuals who regard free-ranging, wild bison as culturally important, including positive impacts on those seeking to view bison. Positive impacts from the acquisition and use of about 6,000 acres outside the park for winter range would benefit ungulates, particularly pronghorn. A reduction in the use of the Stephens Creek facility during step 3 of the modified preferred alternative would also benefit wildlife in the vicinity. No adverse effect on any species protected under the Endangered Species Act is anticipated. Slight benefits to livestock operators from measures to mitigate the perception of risk, including additional testing of cattle, possible vaccination of adult cattle, and many other risk management measures at no cost to livestock operators, are expected. Some reduction in risk to the health of personnel handling bison in capture facilities is also expected in step 3 of the modified preferred alternative. Nonmarket benefits associated with the use of acquired winter range north of the park by bison are also predicted.

To summarize impacts from the other seven alternatives analyzed, implementation of alternative 7 would result in adverse impacts on the social values of some people, groups, or tribes, a few ranchers using public allotments on the Gallatin National Forest should those allotments be closed, wildlife species (predators and scavengers), the cultural importance of the herd to some tribes and visitors, and viewing opportunities for those seeking to view bison. Other alternatives might have these same impacts but could also affect winter recreation (particularly snowmobiling), nonmarket values, livestock operations, public funds (to acquire winter range), the trumpeter swan, bald eagle, lynx, and wolverine, and the historic landscape of the area. Alternatives 2, 3, and 7 would have beneficial impacts to wildlife and benefits associated with the nonmarket values attributed to the use of acquired winter range by bison. Similar nonmarket benefits associated with the reduction of seroprevalence achieved in alternative 5 and phase 2 of alternative 6 (which would not occur during the 15-year life of the plan) are also predicted. Mitigating measures and some monitoring would be needed to avoid impacts on threatened or endangered species in alternatives 5 and 6.

The final environmental impact statement will be available for public review a minimum of 30 days prior to issuance of records of decision by the agencies. Comments must be postmarked on or before October 2, 2000. Please send to:

Yellowstone National Park
Attn: Sarah Bransom, YCR
P.O. Box 168
YNP, WY 82190

Ancient Indian

cave art.

CONTENTS

TABLES

MAPS

INTRODUCTION

This summary documents the additions and changes made to the *Draft Environmental Impact Statement* released to the public in June 1998 that are now contained in volume 1 of the final environmental impact statement. Original text from the *Draft Environmental Impact Statement* is shown in black, while changes and additions to the draft are shown in green. The exception to this is headings. Both original and new headings are shown in black.

PROPOSED ACTION

The environmental impact statement analyzes impacts of several different means (alternatives) for the interagency, long-term management (assumed for purposes of analysis to be 15 years) of Yellowstone area bison to ensure domestic cattle in portions of Montana adjacent to Yellowstone National Park are protected from brucellosis, a disease some of these bison carry, and to ensure the wild and free-ranging nature of the bison herd. Each alternative benefits from the cooperation of the U.S. Department of the Interior's National Park Service (NPS), the state of Montana, and the U.S. Department of Agriculture's Forest Service and APHIS. In nearly every alternative, all have jurisdiction over a portion of the management effort, either directly or indirectly. At this time, the modified preferred alternative is the federal agencies' preferred means of bison management.

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PROJECT LOCATION

The analysis area is a part of what is often described as the Greater Yellowstone Area, the largest and most nearly intact ecosystem in the contiguous United States (Greater Yellowstone Coordinating Committee 1991). The portion specifically subject to analysis includes those areas in Yellowstone National Park habitually occupied by bison (approximately 1.75 million acres) and adjacent federal, state, and private lands outside the park in southwestern Montana (parts of Park and Gallatin Counties) that have been periodically occupied by Yellowstone bison over the past 12 years.

The area outside the park includes approximately 568,994 acres, of which about 97% is managed by Gallatin National Forest, 1% by state or local government, and 2% by private owners (see Greater Yellowstone Area map.)

NEED FOR ACTION

Bison are an essential component of Yellowstone National Park because they contribute to the biological, ecological, cultural, and aesthetic purposes of the

park. However, Yellowstone National Park is not a self-contained ecosystem for bison, and periodic migrations into Montana are natural events. Some bison have brucellosis and may transmit it to cattle outside the park boundaries in Montana. As bison migrate out of the park and into Montana, they move from one jurisdiction with management objectives to a different jurisdiction with different management objectives. Therefore, the cooperation of several agencies is required to fully manage the herd and the risk of transmission of brucellosis from bison to Montana domestic cattle.

Bison exiting Yellowstone National Park through north entrance near Gardiner, Montana.

PURPOSE OF ACTION

The purpose of the proposed interagency action is 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 the state of Montana.

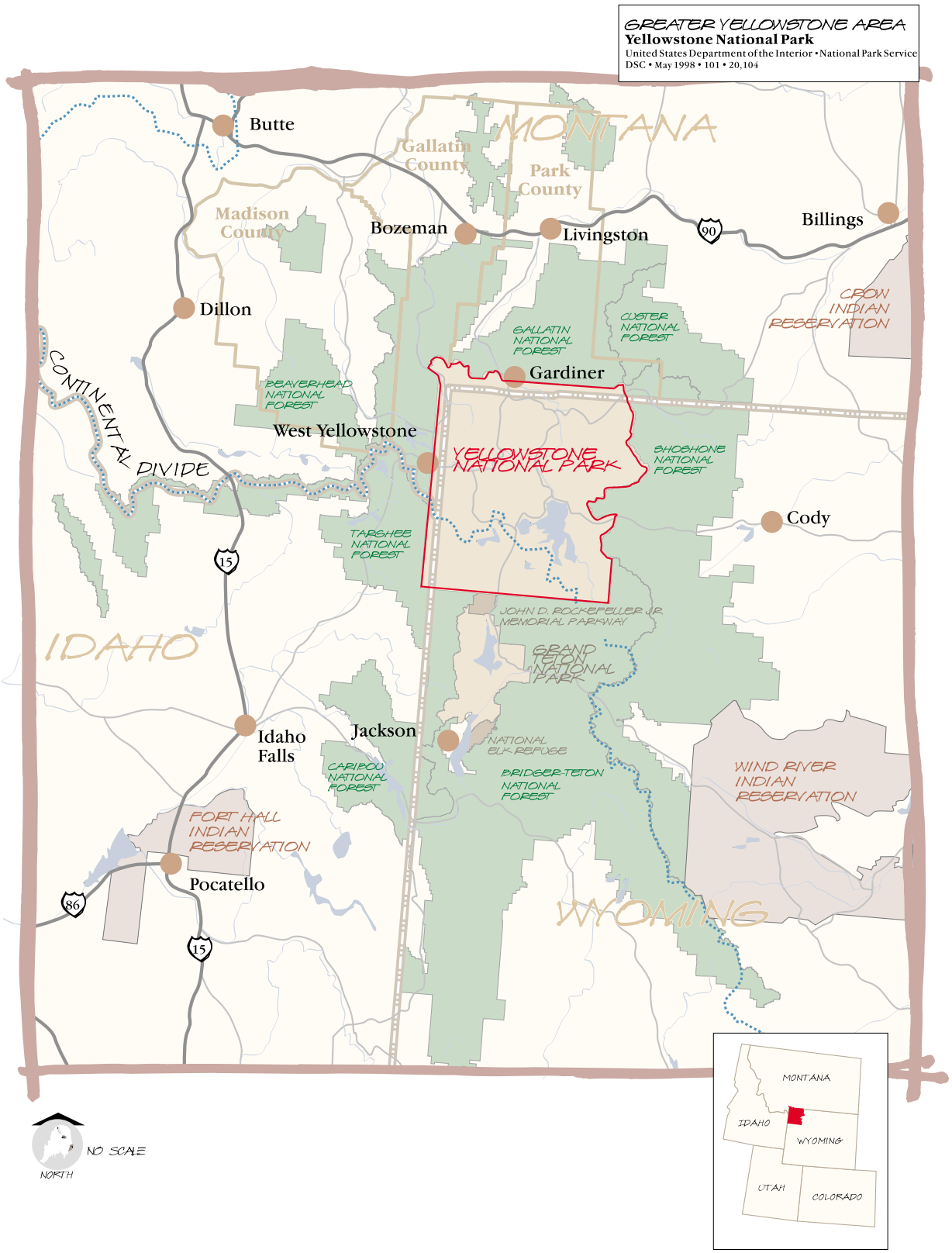
BACKGROUND

The Yellowstone Area Bison Herd

Bison are native to the Greater Yellowstone Area and were observed there by early travelers both before and after the creation of Yellowstone National Park in 1872 and the Yellowstone Timber Land Reserve in 1891.

Hunting and poaching of bison in the late 1800s substantially reduced the number of bison in the Yellowstone herd, and by 1901, only 25 bison were counted. Fearful the small wild herd might vanish, park managers imported 21 bison from captive herds into the park in 1902. These bison were raised using livestock techniques on the "Buffalo Ranch" in Lamar Valley until the 1930s, when the National Park Service gradually began efforts to restore the bison to a more natural distribution (NPS, USDI, Meagher 1973). Although the native and captive herds were initially kept separate, they began to intermingle between 1915 and 1920. After the 1920s, little or no effort was made to keep the two populations separate.

By 1922, the park suggested that a law be passed authorizing the sale or disposition of some bison (Albright 1922, as cited in Skinner and Alcorn 1942–1951). Authority for this was granted in the Appropriation Act of 1923.


GREATER YELLOWSTONE AREA
Yellowstone National Park
United States Department of the Interior • National Park Service
DSC • May 1998 • 101 • 20,104
MONTANA
IDAHO
WYOMING
Butte
Gallatin County
Park County
Madison County
Bozeman
Livingston
Billings
90
Dillon
CROW INDIAN RESERVATION
GALLATIN NATIONAL FOREST
CUSTER NATIONAL FOREST
Gardiner
BEAVERHEAD NATIONAL FOREST
CONTINENTAL DIVIDE
West Yellowstone
YELLOWSTONE NATIONAL PARK
SHOSHONE NATIONAL FOREST
Cody
TARGHEE NATIONAL FOREST
15
JOHN D. ROCKEFELLER JR. MEMORIAL PARKWAY
GRAND TETON NATIONAL PARK
Idaho Falls
Jackson
NATIONAL ELK REFUGE
CARIBOU NATIONAL FOREST
BRIDGER-TETON NATIONAL FOREST
WIND RIVER INDIAN RESERVATION
FORT HALL INDIAN RESERVATION
Pocatello
86
15
NO SCALE
NORTH
MONTANA
IDAHO
WYOMING
UTAH
COLORADO

By the 1930s, the total number of bison wintering in the Lamar area had increased to over 1,000, and the park began reductions by shipping bison to public parks, zoos, and private estates. Bison were also used to begin herds in other areas of the park. Artificial feeding of the Lamar Valley herd, herd reductions to achieve range management goals, and other manipulation of the population continued from the 1920s until the late 1960s, and were often quite intensive. The highest reported bison count during this period was 1,477 in 1954.

In 1967, when herd reductions in the park ceased as part of a larger redirection of park policies, 397 bison were counted. Since that time bison, elk, and other animals have been allowed to reach population levels dictated by environmental conditions.

Brucellosis was first diagnosed in the Yellowstone herd in 1917 (Mohler 1917, as cited in Tunnicliff and Marsh 1935). In 1968, in response to livestock industry concerns over brucellosis, the National Park Service proposed a program to control bison at the boundary of the park. In addition, an early version of parkwide capture, test, and slaughter or vaccination efforts took place in the mid-1960s (Yellowstone National Park Bison Management Plan 1964–65). These efforts were reviewed by park management and determined to be ineffective and "never-ending" (Meagher 1972). Beginning in 1967, this type of bison management ceased in the park. More recently, a series of four interim bison management plans (the latest in 1996) put specific boundaries and lethal control measures in place. In 1996–97, a particularly harsh winter with deep snow and ice conditions sent hundreds of bison toward park boundaries, seeking accessible forage at lower elevations. Implementation of the interim plan, combined with the severe winter conditions, resulted in the removal of 1,123 bison in the five months between November 14, 1996, and April 15, 1997 (1,084 bison were shot or slaughtered, and 39 were used for research purposes). Others died of starvation or other natural causes inside the park, bringing the total population down from an estimated 3,500 in fall 1996 to an estimated 2,000 animals by early spring 1997. The federal agencies and the state of Montana discussed the situation and in 1977 began to implement adjustments to the interim plan that were aimed at reducing the number of bison shot or shipped to slaughter. These adjustments include increased emphasis on hazing bison back into the park, holding bison up to the capacity of the Stephens Creek capture facility until weather conditions moderate, and allowing low-risk bison that evade capture in the West Yellowstone area to remain on public lands for 30 to 60 days before cattle are released on federal grazing allotments.

Brucellosis in Cattle and Bison

Brucellosis is a contagious bacterial disease, caused by various species of the genus, *Brucella*, that infects domestic animals, wildlife, and humans worldwide. *Brucella abortus* is the species that infects both cattle and bison. There is no cure for brucellosis in these species. Vaccines developed so far are not 100% effective, and are to date less effective with bison than with cattle. The first known case of brucellosis in the bison herd was reported in 1917. It is generally agreed that the transmission of brucellosis to the Yellowstone bison herd was from cattle, and occurred either through contact with infected cattle or from infected cows' milk fed to captive bison calves.

In cattle, the organism is shed primarily in aborted tissues, reproductive tissues, and discharges, especially just before, during, or soon after abortion or live birth. Ingestion by other cattle of contaminated material is the primary route of infection. Cows infected with brucellosis characteristically abort their first calf after the fifth month of gestation.

Less is known about the disease in bison, particularly free-ranging bison. Transmission from bison to cattle has occurred under experimental conditions in confined spaces, but has not been documented under free-ranging conditions. Since the release of the *Draft Environmental Impact Statement*, the National Academy of Sciences finalized a summary of pertinent literature on several aspects of brucellosis (NAS 1998). Relevant material from this summary is used throughout volumes 1 and 2 of the final environmental impact statement to clarify discussions on epidemiology and pathology of the disease in both cattle and bison.

Diagnosis. In cattle, diagnosis is based on the results of blood tests, herd history, clinical signs, and other information. The diagnosis can be confirmed by positive cultures. *B. abortus* may be isolated from tissues collected at slaughter, milk or udder secretions, biopsy of lymph nodes, reproductive tract exudates, discharges from live animals, or fetal or placental materials collected at the time of abortion or calving. In Yellowstone bison, agencies have used a blood test for the presence of *Brucella* antibodies. For a number of reasons, these blood tests tend to overestimate the number of bison actually harboring the bacteria. Difficulties in isolating the bacteria from tissues and other factors have also meant fewer positive culture tests than the number of infected bison.

Risk of Transmission. Scientists and researchers disagree on even some of the most basic factors influencing the risk of transmission. These include whether studies on cattle are applicable to bison, whether controlled studies

are applicable in the field, and the best ways to conduct additional research to determine the risk of transmission.

These disagreements and a paucity of information on brucellosis in bison make it impossible to quantify the risk of *B. abortus* transmission from bison (and elk, although the environmental impact statement does not analyze brucellosis in elk) in the Yellowstone area to domestic livestock. Instead, the agencies have identified factors that affect risk. They include the following:

1. The degree of association between potentially infectious and susceptible animals. Management actions emphasize separation to minimize risk.
2. The number and density of infectious animals in the host population.
3. The number of susceptible animals that may associate with infectious animals.
4. Environmental factors such as weather, sunlight, and other factors that determine the viability of the organism outside its host.
5. The class of the infectious animals. Because the disease is transmitted in cattle through ingestion of contaminated birth materials, pregnant bison are considered higher risk than other classes.
6. Vaccination and neutering reduce the transmission of the disease.
7. Some animals are naturally resistant to infection.

Since bison and cattle are prevented from interacting under each of the alternatives in the environmental impact statement, it is the presence and persistence of bacteria in birth materials that are at issue in determining the risk of transmission. Research completed since the release of the *Draft Environmental Impact Statement* has direct bearing on this discussion. In one study, 30 known bison birth or abortion sites in the park from 1996 to 1998 were sampled. The *B. abortus* bacterium was isolated at two of those sites immediately following the birth or abortion event and persisted for a maximum of 18 days (Coffin, pers. comm.). Cook (1999) studied *B. abortus* strain RB51 on samples taken from the exposed surface of bovine fetuses in Wyoming under natural environmental conditions. While some environmental conditions may vary in Wyoming from those found in the impact area, Cook found that the bacteria were vulnerable to light and desiccation and concluded that by June, when cattle are scheduled to return to public grazing allotments in the impact area, as few as 4.7 days would be required to ensure the absence of any live bacteria. Under all alternatives, susceptible cattle would not be allowed to graze until a minimum of 30 days have elapsed since bison were hazed back into the park.

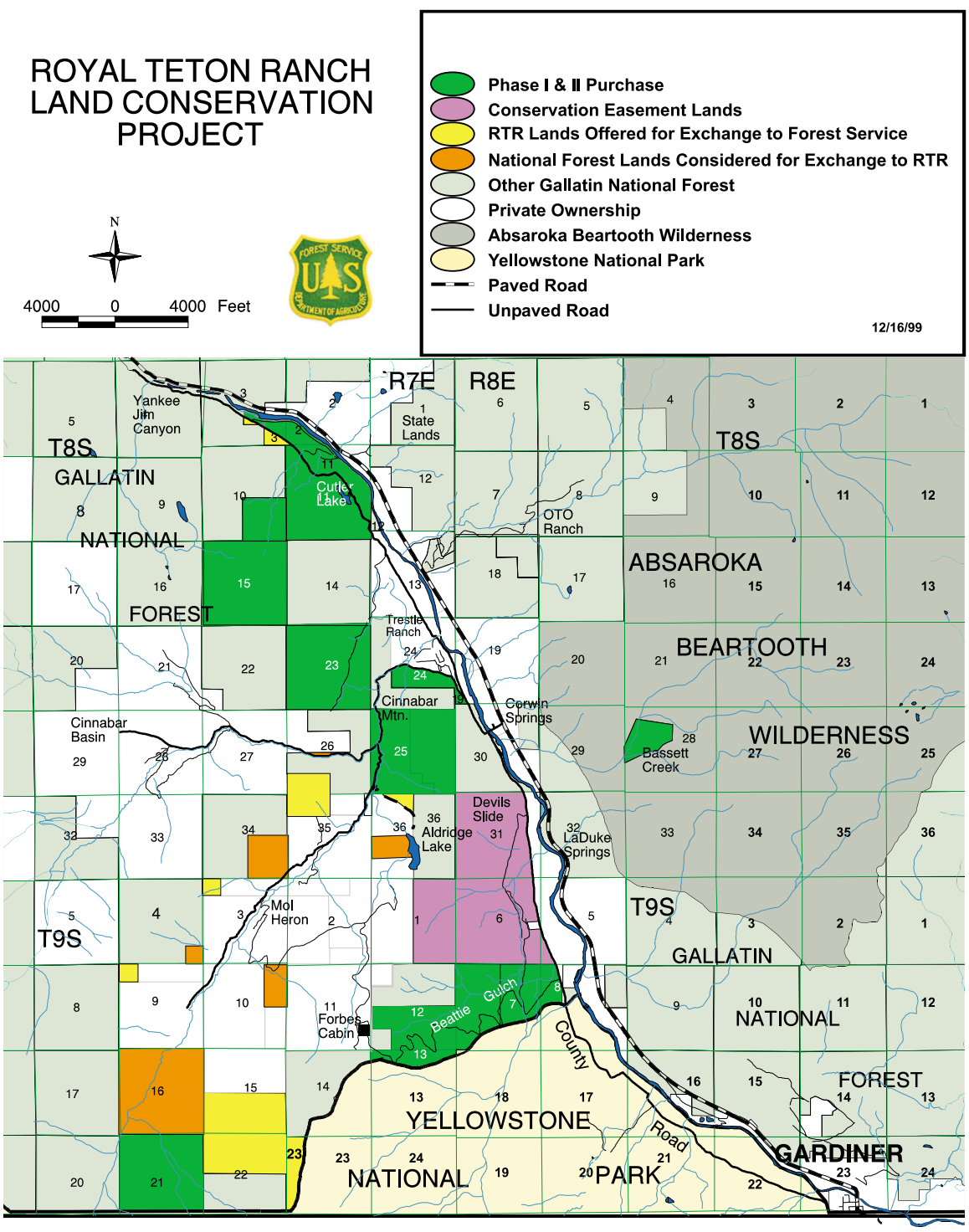
Alternative Interpretation of Risk. The above information represents areas where scientists generally agree on the interpretation of available data. However, considerable debate and need for additional research remain. The bulk of brucellosis research and disease management has focused on domestic livestock, yet limited published information suggests the disease may be transmitted differently and have different clinical, pathological, and population effects in bison (Williams et al. 1994; Meyer and Meagher 1995a).

Those who suggest the risk is negligible point out that there have been no documented cases of brucellosis transmission from wild, free-ranging bison to cattle.

It is possible that, although brucellosis may be endemic in the Yellowstone area bison herd, few of the animals are capable of transmitting the disease. This suggestion is supported by noting the discrepancy between the number of bison that test seropositive for brucellosis but culture tissue negative (Roffe et al. 1999). This discrepancy and the infrequency of observed abortions in the Yellowstone bison herd (usually required for transmission of the disease between cattle) has led to the theory that the primary route of transmission among cattle (abortions and birthing events) may be different from that among bison. In bison, the bacteria may be transmitted through milk (Meyer and Meagher 1995a).

Bison Distribution

The Yellowstone bison population uses three different wintering areas in the park: Pelican Valley (the smallest), Mary Mountain (the largest, in the Hayden Valley-Firehole River area), and the northern range. Yellowstone National Park grooms roads in the winter for snowmobile use, which allows bison to easily traverse the park. Bison seem to use the roads to exit in severe winters, such as the 1975–76 and 1996–97 winters, and retain the memory of the access routes (Meagher 1989a). While experts agree that bison traveling on groomed routes are traveling in a more energy-efficient manner than bison traveling through deep snow, there is disagreement about what bison would do if grooming ceased. What result this would have on bison numbers and distribution is not known. Bison migrate across the north and west ends of the park during the winter into Montana. In the north they exit primarily across the Reese Creek boundary of Yellowstone National Park, and move immediately onto adjacent private land where several hundred cattle are present year-round. Through the purchase of lands and conservation easements, a portion of this adjacent private land has been acquired by the U.S. Forest Service since the release of the *Draft Environmental Impact Statement (*see Royal Teton map). One of the designated uses is as a wildlife


ROYAL TETON RANCH
LAND CONSERVATION
PROJECT
N
4000 0 4000 Feet
Phase I & II Purchase
Conservation Easement Lands
RTR Lands Offered for Exchange to Forest Service
National Forest Lands Considered for Exchange to RTR
Other Gallatin National Forest
Private Ownership
Absaroka Beartooth Wilderness
Yellowstone National Park
Paved Road
Unpaved Road
12/16/99
R7E
R8E
T8S
T9S
GALLATIN
NATIONAL
FOREST
ABSAROKA
BEARTOOTH
WILDERNESS
YELLOWSTONE
NATIONAL
PARK
GARDINER
Yankee Jim Canyon
State Lands
Cutler Lake
OTO Ranch
Trestle Ranch
Cinnabar Mtn.
Corwin Springs
Cinnabar Basin
Bassett Creek
Devils Slide
Aldridge Lake
LaDuke Springs
Mol Heron
Forbes Cabin
Beattie Gulch
County Road

winter range. After an existing cattle lease on them expires in 2002, it is anticipated that bison would be allowed to use these acquired lands under alternatives where the lands are designated as a bison management area. These alternatives include 2, 3, 7, and the modified preferred alternative.

Bison may also enter national forest land in the Eagle Creek/Bear Creek area east of Reese Creek, where they occasionally enter private lands in the Gardiner area by traveling along the Maiden Basin hydrographic divide and Little Trail Creek drainage. These lands are collectively referred to as the Eagle Creek/Bear Creek "special management area" (areas outside the park where bison are allowed) in this document. To the east of these lands (and north of the park) lie Hellroaring and Slough Creek drainages and the Absaroka-Beartooth Wilderness, part of the national forest where cattle are not present. A few bison use these higher elevation, more rugged lands in winter and summer.

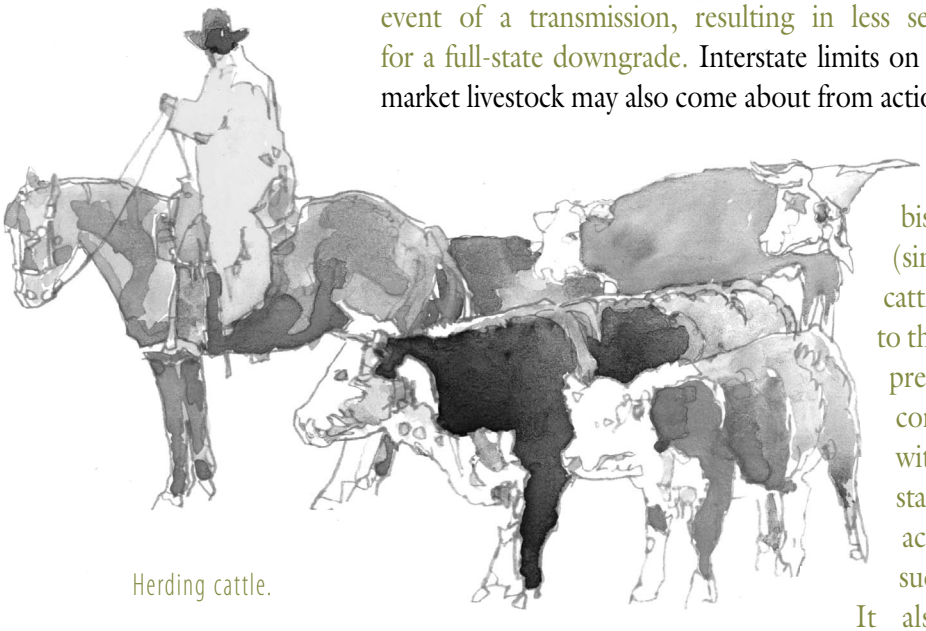
From the west side of the park, bison move along the Madison River, Duck Creek, and Cougar Creek in the vicinity of West Yellowstone. From here, bison infrequently move north (usually along Highway 191) onto public lands administered by the U.S. Forest Service in the Cabin Creek Recreation and Wildlife Management Area and the Monument Mountain Unit of the Lee Metcalf Wilderness. The western special management area (SMA) in this document includes these lands south to the West Yellowstone area. Up to a few hundred cattle may occupy select public and private lands in the West Yellowstone area in the summer months. No cattle are present in the winter.

Economic Impacts of Brucellosis in Cattle

Brucellosis (*B. abortus*) has the following direct impacts on the livestock industry:

- Abortion of calves
- Decreased weight gain by calves
- Delays in calf production
- Increased rates of culling and replacement
- Increased testing and vaccinating costs

The presence of livestock disease may also affect each state's classification by the Animal and Plant Health Inspection Service. Montana is currently "class-free" and can transport its cattle across state lines without testing for brucellosis. Downgrading could have extensive economic ramifications throughout the livestock industry in Montana by restricting ranchers' access to interstate and international livestock markets. However, it is possible under



Herding cattle.

APHIS rules, that only a portion of the state would be downgraded in the event of a transmission, resulting in less severe economic impacts than for a full-state downgrade. Interstate limits on Montana producers' ability to market livestock may also come about from actions of state veterinarians whose states import Montana cattle and who see Yellowstone bison as a potential disease threat (since no cure for brucellosis in cattle or bison exists). In response to this possible threat, the modified preferred alternative includes a commitment by APHIS to work with Montana to educate any state indicating it would take such action and convince them that such sanctions are unwarranted. It also includes provisions for additional monitoring and regular testing of cattle herds in the impact area and possible adult vaccination of these cattle at government expense. The potential for widespread economic consequences is a primary motivating factor in taking management actions described in the alternatives in the environmental impact statement.

OBJECTIVES AND CONSTRAINTS IN TAKING ACTION

In addition to the above-stated purpose, the agencies have agreed that nine objectives would guide them in determining whether an alternative is reasonable, and in selecting the preferred alternative. Each alternative must meet the following objectives:

1. Address bison population size and distribution; have specific commitments relating to size of bison herd.
2. Clearly define a boundary line beyond which bison will not be tolerated.
3. Address the risk to public safety and private property damage by bison.
4. Commit to the eventual elimination of brucellosis in bison and other wildlife.
5. Protect livestock from the risk of brucellosis.
6. Protect the state of Montana from risk of reduction in its brucellosis status.
7. At a minimum, maintain a viable population of wild bison in Yellowstone National Park, as defined in biological, genetic, and ecological terms.

8. Be based on factual information, with the recognition that the scientific database is changing.

9. Recognize the need for coordination in the management of natural and cultural resource values that are the responsibility of the signatory agencies.

Another important factor in deciding the reasonableness of alternatives are agency constraints imposed by laws, regulations, or other requirements. All alternatives must be within these constraints to be a viable choice. A summary of legislative and regulatory requirements of each of the four agencies involved in bison management is provided in volume 1, "Purpose of and Need for Action."

ISSUES

Public scoping identified several environmental problems (issues) that should be addressed in a cooperative bison management plan. Scoping also identified other objectives and alternatives the public wished agencies to consider in their planning. The resources that agencies believed would experience more than negligible impacts are listed below, and each is analyzed in the environmental impact statement:

Bison calf.

- the Yellowstone area bison population size, distribution, and seroprevalence
- recreation
- socioeconomics, including the regional economy, minority and low-income populations, social values, and nonmarket values
- livestock operations in the region
- threatened and endangered species, such as the grizzly bear, and sensitive species or species of special concern
- other wildlife
- human safety
- cultural resources
- visual resources

SUMMARY OF ALTERNATIVES AND IMPACTS

The environmental impact statement evaluates eight alternatives for the long-term management of bison. Alternative 1 is the no-action alternative (continue with existing interim plan), and the federal agencies have identified the modified preferred alternative (adaptive management approach) as its preferred plan.

The eight alternatives have several features in common, including the following:

- All alternatives benefit from, and in some cases require, the cooperation of the state of Montana, the U.S. Forest Service, the National Park Service, and the Animal and Plant Health Inspection Service.
- Every alternative envisions the bison population would be managed primarily through natural processes inside Yellowstone National Park.
- In all alternatives (except alternative 5 in the short term), the use of lethal controls to manage bison is minimized as the population size approaches 1,700 animals.
- All alternatives include large geographic areas where bison are able to range with little human intervention. In alternative 5, this area is limited to Yellowstone National Park.
- Monitoring is an integral part of every alternative, especially as bison approach designated border areas in Montana.
- All alternatives define a management boundary beyond which agencies would take action to ensure bison do not remain.
- If a capture facility is sited as part of an alternative, it would meet certain environmental criteria and comply with requirements of the Endangered Species Act and the National Historic Preservation Act before construction began.
- All alternatives include humane treatment of bison held in capture or quarantine facilities.
- All alternatives except alternative 5 allow bison outside the park. To do so and not affect Montana's class-free status, special management areas (SMAs) or management zones (in the case of the modified preferred alternative) would be created. The creation of these SMAs or management zones would not require changes to current APHIS regulations, but would require the approval of the state of Montana as specified by Montana law.
- Slaughtered bison could be auctioned or distributed to social service organizations. Bison shot in the field may be released to tribes. Live bison would be available if they had completed the approved quarantine protocol.

The environmental impact statement evaluates eight alternatives for the long-term management of bison.

- In Montana, private landowners may shoot bison on their land with permission from the Department of Livestock, or they may ask the department to remove bison.
- All alternatives include the suggested vaccination of female cattle calves in areas adjacent to the park or in SMAs, as well as surveillance testing of these herds should contact with bison be suspected or occur. All alternatives also assume vaccination of bison calves and captured adult bison when a safe and effective vaccine is available.
- All alternatives include future research efforts.

For a comparison of actions and features among alternatives, see table 1, "Summary Comparison of Alternative Actions" and table 2, "Comparison of Features of Each Alternative."

ALTERNATIVES

Alternative 1: No Action — Continuation of the Current Interim Bison Management Plan

Adopting this alternative would continue current bison management as set forth in the 1996 *Interim Bison Management Plan* as defined by National Environmental Policy Act guiding regulations (40 CFR 1502.14). The interim plan relies on strict border enforcement to keep bison and cattle separate, and has no provision for the quarantine of bison. Bison are prevented from crossing the northern park boundary at Reese Creek because the adjacent land is private and occupied by cattle throughout the year. All bison captured at the Stephens Creek facility are shipped to slaughter.

Bison are allowed in the Eagle Creek/Bear Creek area, a large tract of public (U.S. Forest Service) land north and east of Reese Creek. The Department of Livestock, with help from the agencies, maintains a boundary at Little Trail Creek/Maiden Basin hydrographic divide in the Eagle Creek/Bear Creek area. Bison moving north of this boundary and approaching private land in the Gardiner area are removed by agency personnel with the permission of the landowner.

In the West Yellowstone area, public lands administered by the U.S. Forest Service are adjacent to the park. Cattle are more dispersed than at Reese Creek and are not grazed during the winter months. Up to 50–100 seronegative nonpregnant bison in the West Yellowstone area are able to overwinter successfully outside the park without coming in contact with cattle. Seropositive, untested, or any pregnant bison are removed. Bison are excluded from the West Yellowstone area from May through October to prevent contact while cattle occupy the region. Bison located outside the park in the

west boundary area would be hazed back into the park in the spring, 30 to 60 days before cattle occupy the area. The exact number of days, between 30 and 60, would be at the discretion of the state veterinarian. Those bison that could not be hazed back into the park would be shot. In addition, a handful of bison (usually single bulls) use the Cabin Creek/Lee Metcalf area on the west, or Hellroaring and Slough drainages to the north and east of Eagle Creek/Bear Creek. Those few that do move beyond the borders of either of these large tracts of public land would be hazed or shot.

Adjustments to the interim plan aimed at reducing the number of bison shot or shipped to slaughter were implemented beginning in 1997. These include increased emphasis on hazing bison back into the park, holding bison up to the capacity of the Stephens Creek capture facility until weather conditions moderate, and allowing low-risk bison that evade capture in the West Yellowstone area to remain on public lands for 30 to 60 days before cattle are released on federal grazing allotments.

Alternative 2: Minimal Management

The purpose of this alternative is to restore as near-natural conditions as possible for bison, including a small portion of their historic nomadic migration patterns. The area outside Yellowstone National Park over which bison would be able to range (e.g., the SMAs) without interference from agencies is the largest of all alternatives.

In each alternative, including alternative 2, many changes, such as land acquisition, changes in cattle operations, and a safe and effective bison vaccine, are described. Each of these involves some unknowns, as well as time to implement. Therefore, until these changes were in place, relevant management tools in the interim plan would remain in effect. The description below assumes these changes have been made. Since completion of the *Draft Environmental Impact Statement*, the federal Departments of the Interior and Agriculture and the Rocky Mountain Elk Foundation teamed in February and again in August 1999 to purchase lands and conservation easements totaling 6,131 acres between the Reese Creek boundary and Yankee Jim Canyon. The purchased lands would be under the jurisdiction of the Gallatin National Forest and available for use by wildlife. It is expected that bison would be able to use the acquired lands for winter range when a cattle lease currently in operation on part of this property expires in 2002.

The primary means to minimize the risk of disease transmission would be changes in cattle operations in the SMAs. This alternative would provide for lethal control of bison only in cases where human safety was in immediate

danger, on private property at the request of the landowner, or outside the SMA border. Bison would not be captured or slaughtered by agencies. A key tool available to restore natural conditions and help control bison distribution would be the closure (e.g., discontinuing grooming) of winter groomed roads in Yellowstone National Park that the animals now use to traverse the park. Bison have "discovered" these pathways from the interior to both the northern and western boundaries of the park, and can use them routinely during the winter to access areas they would otherwise have more difficulty reaching. It is hypothesized that the energetic cost of traveling long distances on groomed roads would be low, and they in effect could be allowing bison to access other foraging areas, leave the interior, and move to boundary areas. Alternative 2 would be the only alternative to propose changes in winter operations in some segments of park roads to control bison distribution, although other alternatives include research on the use of roads and potential barriers to bison travel (alternative 3), and plowing to access capture facilities (alternatives 5 and 6).

In addition to leaving road segments ungroomed, the agencies would maintain boundary lines through hazing and shooting. Landowners could request bison on their property be removed, or could shoot them with permission of the Montana Department of Livestock. Cattle operators on private lands inside designated SMAs might be offered incentives to remove susceptible (breeding) cattle, or grazing rights, easements, or property in bison winter range might be purchased from willing sellers to remove cattle altogether. In addition, public grazing allotments might be modified to accommodate bison.

Alternative 3: Management with Emphasis on Public Hunting

Alternative 3 would rely on hunting of bison to regulate population numbers and distribution of bison outside the park, and on separation of bison in time and space to preclude contact of bison with cattle. Where hunting was infeasible or inappropriate, capture and shipment of seropositive bison to slaughter and seronegative bison to quarantine would be used to maintain separation and manage the risk of disease transmission. As in other alternatives, bison would be vaccinated when a safe and effective vaccine was developed to further reduce this risk. This alternative would have both a distinct short-term (phase 1) and a long-term (phase 2) management strategy.

In the short term, the separation of cattle and bison on the northern (Reese Creek) boundary would be maintained through capture at Stephens Creek and the shipment of seropositives to slaughter and seronegatives to quarantine (or slaughter until the quarantine facility was built). Under the provisions of the interim management plan, the agencies now ship some of the bison captured

at Stephens Creek to slaughter. A quarantine facility would give the agencies flexibility in the disposition of seronegative bison they do not now have.

Bison that completed the entire quarantine procedure would be shipped live to requesting tribes or organizations, or used to repopulate herds on public lands. The location, design, and operation of a quarantine facility has not been determined, and an appropriate range of alternatives with different features would be evaluated before one was built. Additional NEPA and other compliance would be required to build such a facility on federal land or use federal money. Until the time a quarantine facility was constructed, all seronegative bison captured at Stephens Creek would be sent to slaughter.

The Department of Livestock, with help from the agencies, would maintain a boundary at Little Trail Creek/Maiden Basin hydrographic divide similar to alternative 1. Bison moving north of this boundary would be removed by agency personnel with the permission of the landowner.

Bison would be hazed back into the park in the spring, 30 to 60 days before cattle occupy the area. The exact number of days, between 30 and 60, would be at the discretion of the state veterinarian. Those bison that could not be hazed back into the park would be shot. As in alternatives 1 and 4, agencies would also maintain a boundary at the north end of the Cabin Creek Recreation and Wildlife Management Area/Monument Mountain Unit of the Lee Metcalf Wilderness. Hunting would be used in both the Eagle Creek/Bear Creek and western SMAs to help control population numbers and distribution. Research on the degree to which the winter grooming of park roads contributed to migration out of the park would continue, and changes in road grooming practices would be made in the long term if research showed they were warranted. These changes would be implemented through amendments to the park's winter use plan and appropriate NEPA documentation.

In the long term, alternative 3 would call for acquisition of bison winter range through purchase of grazing rights, easements, or property from willing sellers, alterations in cattle allotments, and/or changes in livestock operations to remove susceptible cattle. This newly acquired winter range would be designated as the Reese Creek SMA, and would include lands on the west side of the Yellowstone River between Reese Creek and Yankee Jim Canyon. Since the release of the *Draft Environmental Impact Statement*, these lands have been acquired. It is anticipated they would be available for use by bison when a current cattle lease on a portion of them expires in 2002. The Department of Livestock, with help from the agencies, would maintain a boundary at Yankee Jim Canyon, and hunting in the Reese Creek SMA would be used to

help control population size and distribution of the bison herd. The Stephens Creek capture facility would be dismantled and moved between the park boundary and Yankee Jim Canyon to help maintain this boundary during phase 2, when bison would be allowed to use the Reese Creek SMA.

If this alternative was selected, the agencies would request the 2001 Montana Legislature to authorize a fair-chase hunt for bison. Public hunting would then become the primary tool for agencies to control population sizes in the new Reese Creek SMA, and would also be allowed in the Eagle Creek/Bear Creek area and western SMA.

Modifications in grazing allotments, acquisition or easement of private land, or conversion from cow-calf to steer or spayed heifer production are options in this alternative for the West Yellowstone area to further reduce the risk of bison commingling with susceptible cattle.

Alternative 4: Interim Plan with Limited Public Hunting and Quarantine

The interim plan (no action, or alternative 1 in this analysis) has served to ensure spatial separation of the bison herd from domestic cattle on the northern and western borders of Montana. However, it has given agencies few options when harsh winters force more than the average number of bison toward the boundaries of Yellowstone National Park. For this reason, alternative 4 includes a quarantine facility to preserve seronegative bison captured at Stephens Creek. Bison completing the quarantine protocol would be released to tribes, requesting organizations, or to repopulate herds on public lands. The location of the facility has not been determined, and locating it on federal land or using federal money would mean subsequent NEPA analysis, including public input, would be required.

Hunting, should it be approved by the Montana Legislature, would be another tool proposed to help agencies control population numbers and distribution. A limited hunt, primarily for recreation, would be allowed in the West Yellowstone and Eagle Creek/Bear Creek areas.

Except for these differences, alternative 4 would be identical to the interim management plan, alternative 1.

Alternative 5: Aggressive Brucellosis Control within Yellowstone National Park through Capture, Test, and Removal

This alternative would implement an aggressive three-year capture and test program for all bison in the park, including those in its interior. Those testing negative would be released in the park, and seropositives would be shipped to

slaughter. If a safe and effective vaccine was available, seronegative bison would also be vaccinated. Bison would not be allowed outside the park anywhere in Montana, and agencies would maintain northern and western boundaries. Bison at these boundaries would be hazed back into the park if possible, but shot if they were unresponsive to hazing. Capture facilities would be set up in nine areas. All untested bison would be shot in the latter stages of the capture, test, and slaughter program. When subsequent testing indicated brucellosis had been eradicated from the bison population, a new bison management plan would be prepared.

Alternative 6: Aggressive Brucellosis Control within Yellowstone National Park through Vaccination

This alternative, like alternative 5, would pursue the aggressive reduction of brucellosis from the Yellowstone bison herd. However, the entire bison herd would first be vaccinated (when a safe and effective vaccine was available), primarily through remote means, and tested as they attempted to exit at park boundary locations. When tests showed the incidence of exposure to *B. abortus* had stabilized as a result of vaccination, (estimated to occur in 10 years) the herd-wide capture, test, and slaughter of seropositive bison outlined in alternative 5 would begin.

Unlike alternative 5, bison would be allowed in the Eagle Creek/Bear Creek and western SMAs, although the majority of bison in the western SMA would be tested and released seronegatives. The National Park Service would construct and operate a capture facility at Seven-Mile Bridge inside the park on the west side. Nearly all bison migrating toward the West Yellowstone area cross through this narrow area. These facilities (at Duck Creek and the Madison River) would be dismantled, although a small, backup capture facility near Horse Butte, might be maintained.

Alternative 7: Manage for Specific Bison Population Range

This alternative departs from all other alternatives in that a range of bison population numbers would be the focus, and specific management scenarios would be put in place as the population approached either end of that range. This range would be from 1,700 to 2,500 bison. Agency controls would decrease as the bison population approached 1,700 and would cease at 1,700 bison in certain areas as described in management sections for each area. Additional measures to remove increasing numbers of bison would be implemented near the 2,500 mark if bison left the park or SMAs described in this alternative. Because bison removals occur at or outside the park boundary, the bison population could at times exceed 2,500 inside the park.

In the long term, the agencies might acquire access to additional winter range in the Gardiner Valley on the west side of the Yellowstone River through purchase of grazing rights, easements, or property from willing sellers. Since the release of the *Draft Environmental Impact Statement*, these lands have been acquired. It is anticipated they would be available for use by bison when a current cattle lease on a portion of them expires in 2002. This tract would be designated an SMA subject to the approval of the state of Montana as specified by Montana law. The capture facility now located at Stephens Creek could be dismantled and moved to an appropriate location in the SMA. Modifications have been made in grazing permits for the allotments near the park such that the Montana state veterinarian may request a change in the date that livestock return to federal allotments, depending on how long bison have been out of the park in the west boundary area. No other modifications in grazing allotments, property acquisitions, or easements in the western SMA would occur.

Although alternative 7 is distinct, it has elements similar to other alternatives. Capture and slaughter of seropositives would be the primary means of managing risk, as it is in alternatives 1, 4, and 5. Most seronegative bison would be shipped to quarantine, as described in alternative 4. Also like alternative 4, low levels of hunting would be allowed in one or more of the SMAs outside the park. As in alternative 3, alternative 7 has a long-term phase that proposes the acquisition of winter range north of the park boundary. However, as described above, this alternative is much more specific in defining a population size and management tools to keep it at that size. It is also true that alternatives 1 through 6 are unique, as each emphasizes a particular strategy to manage bison or combination of strategies not analyzed in alternative 7.

Modified Preferred Alternative

The modified preferred alternative employs an adaptive management approach that allows the agencies to gain experience and knowledge before proceeding to the next management step, particularly with regard to managing bison on winter range outside Yellowstone National Park (see Modified Preferred Alternative map). The alternative uses many tools to address the risk of transmission, but primarily relies on strict enforcement of spatial and temporal separation of potentially infectious bison or their birth products and susceptible cattle. Until an existing cattle lease on acquired lands north of the park's Reese Creek boundary expires, step 1 would follow the interim plan with the exception that seronegative pregnant bison would be released onto the western boundary area along with other seronegative bison

(up to a designated 100-bison tolerance level). When the lease expires, it is assumed step 2 of the plan would begin, and seronegative bison would be released into the boundary area north of Reese Creek as well, up to a designated 100-bison tolerance level. After a minimum of two years of experience managing bison outside the park in both the northern (or Reese Creek) and western boundary areas, step 3 would begin, which allows untested bison (up to the 100-bison tolerance level) to occupy them. Parkwide vaccination of vaccine-eligible bison would begin when a safe and effective vaccine and remote delivery system become available.

Spatial and temporal separation would be maintained by monitoring both boundary areas 7 days a week. As bison move further from the park, management would become increasingly aggressive. All bison outside the park in these areas would be hazed back into the park in the spring, approximately 45 days before cattle return to these same lands. Research performed since the completion of the *Draft Environmental Impact Statement* (K. Coffin, pers. comm.; Cook 1999) indicates that as few as 4.7 days would be required to ensure the die-off of any remaining bacteria in weather typical of a Wyoming June. As an additional risk management measure, the agencies would maintain a population target for the whole herd of 3,000 bison. This is the number above which the NAS (1998) report indicates bison are most likely to respond to heavy snow or ice by attempting to migrate to the lower elevation lands outside the park in the western and northern boundary areas. Seronegative bison attempting to leave the park and not amenable to hazing when either the population exceeds 3,000 or tolerance levels outside the park have been met or exceeded, would be removed to quarantine. If the quarantine facility is full or otherwise unavailable, they would be sent to slaughter. If population numbers are low, bison, up to the capacity of the Stephens Creek capture facility, would be held until weather moderates or until spring green-up begins and then released back into the park. Additional risk mitigation measures under the modified preferred alternative include the following:

Stephens Creek capture facility.

Vaccination of cattle in the impact area would be required if 100% voluntary vaccination is not achieved.

APHIS and Montana would conduct additional monitoring of cattle herds grazed in the impact area, including regular testing of test-eligible cattle and possible adult vaccination of these cattle herds.

Seronegative pregnant females allowed into the boundary areas would be fitted with radio collars and vaginal transmitters (in step 1 in the West Yellowstone area and in step 2 in the Reese Creek area) so that agencies can monitor the birth site for bacteria if bison give birth or abort while outside the park.

To minimize lethal control, agencies would maximize the use of hazing to keep bison off private lands, to keep them from exiting the park, and to return them to the park if exiting would mean their removal to slaughter or quarantine.

ENVIRONMENTAL CONSEQUENCES

The environmental impacts of each alternative were analyzed and compared to No Action. Below is a summary of those impacts. For a comparison of impacts among alternatives, see table 3, "Summary Comparison of Impacts of Alternatives."

Impacts on Bison Population

A simple model based on averages (deterministic) was used to predict changes in bison populations and/or seroprevalence rates should a given alternative be implemented. Because a single severe winter, such as the 1996–97 winter, could alter estimates of bison numbers significantly, the analysis also includes a section on the effects of "stochastic" events on the population size.

The deterministic model predicts the continued implementation of alternative 1 would result in a growing bison population. From 1997 to 2006, the bison population would increase at 4% per year to approximately 3,100. Management actions in this alternative would not measurably affect the age/sex distribution or reproductive rates of bison in this or any alternative except for alternative 5. Bison distribution outside the park is indicated in table 4. In this, and all other alternatives except alternative 5, 100–200 bison would freely range on public lands in the Eagle Creek/Bear Creek area.

Alternative 2 would result in the largest and fastest growth of the bison population of all alternatives. From 1997 to 2006, the population is expected to increase to 3,500, moderately more bison (14%) than in alternative 1.

Alternative 3 would result in growth of the bison population, with numbers controlled primarily through hunting. From 1997 to 2006, the bison population would be expected to increase from about 2,200 to 3,500 (average

increase 6%/year). Limited capture operations, agency shooting, hunting, and periodic severe environmental conditions would likely maintain the bison population near the upper management range of 1,700 to 3,500. It is estimated that alternative 3 would result in moderately more bison in the population (14% increase) compared to alternative 1.

In alternative 4, bison population numbers would be controlled through capture, shipment of seropositive bison to slaughter, and hunting. This alternative would result in a slowly increasing bison population with lower population numbers than alternatives 1, 2, 3, or 6. From 1997 to 2006, the bison population would be expected to increase from about 2,200 bison to 2,800 (average increase 3%/year). This would be a minor decrease (8% lower) in bison population size relative to alternative 1.

For alternative 5, the bison population would be expected to decline from 2,200 bison to approximately 1,250 bison by 1999. The bison population would be expected to number approximately 2,000 by 2006, and approximately 2,900 bison by 2011, 10 years after capture, test, and slaughter operations have ceased. No bison would be expected in Reese Creek, Eagle Creek/Bear Creek, or West Yellowstone in this alternative. The bison population would experience a major decrease in this alternative, representing a nearly 47% reduction, compared to alternative 1, over a period of only three years.

No bison would be allowed anywhere outside Yellowstone National Park boundaries under alternative 5. Management actions in alternative 5 could affect the age/sex distribution or reproductive rate of the bison population. Bison distribution within the park would likely be affected, and several areas would likely have few or no bison for as long as 10 years.

In alternative 6, all bison would be vaccinated for approximately 10 years (beginning in the year 2000) to reduce seroprevalence in the population. After whole herd vaccination, bison would be captured, tested, and seropositives slaughtered, similar to alternative 5. Two different estimates of population size were calculated based on the effectiveness of the vaccine. Assuming a 70% effectiveness, the bison population would be expected to increase during the vaccination phase from 2,200 bison to approximately 3,500 bison in 2010, a negligible to minor increase compared to alternative 1. After 10 years of vaccination (2010), capture and slaughter would begin, and the population would drop from 3,500 to about 2,900 in a single year, a moderate (17%) decrease compared to alternative 1. If the vaccine was only 25% effective, the population would drop from 3,500 animals in 2010 to

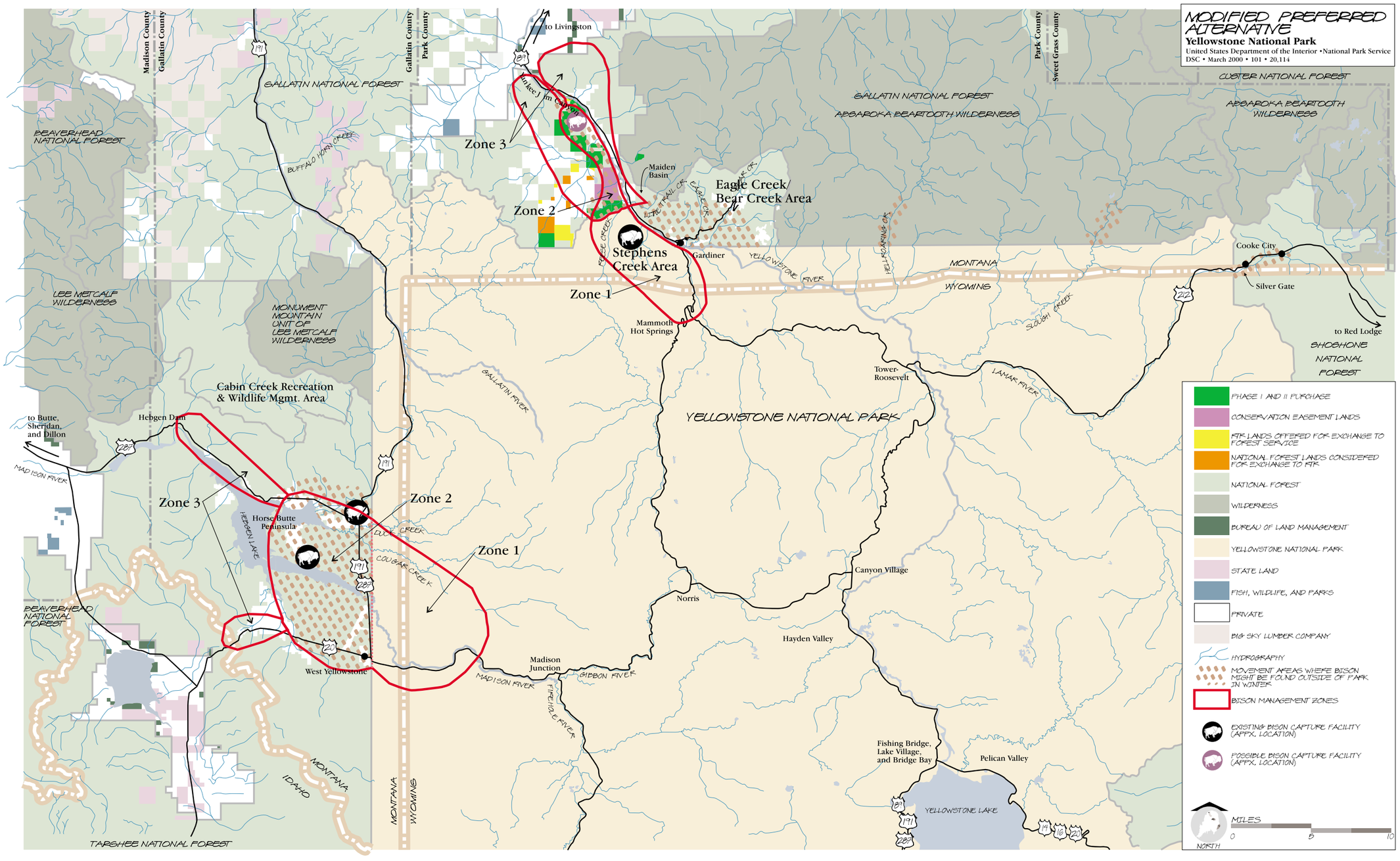

MODIFIED PREFERRED ALTERNATIVE
Yellowstone National Park
United States Department of the Interior • National Park Service
DSC • March 2000 • 101 • 20,114
to Livingston
Madison County
Gallatin County
Park County
Sweet Grass County
GALLATIN NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
BUFFALO HORN CREEK
Jardine Jim Canyon
Zone 3
Zone 2
Zone 1
Maiden Basin
Eagle Creek/ Bear Creek Area
BULL TRAIL CR.
EAGLE CR.
REESE CREEK
Stephens Creek Area
Gardiner
YELLOWSTONE RIVER
HELLROARING CR.
ABSAROKA BEARTOOTH WILDERNESS
CUSTER NATIONAL FOREST
Cooke City
Silver Gate
MONTANA
WYOMING
SLOUGH CREEK
to Red Lodge
SHOSHONE NATIONAL FOREST
LEE METCALF WILDERNESS
MONUMENT MOUNTAIN UNIT OF LEE METCALF WILDERNESS
Mammoth Hot Springs
GALLATIN RIVER
Tower-Roosevelt
LAMAR RIVER
YELLOWSTONE NATIONAL PARK
Cabin Creek Recreation & Wildlife Mgmt. Area
to Butte, Sheridan, and Dillon
Hebgen Dam
MADISON RIVER
Zone 3
Zone 2
Zone 1
Horse Butte Peninsula
HEBGEN LAKE
DUCK CREEK
COUGAR CREEK
West Yellowstone
BEAVERHEAD NATIONAL FOREST
Canyon Village
Norris
Hayden Valley
Madison Junction
GIBBON RIVER
MADISON RIVER
FIREHOLE RIVER
Fishing Bridge, Lake Village, and Bridge Bay
Pelican Valley
YELLOWSTONE LAKE
IDAHO
MONTANA
WYOMING
TARGHEE NATIONAL FOREST
PHASE I AND II PURCHASE
CONSERVATION EASEMENT LANDS
MTF LANDS OFFERED FOR EXCHANGE TO FOREST SERVICE
NATIONAL FOREST LANDS CONSIDERED FOR EXCHANGE TO MTF
NATIONAL FOREST
WILDERNESS
BUREAU OF LAND MANAGEMENT
YELLOWSTONE NATIONAL PARK
STATE LAND
FISH, WILDLIFE, AND PARKS
PRIVATE
BIG SKY LUMBER COMPANY
HYDROGRAPHY
MOVEMENT AREAS WHERE BISON MIGHT BE FOUND OUTSIDE OF PARK IN WINTER
BISON MANAGEMENT ZONES
EXISTING BISON CAPTURE FACILITY (APPX. LOCATION)
POSSIBLE BISON CAPTURE FACILITY (APPX. LOCATION)
MILES
0
5
10
NORTH

Table 1: Summary Comparison of Alternative Actions

Action	Alternative 1: No Action – Continuation of the Current *Interim Bison Management Plan*	Alternative 2: Minimal Management	Alternative 3: Management, with Emphasis on Public Hunting	Alternative 4: Interim Plan with Limited Public Hunting and Quarantine	Alternative 5: Aggressive Brucellosis Control within Yellowstone National Park through Capture, Test, and Removal	Alternative 6: Aggressive Brucellosis Control within Yellowstone National Park through Vaccination	Alternative 7: Manage for Specific Bison Population Range	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implement Interim Plan outside Yellowstone National Park, Modified Preferred Alternative inside Yellowstone National Park
Bison population range	No range specified in existing interim plan	Allow natural forces to determine herd size	Manage herd within range of natural variation: 1,700–3,500	Same as alternative 3	Manage herd size to prevent loss of genetic integrity and ensure success of disease control	Same as alternative 5	Manage herd within range of 1,700 to 2,500	Manage for overall population limit of 3,000 bison	Same as alternative 1; assume management would maintain herd within 1,700–3,000	Same as alternative 1; assume management would maintain herd within 1,700–3,000
Capture, test, and slaughter operations	Reese Creek: capture all bison at Stephens Creek facility inside park and ship seropositives to slaughter, temporarily hold seronegative bison; West Yellowstone: capture, test, and ship seropositive males and females and all pregnant females to slaughter; test and release seronegative male and nonpregnant females on public land; capture facilities on national forest and/or private land used during winter months	Phase 1 same as alternative 1; phase 2 no capture, test, and slaughter operations	Reese Creek: in phase 1, ship all seropositives to slaughter, seronegatives to quarantine; in phase 2, capture facility between Yankee Jim Canyon and Reese Creek as backup to hunting; West Yellowstone: no capture facilities	Capture facilities same as alternative 1, except ship seronegatives from Reese Creek to quarantine	Temporary capture facilities throughout park; test; ship all seropositives to slaughter and release all seronegatives within park; Stephens Creek facility remains	Reese Creek: ship all captured bison to slaughter; West Yellowstone capture facility at Seven-Mile Bridge area inside park; test and ship seropositives to slaughter; test, vaccinate, and release all seronegatives onsite; phase 2 capture facilities same as alternative 5	Reese Creek: in phase 1, ship all seropositives to slaughter, seronegatives to quarantine; in phase 2, capture facility between Yankee Jim Canyon and Reese Creek; West Yellowstone: same as alternative 1, except quarantine all seronegatives at high population levels and all seronegative-pregnant bison at population mid range; capture facility at Horse Butte	Step 1- Reese Creek: same as alternative 1; West Yellowstone: capture bison, ship seropositives to slaughter, release all seronegatives on public land up to 100 tolerance; Step 2 - Reese Creek: capture bison, ship seropositives to slaughter, release seronegatives on public and conservation easement lands up to 100 tolerance; West Yellowstone: same as Step 1; Step 3 - Reese Creek: allow untested bison on public and conservation easement lands up to 100 tolerance, capture and release seronegatives when >100, <45 day separation, >3,000 bison; West Yellowstone: allow untested bison up to 100 tolerance, capture and release seronegatives when >100, <45 day separation, >3,000 bison	Capture facilities same as revised alternative 1 except hold calves instead of all seronegatives at Stephens Creek facility; possibly ship seronegatives to quarantine in phase 1 and phase 2 same as alternative 4; West Yellowstone: same as alternative 1	Capture facilities same as either revised alternative 1 or 4 in step 1 (depending on whether quarantine is available); in steps 2 and 3, Stephens Creek facility would only be used to hold up to 125 overwintering seronegative bison if total population numbers were 3,000 or below. West Yellowstone - assumed to be same as alternative 4 in all steps.
Contingency Plan	None specifically identified. Actions common to all alternatives identifies that when the population approaches 1,700, agencies would more aggressively employ	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1 but bison population could go below 1,700	Same as alternative 1	Same as alternative 1	Detailed plan to reduce the number of bison that are killed as part of bison management actions and to provide for a generally stable bison population should large numbers of bison attempt to move outside the park in	"Agency implemented lethal controls would decrease as population approaches 1,700 and cease at 1,700 in certain areas."- same as or similar to alternative 1	Same as alternative 1 and hold up to 125 seronegative bison over the winter if population levels at 3,000 or below.

Table 1: Summary Comparison of Alternative Actions *(continued)*

Action	Alternative 1: No Action – Continuation of the Current *Interim Bison Management Plan*	Alternative 2: Minimal Management	Alternative 3: Management, with Emphasis on Public Hunting	Alternative 4: Interim Plan with Limited Public Hunting and Quarantine	Alternative 5: Aggressive Brucellosis Control within Yellowstone National Park through Capture, Test, and Removal	Alternative 6: Aggressive Brucellosis Control within Yellowstone National Park through Vaccination	Alternative 7: Manage for Specific Bison Population Range	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implement Interim Plan outside Yellowstone National Park, Modified Preferred Alternative inside Yellowstone National Park
Contingency Plan (Continued)	nonlethal methods to encourage bison to remain within management boundaries; lethal control would still occur for bison posing greatest risk of transmission							response to severe winter weather; actions emphasize hazing, capture, and release of seronegative bison to tolerance level, and holding seronegative bison for spring release; if hazing ineffective and tolerance levels exceeded, additional bison sent to quarantine, to slaughter, or shot.		
Agency Shooting	Agency personnel would shoot bison that could not be hazed, evaded capture, or were deemed unsafe to handle (usually large adult males)	Agency personnel would shoot bison that could not be hazed and attempted to move beyond SMA boundaries, threatened human safety, or were identified for removal from private property	Same as alternative 1	Same as alternative 1	Bison would be shot if they attempted to move beyond the park boundary and were unresponsive to hazing	Same as alternative 1	Same as alternative 1	Same as alternative 1	Not specifically addressed, but assumed to be the same as alternative 1	Same as alternative 1 in step 1; in steps 2 and 3, Montana might choose to continue to shoot bison to enforce boundaries or facilitate capture
Quarantine operations	No quarantine operations	No quarantine operations	Quarantine operations - take seronegatives from Stephens Creek in phase 1; relocate capture facility in phase 2	Quarantine operations - Reese Creek: quarantine all seronegatives; West Yellowstone: quarantine seronegative-pregnant females	No quarantine operations	No quarantine operations	Quarantine operations – take seronegatives from Stephens Creek in phase 1; West Yellowstone: quarantine seronegative-pregnant females; if population high, quarantine all seronegatives	Quarantine operations, if available; take seronegative bison from Reese Creek and West Yellowstone under the following circumstances: 1) when bison tolerance levels of 100 were exceeded, 2) when overall population >3,000, 3) to enforce 45-day separation period	Quarantine operations Reese Creek quarantine all seronegatives until whole-herd (including adult) vaccination initiated; West Yellowstone: quarantine seronegative pregnant females. Same as alternative 4	Quarantine operations used in step 1, if available; Montana may continue to use quarantine for captured seronegative, nonpregnant bison in steps 2 and 3
Monitoring of bison	Aerial and ground reconnaissance of bison in and adjacent to park	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1 and monitor bison to facilitate capture inside park	Phase 1, same as alternative 1; phase 2, same as alternative 5	Same as alternative 1	Aerial and ground reconnaissance of bison in and adjacent to Yellowstone National Park; telemetry of pregnant bison; additional staff to enforce zone management boundaries	Not specifically addressed; assumed to be similar to alternative 1	Same as alternative 1

Table 1: Summary Comparison of Alternative Actions *(continued)*

Action	Alternative 1: No Action – Continuation of the Current *Interim Bison Management Plan*	Alternative 2: Minimal Management	Alternative 3: Management, with Emphasis on Public Hunting	Alternative 4: Interim Plan with Limited Public Hunting and Quarantine	Alternative 5: Aggressive Brucellosis Control within Yellowstone National Park through Capture, Test, and Removal	Alternative 6: Aggressive Brucellosis Control within Yellowstone National Park through Vaccination	Alternative 7: Manage for Specific Bison Population Range	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implement Interim Plan outside Yellowstone National Park, Modified Preferred Alternative inside Yellowstone National Park
Bison hunting	No hunt	No hunt	If legislature approves, state of Montana institutes fair-chase hunt on public and private land in all SMAs; public hunt during winter (Oct.–Feb.) primary method to control population numbers and distribution	If legislature approves, state of Montana institutes fair-chase hunt on public lands; public recreational hunt during winter (Oct.–Feb.)	No hunt	No hunt	If legislature approves, state of Montana institutes fair-chase hunt on public lands at Eagle Creek/Bear Creek; in phase 2, hunting could be allowed on public lands in all SMAs	No hunt	No hunt	No hunt
Bison management on public lands adjacent to Yellowstone National Park	Allow bison on public lands in Eagle Creek/Bear Creek except north of Little Trail Creek/Maiden Basin hydrographic divide; do not allow bison north of Reese Creek; do not allow bison in West Yellowstone area beyond May and until November 1	Allow bison on public lands in Eagle Creek/Bear Creek; in Gardiner Valley south of Yankee Jim Canyon; and south of Buffalo Horn Creek and east of Hebgen Lake in western area	Allow bison on public lands in Eagle Creek/Bear Creek except north of Little Trail Creek/Maiden Basin hydrographic divide; do not allow bison in West Yellowstone area beyond May and until November 1; in phase 1, bison not allowed north of Reese Creek; phase 2, bison allowed between Reese Creek and Yankee Jim Canyon	Same as alternative 1	Do not allow bison outside park; haze to return bison to interior of park	Same as alternative 1	Allow bison on public lands in Eagle Creek/Bear Creek except north of Little Trail Creek/Maiden Basin hydrographic divide; do not allow bison in West Yellowstone area beyond May and until November 1; in phase 1, bison not allowed north of Reese Creek; in phase 2, bison allowed between Reese Creek and Yankee Jim Canyon	Allow bison on public lands in Eagle Creek/Bear Creek area except north of Little Trail Creek/Maiden Basin hydrographic divide; Reese Creek: step 1 - do not allow bison north of Reese Creek; step 2 - allow seronegative bison on public and conservation easement lands up to 100; then after 2 years (step 3) allow untested bison up to 100; for steps 2 and 3, do not allow bison beyond zone management boundaries at Yankee Jim Canyon. Haze to return to park in spring; West Yellowstone: step 1, 2 - release all seronegative bison on public land in Horse Butte area during winter up to 100: step 3 - allow untested bison on public land during winter, up to 100; do not allow bison in West Yellowstone area past mid-May to enforce 45-day separation;	Same as alternative 1 except state veterinarian would consult with agencies, use weather and other criteria to determine haze back date within 30–60 day window (e.g., the date may vary between April 1 and May 1).	Same as alternative 1

Table 1: Summary Comparison of Alternative Actions *(continued)*

Action	Alternative 1: No Action – Continuation of the Current *Interim Bison Management Plan*	Alternative 2: Minimal Management	Alternative 3: Management, with Emphasis on Public Hunting	Alternative 4: Interim Plan with Limited Public Hunting and Quarantine	Alternative 5: Aggressive Brucellosis Control within Yellowstone National Park through Capture, Test, and Removal	Alternative 6: Aggressive Brucellosis Control within Yellowstone National Park through Vaccination	Alternative 7: Manage for Specific Bison Population Range	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implement Interim Plan outside Yellowstone National Park, Modified Preferred Alternative inside Yellowstone National Park
Bison management on public lands adjacent to Yellowstone National Park (Continued)								beginning approximately November 1, do not allow bison beyond management zone boundaries during winter		
Bison management on private lands adjacent to Yellowstone National Park	Remove bison at landowner request	Same as alternative 1	Bison hunted with landowner permission; remove at landowner request	Remove bison at landowner request; possible bison hunt under special and limited circumstances	Same as alternative 1	Same as alternative 1	Same as alternative 3	Remove, preferentially by hazing, at landowner request	Same as alternative 1	Same as alternative 1
Surveillance testing of cattle	No change in existing cattle surveillance requirements	Require testing of susceptible cattle in SMA	Require testing of cattle in contact with bison	Same as alternative 3	Same as alternative 1	Require testing of cattle in high-risk areas in West Yellowstone	Whole herd surveillance protocols for cattle within SMAs recommended by APHIS	APHIS would cooperate with Montana to conduct additional testing and vaccination of cattle that graze in areas that bison might occupy in the winter; APHIS would offer livestock operators option of having cattle certified as brucellosis free; federal agencies would provide funds for direct costs of additional testing in unlikely event bison commingle with cattle	Not specifically addressed; assumed to be same as alternative 1	Same as alternative 1
Vaccination of cattle with RB51	Encourage calfhood vaccination of cattle adjacent to park	Encourage vaccination of all susceptible female cattle calves within SMA, adjacent to park or within 20-mile radius of either	Same as alternative 2	Same as alternative 2	Same as alternative 1	Same as alternative 2	Same as alternative 2	Montana would encourage vaccination of cattle that may graze in areas that bison might occupy in winter; if voluntary compliance was not 100%, Montana would make it mandatory; federal government would reimburse direct cost of vaccination	Mandatory vaccination if 100% compliance not met by May 2001; cost reimbursed by federal government	Mandatory vaccination if 100% compliance not met by May 2001; cost reimbursed by federal government

Table 1: Summary Comparison of Alternative Actions *(continued)*

Action	Alternative 1: No Action – Continuation of the Current *Interim Bison Management Plan*	Alternative 2: Minimal Management	Alternative 3: Management, with Emphasis on Public Hunting	Alternative 4: Interim Plan with Limited Public Hunting and Quarantine	Alternative 5: Aggressive Brucellosis Control within Yellowstone National Park through Capture, Test, and Removal	Alternative 6: Aggressive Brucellosis Control within Yellowstone National Park through Vaccination	Alternative 7: Manage for Specific Bison Population Range	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implement Interim Plan outside Yellowstone National Park, Modified Preferred Alternative inside Yellowstone National Park
Vaccination of bison	Vaccinate bison calves after vaccine is developed that is safe and effective for bison using capture facilities and remote means	Same as alternative 1, using remote means only	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1	Vaccinate all captured vaccination-eligible bison (initially calves and yearlings) with safe vaccine; possible remote vaccination with safe vaccine, safe/effective delivery system on untested bison tolerated at West Yellowstone; when safe and effective vaccine and safe and effective delivery available, conduct remote parkwide vaccination on eligible bison	Vaccinate captured bison with safe vaccine for that age/class of bison in phases 1 and 2; vaccinate whole herd with safe and effective vaccine for all bison with a safe and effective remote delivery system in phase 2	Vaccinate all captured vaccination-eligible bison (initially calves and yearlings) with safe vaccine; possible remote vaccination with safe vaccine, safe/ effective delivery system on untested bison tolerated at West Yellowstone; when safe and effective vaccine and safe and effective delivery available, conduct remote parkwide vaccination on eligible bison - same as modified preferred alternative
Modify national forest grazing allotments	No modification of national forest grazing allotments	Modification of national forest grazing allotments may occur	No modification of national forest grazing allotments expected in phase 1, but may occur in phase 2	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 3	If needed, modify public land-grazing start date to ensure 45-day temporal separation between bison use of public lands in winter and cattle grazing on public lands in summer and fall	Same as alternative 1	Same as alternative 1
Change in land use, easement, or acquisition of additional wildlife habitat.	No change in existing land use/ownership **FEIS Note:** Land north of Reese Creek designated as wildlife habitat has been acquired; a cattle lease on this land remains in effect until 2002	Easement or acquisition of additional winter wildlife habitat; or change from breeder cattle (susceptible cattle) to steers/spayed heifers within SMA	Similar to alternative 2, with reduced acquisition	Same as alternative 1	Same as alternative 1	Same as alternative 1	Phase 1, no change; phase 2, acquire additional winter range north of Reese Creek; no changes in cattle operations	Same as revised alternative 1	Same as revised alternative 1	Same as revised alternative 1

Table 1: Summary Comparison of Alternative Actions *(continued)*

Action	Alternative 1: No Action – Continuation of the Current *Interim Bison Management Plan*	Alternative 2: Minimal Management	Alternative 3: Management, with Emphasis on Public Hunting	Alternative 4: Interim Plan with Limited Public Hunting and Quarantine	Alternative 5: Aggressive Brucellosis Control within Yellowstone National Park through Capture, Test, and Removal	Alternative 6: Aggressive Brucellosis Control within Yellowstone National Park through Vaccination	Alternative 7: Manage for Specific Bison Population Range	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implement Interim Plan outside Yellowstone National Park, Modified Preferred Alternative inside Yellowstone National Park
Winter road grooming	No change in existing winter road management **FEIS Note:** *(*Changes in winter road management made as a result of separate planning efforts would be implemented	Eliminate winter grooming and snowmobile use of some trails; research effects of closures on population numbers and on ability to keep bison within park boundaries	Research effects of road closures on bison	Same as alternative 1	Plow roads in winter for access to bison capture facilities	Phase 1 - plow road to Seven-Mile Bridge capture facility; phase 2 - plow roads same as in alternative 5	Same as alternative 1	No changes in winter road management proposed	Same as revised alternative 1	Same as revised alternative 1
Total annual cost of alternative (includes one-time only costs such as quarantine, capture facilities, and land acquisition)	• NPS – $660,500 • USFS – $16,500 • State of MT – $154,000-$451,000 • APHIS – $201,300	• NPS – $420,700 • USFS – $187,000 • State of MT – $165,000 • APHIS – $36,300 • Shared costs (up to $44.1 million)	• NPS – $709,800 • USFS – $44,000 • State of MT – $247,500 • APHIS – $1,026,300–$1,356,300 • Shared costs (up to $33.1 million)	• NPS – $643,800 • USFS – $27,500 • State of MT – $448,800 • APHIS – $1,185,800–$1,515,800	• NPS – $2,815,290 • USFS – $16,500 • State of MT – 0 • APHIS – $56,100	(phase 2) $1,1013,860 – phase 1; $2,377,160 – phase 2 • USFS – $16,500 • State of MT – $156,700–phase 1; $192,500–phase 2 • APHIS – $24,700–phase 1; $29,700–phase 2	• NPS – $1,071,700 • USFS – $33,000 • State of MT – $443,020 • APHIS – $1,216,300–$1,546,300 • Shared costs (up to $29.1 million)	• NPS – $1,071,700 • USFS – $22,00 • State of MT – $388,020 • APHIS – $1,538,800 • Shared costs (up to $29.1 million)	Costs not included. Assumed to be similar to alternative 4	In step 1 - same as alternative 1; in steps 2 and 3 - NPS costs would be reduced; Montana's may be increased

Table 2: Comparison of Features of Each Alternative

Action	Alternative 1: No Action - Continuation of the Current *Interim Bison Management Plan*	Alternative 2: Minimal Management	Alternative 3: Management with Emphasis on Public Hunting	Alternative 4: Interim Plan with Limited Public Hunting and Quarantine	Alternative 5: Aggressive Brucellosis Control within Yellowstone National Park through, Capture, Test, and Removal	Alternative 6: Aggressive Brucellosis Control within Yellowstone National Park through Vaccination	Alternative 7: Manage for Specific Bison Population Range	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implementation of Interim Plan outside Park, Modified Preferred inside Park
Agency-enforced boundary control at Reese Creek	✓	✓ (phase 1)	✓	✓	✓	✓	✓	✓ (steps 1, 2)	✓	✓ (step 1)
Agency enforced boundary control at Little Trail Creek/ Maiden Basin divide	✓	✓ (phase 1)	✓	✓		✓	✓	✓	✓	✓
Bison shot inside Eagle Creek/Bear Creek area			✓ (hunt)	✓ (hunt)	✓ (agency)					
Agency-enforced boundary at Yankee Jim Canyon (northern boundary beyond Reese Creek)		✓	✓ (phase 2)				✓ (phase 2)	✓ (steps 2, 3)		
Agency-enforced boundary at Cabin Creek area boundary on western side	✓		✓	✓		✓	✓	✓	✓	✓
Agency-enforced boundary at Buffalo Horn Creek on western side		✓								
Capture facility at Stephens Creek (northern, Reese Creek boundary inside park)	✓	✓ (phase 1)	✓ (phase 1)	✓	✓	✓	✓ (phase 1)	✓	✓	✓ (step 1)
Capture facilities at Duck Creek and Madison River (western boundary)	✓	✓ (phase 1)		✓	✓					
Capture facilities at several locations inside park					✓	✓ (phase 2)				
Capture facilities at Duck Creek and Horse Butte (western boundary)							✓	✓	✓	✓
Capture facilities at Seven-Mile Bridge (western boundary inside park)						✓				

Table 2: Comparison of Features of Each Alternative *(continued)*

Action	Alternative 1: No Action - Continuation of the Current *Interim Bison Management Plan*	Alternative 2: Minimal Management	Alternative 3: Management with Emphasis on Public Hunting	Alternative 4: Interim Plan with Limited Public Hunting and Quarantine	Alternative 5: Aggressive Brucellosis Control within Yellowstone National Park through, Capture, Test, and Removal	Alternative 6: Aggressive Brucellosis Control within Yellowstone National Park through Vaccination	Alternative 7: Manage for Specific Bison Population Range	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implementation of Interim Plan outside Park, Modified Preferred inside Park
Seronegative bison from Stephens Creek slaughtered	✓	✓ (phase 1)			✓	✓		✓ (step 1; steps 2 and 3 under certain conditions, quarantine full)	✓ (phase 1)	✓ (step 1)
Seronegative bison from Stephens Creek quarantined			✓	✓			✓	✓ (step 1; steps 2 and 3 under certain conditions)	✓	✓ (step 1)
Seronegative-nonpregnant bison from West Yellowstone capture facilities released onsite	✓	✓ (phase 1)		✓		✓	✓	✓	✓	✓
Seronegative-pregnant bison from West Yellowstone slaughtered	✓	✓ (phase 1)							✓	✓
Seronegative-pregnant bison from West Yellowstone quarantined				✓			✓ (at high population levels)		✓	✓
Seronegative-pregnant bison from West Yellowstone released onsite						✓		✓		
Quarantine facilities			✓	✓			✓	✓	✓	✓
Bison hazed into capture facilities, away from borders	✓	✓ (phase 1)	✓	✓	✓	✓	✓	✓	✓	✓
Bison crossing boundaries shot	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SMA in Eagle Creek/Bear Creek	✓	✓	✓	✓		✓	✓	✓	✓	✓
SMA between Reese Creek and Yankee Jim Canyon on west side of Yellowstone River only			✓				✓	✓		
SMA between Reese Creek and Yankee Jim Canyon on east and west side of Yellowstone River		✓								
Western SMA including Horse Butte area	✓	✓	✓	✓		✓	✓	✓	✓	✓

Table 2: Comparison of Features of Each Alternative *(continued)*

Action	Alternative 1: No Action - Continuation of the Current *Interim Bison Management Plan*	Alternative 2: Minimal Management	Alternative 3: Management with Emphasis on Public Hunting	Alternative 4: Interim Plan with Limited Public Hunting and Quarantine	Alternative 5: Aggressive Brucellosis Control within Yellowstone National Park through, Capture, Test, and Removal	Alternative 6: Aggressive Brucellosis Control within Yellowstone National Park through Vaccination	Alternative 7: Manage for Specific Bison Population Range	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implementation of Interim Plan outside Park, Modified Preferred inside Park
Western SMA includes Cabin Creek/Lee Metcalf area	✓	✓	✓	✓		✓	✓	✓	✓	✓
Western SMA includes all land south of Buffalo Horn Creek		✓								
Bison hazed back into park from West Yellowstone in May	✓	✓ (phase 1)	✓ (phase 1)	✓		✓	✓	✓	✓	✓
Bison hazed back into park from Reese Creek in April								✓ (steps 2, 3)		
Bison hunted in West Yellowstone area			✓	✓ (limited)			✓ (possible)			
Untested bison outside park at Reese Creek								✓ (step 3)		✓ (step 2, 3)
Seronegative bison released at Reese Creek								✓ (step 2)		✓ (step 2)
Untested bison allowed into western SMA, including West Yellowstone area								✓ (step 3, possible in step 2)		
Capture facility at Stephens Creek used only to hold 125 bison overwinter, if late winter population greater than 3,000, or if more than 100 bison occupy Reese Creek management area outside park.								✓ (step 3)		
Capture facility at Horse Butte used only if late winter population greater than 3,000, or if more than 100 bison occupy West Yellowstone management area outside park								✓ (step 3)		

Table 3: Summary Comparison of Impacts of Alternatives

The following terms are used in this impact summary chart and throughout the environmental impact statement. In some cases, the terms are defined quantitatively. However, when they are not, the following definitions apply:

- Negligible – at lower levels of detection
- Minor – detectable, but slight
- Moderate – readily apparent environmental effects with the potential to become major
- Major – severe adverse or exceptional beneficial effects

Topic	Alternative 1: No Action	Alternative 2:	Alternative 3:	Alternative 4:	Alternative 5:	Alternative 6:	Alternative 7:	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implementation of Interim Plan outside Park, Modified Preferred inside Park
Impacts on Bison Population										
Estimated population size (# bison) in 2006 or later	3,100 in 2006 from DEIS deterministic model; the stochastic model predicts a mean population of 3,700	3,500 in 2006; moderate increase from DEIS deterministic model; the stochastic model predicts a mean population of 5,200, a major increase compared to alternative 1	3,500 in 2006; moderate increase from DEIS deterministic model; the stochastic model predicts a mean population of 3,700; similar to alternative 1	2,800 in 2006; minor decrease from DEIS deterministic model; the stochastic model predicts a mean population of 3,700; similar to alternative 1	Deterministic model predicts 2,150 in 1997 to 1,250 in 1999; up to 2,000 by 2006; major decrease; the stochastic model predicts a mean population of 2,900 in 2000 to 2,080 in 2001; major decrease, 2,494 in 2004; major decrease compared to alternative 1, 3,600 in 2014	Deterministic model predicts 3,500 in 2010; 2,500–2,900 in 2011; moderate to major decrease; the stochastic model predicts that phase 2 could not be implemented during life of the plan; required at least 20 years to fully implement alternative; a mean population of 3,700 at 15 years	Deterministic model predicts 2,700 in both 2006 and 2011; moderate to major decrease; the stochastic model predicts that the population objective is never achieved; the stochastic model predicts a mean population of 3,600; similar to alternative 1	Deterministic model predicts 3,245 in 2006; similar to alternative 1; major increase compared to alternative 7; the stochastic model predicts a mean population of about 3,700; similar to alternative 1	Same as alternative 1	Same as alternative 1
Estimated distribution in West Yellowstone	Deterministic model predicts 18–52 bison; the stochastic model predicts an average of 61–66 seronegative nonpregnant bison would remain	Deterministic model predicts 20–60 bison; the stochastic model predicts an average of 366–1,128 bison could winter in the western SMA; a major increase	Deterministic model predicts 16–120 bison; the stochastic model predicts an average of 62-68 bison, similar to alternative 1	Deterministic model predicts 1–52 bison; the stochastic model predicts an average of 56-60 bison; a minor decrease	Both deterministic and stochastic models predict 0 bison; a major decrease	Deterministic model predicts 22–60 bison; the stochastic model predicts an average of 58 – 80 seronegative bison might winter in the area; a minor to major increase	Deterministic model predicts 13–51 bison; the stochastic model predicts no bison would winter in the area in an attempt to meet population objectives; a major decrease	The deterministic model predicts 22–60; minor to moderate increase compared to alternative 1; the stochastic model predicts 10 bison up to 100 tolerance limit might winter in the area; similar to alternative 1 but more management flexibility and less hazing, capture and handling when tolerance limit is not exceeded	Same as alternative 1	Same as alternative 1
Estimated distribution in Reese Creek	0 bison	Deterministic model predicts 0–120 bison; the stochastic model predicts an average of 462–530 bison could winter north of the park; a major increase	Deterministic model predicts 60-80 bison; the stochastic model predicts an average of 68–80 bison could winter north of the park; a major increase	Deterministic model and stochastic model predict 0 bison; same as alternative 1	Deterministic model and stochastic model predict 0 bison; same as alternative 1	Deterministic model and stochastic model predict 0 bison; same as alternative 1	Deterministic model predicts 0–100 bison; the stochastic model predicts no bison would winter in the area in an attempt to meet population objectives; major decrease	Deterministic model predicts 65–82; major increase compared to alternative 1; the stochastic model predicts 10–20 up to 100 tolerance limit might winter in the area; major increase compared to alternative 1	Same as alternative 1	Same as alternative 1

Table 3: Summary Comparison of Impacts of Alternatives *(continued)*

Topic	Alternative 1: No Action	Alternative 2:	Alternative 3:	Alternative 4:	Alternative 5:	Alternative 6:	Alternative 7:	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implementation of Interim Plan outside Park, Modified Preferred inside Park
Impacts on Bison Population *(continued)*										
Estimated seroprevalence rate in 2011 using the deterministic model and in 2013 for the stochastic model; (for all alternatives except alternative 6, these dates represent 11 years after vaccination of bison begins)	Deterministic model predicts seroprevalence would decline to 24%; stochastic model predicts decline to about 11%	Deterministic model predicts seroprevalence would decline to 26%; minor adverse impact; stochastic model predicts decline to about 13%	Deterministic model predicts seroprevalence would decline to 28%; minor to moderate adverse impact; stochastic model predicts decline to about 15%	Deterministic model predicts seroprevalence would decline to 26%; minor adverse impact; stochastic model predicts decline to about 13%	Both deterministic and stochastic models predict seroprevalence would fall to near 0%; a major beneficial impact	Deterministic model predicts seroprevalence would decline to 0% by 2013; major beneficial impact; stochastic model predicts decline to about 9% in 2014; similar to alternative 1, and that this alternative would require at least 20 years to fully implement	Deterministic model predicts seroprevalence would decline to 23%; negligible to minor beneficial impact; stochastic model predicts decline to about 14%	Deterministic model predicts seroprevalence would decline to 25%; negligible to minor beneficial impact; stochastic model predicts decline to about 13%	Same as alternative 1	Same as alternative 1
Impacts on Recreation										
Visitor experience related to capture facilities and operations	Minor adverse impacts related to capture operations and restricted access or closures because of them	No impact to visitors because capture facilities removed; relative benefit	Negligible adverse impact on visitor use as capture facilities rarely used; relative benefit	Similar to alternative 1	Moderate to major adverse impact from capture operations parkwide; moderate to major adverse impact from additional facilities and year-round operations	Similar impact from operations in phase 2 to those in alternative 5; major adverse impact to visitor experience from capture facility in Seven-Mile Bridge area	Similar to alternatives 1 and 4, although possible adverse impact from increased use of capture facilities to maintain population size	Similar to alternative 7, but less adverse as the target population level is higher than alternative 7	Same as alternative 1	Same as alternative 1
Wildlife viewing opportunities – percent change by 2006 and distribution	42% increase is bison population over 1997; relative benefit compared to existing conditions	14% increase over alternative 1; and wider distribution; minor to moderate benefit compared to alternative 1 to those seeking to view bison	14% increase over alternative 1; minor to moderate benefit compared to alternative 1	8% decrease over alternative 1; minor adverse impact compared to alternative 1	35% decrease over alternative 1; minor to moderate adverse impact compared to alternative 1	1% higher, i.e., same as alternative 1 through the year 2009. Similar to alternative 5 after 2010	12% decrease by 2006; 23% by 2011; minor to moderate adverse impact compared to alternative 1	6% higher than alternative 1 by 2006; 7% lower by 2011; negligible to minor impact compared to alternative 1	Same as alternative 1	Same as alternative 1
Winter recreation; snowmobiling	No impact	Displacement of well over 50% of oversnow park visitors; major impact on individual in-park users; minor to moderate adverse impact overall	Possible minor to major impact if research indicates road closures needed	No impact	Major impact on some individual in-park snowmobile users; minor to moderate impact overall	Similar to alternative 2 for first 10 years; then similar to alternative 5 for 2–3 years	No impact	No impact	Same as alternative 1	Same as alternative 1
Hunting	No impact	No impact	75–85 bison hunting permits; minor to moderate benefit	35 bison hunting permits; minor benefit	No impact	No impact	15–25 bison hunting permits; minor benefit	No impact	Same as alternative 1	Same as alternative 1

Table 3: Summary Comparison of Impacts of Alternatives *(continued)*

Topic	Alternative 1: No Action	Alternative 2:	Alternative 3:	Alternative 4:	Alternative 5:	Alternative 6:	Alternative 7:	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implementation of Interim Plan outside Park, Modified Preferred inside Park
Impacts on Livestock Operations										
Cost of vaccination and testing	2% of yearly production costs; minor impact in the long term, but more apparent in years of low cattle prices	With removal of test-eligible cattle, no testing or vaccinating in SMAs; possibly continued testing and vaccinating in areas near SMAs	Similar to alternative 2 in the long term, but smaller SMAs and possible continued presence of test-eligible herds in western SMA	Same as alternative 1	Possibly less vaccination and testing; minor beneficial impact	First 12 years, same as alternative 1; final 3 years, same as alternative 5	Same as alternative 3 north of Yellowstone National Park; same as alternative 1 west of park	Vaccination costs borne by APHIS resulting in a negligible to minor benefit to producers	Same as alternative 1	Same as alternative 1
Operational changes to non-breeding cattle–individual ranchers	No impact	Possible conversion of cow-calf operations; moderate to major impact on a few individual ranchers	Fewer possible conversions than in alternative 2; moderate to major impact on a few individual ranchers	No impact	No impact	No impact	No impact	No impact	Same as alternative 1	Same as alternative 1
Modification of grazing on national forest allotments	No impact	Possible allotment modifications; moderate to major impact on a few ranchers using allotments now	Fewer possible modifications than in alternative 2; moderate to major impact on a few ranchers using allotments now	No impact	No impact	No impact	Short term, no impact; long-term, a few allotments on the north end may be modified; moderate to major impact on those users	Allotment on/off dates modified; minor impact on local scale Negligible impact on a regional scale	Same as alternative 1	Same as alternative 1
Private land acquisition or easements	No impact	Possible buyouts or easements; major impact on public funds	Fewer possible buyouts or easements than in alternative 2; major impact on public funds	No impact	No impact	No impact	Same as alternative 3, but no acquisitions in West Yellowstone	Acquisitions complete; no new impact on public funds or on landowners expected; one cattle operator on acquired land may experience minor to major adverse effects from relocation	Same as alternative 1	Same as alternative 1
Property damage by bison	Minor impact overall, but could be moderate to major for individuals affected	Short term, same as alternative 1; long term, reduced adverse impact	Short term, same as alternative 1; long-term, reduced adverse impact	Same as alternative 1	Minor impact overall, but could be a moderate to major benefit for individuals who might otherwise experience damage under alternative 1	Same as alternative 1	Short term, same as alternative 1; long term, reduced adverse impact	Negligible to minor overall, but moderate to major for individuals affected	Same as alternative 1	Same as alternative 1
Perception of risk	Risk exists; minor impact	Risk exists; moderate adverse impact	Until changes in operations or acquisitions occur, same as alternative 1; thereafter reduced risk	Same as alternative 1	Reduced risk, moderate beneficial impact	Slightly less, but similar to alternative 5; minor to moderate benefit	West Yellowstone, same as alternative 1; Reese Creek, reduced risk in long term	The same or slightly more beneficial than alternative 1 from additional risk mitigation features	Same as alternative 1	Same as alternative 1

Table 3: Summary Comparison of Impacts of Alternatives *(continued)*

Topic	Alternative 1: No Action	Alternative 2:	Alternative 3:	Alternative 4:	Alternative 5:	Alternative 6:	Alternative 7:	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implementation of Interim Plan outside Park, Modified Preferred inside Park
Impacts on Socioeconomics — Regional Economy										
Impacts on regional economy from wildlife viewing	40–45% of regional economy ($500 million) dependent on tourism	Possible beneficial impact; magnitude unknown	Similar to alternative 2	Similar to alternative 1 with hunting an additional source of local income	Possible adverse impact; magnitude unknown	Similar to alternative 1 until phase 2; then similar to alternative 5	Similar to alternative 1	Similar to alternative 1	Similar to alternative 1	Same as alternative 1
Impacts on regional economy from snowmobiling	No change in existing conditions; $30 million per winter	Loss of an estimated $13.75 million in spending in the Greater Yellowstone Area, likely most heavily impacting communities nearest the park	Same as alternative 1	Same as alternative 1	Similar to alternative 2	Similar to alternative 2	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1
Impacts on regional economy from hunting	Bison hunting not allowed	Same as alternative 1	$33,000 annual expenditures	$15,380 annual expenditures	Same as alternative 1	Same as alternative 1	$10,890 per year increase from fees, expenditures	Same as alternative 1	Same as alternative 1	Same as alternative 1
Impacts on regional economy from livestock sector	Livestock cash receipts for Gallatin and Park counties comprise 5% of livestock cash receipts statewide	A few livestock operators may relocate their private and/or federal grazing operations to other locations; adverse impact offset by increased wildlife viewing related tourism	Same as alternative 2, but fewer livestock operators potentially displaced	Same as alternative 1	Aggressive brucellosis control may increase livestock use of area; negligible benefit	Similar to alternative 5, but less beneficial to livestock operators as brucellosis eliminated more slowly	Same as alternative 3, but without the possibility of displacements in the West Yellowstone area	Similar to alternative 7	Same as alternative 1; no impact	Same as alternative 1; no impact
Impacts on Socioeconomics — Regional Economy Minority and Low-Income Populations										
Minority and low-income populations	$19,500 of bison meat donated on average per year; minor beneficial impact	Negligible adverse impact from loss of bison meat	Negligible adverse impact from loss of bison meat to hunters; negligible benefit from availability of live bison; possible $826,000 in live bison value to tribes	$23,000 per year of bison meat received; value would be higher if some bison are donated live; minor benefit; possible $1.17 million in live bison value to tribes	$61,000 in meat available for 3–4 years; otherwise similar to alternative 1; minor beneficial impact	$19,000 per year donated during phase 1; Similar to alternative 5 during phase 2; minor beneficial impact	$26,000 per year of bison meat received; value would be higher if some bison are donated live; minor benefit; possible $1.06 million in live bison donations to tribes	$26,300 per year of bison meat donated; a possible $1.8 million in live bison value over 15 years of the plan	Potentially more bison slaughtered therefore more meat available to tribes; Unknown number of bison could be sent to quarantine	Same as alternative 1
Impacts on Socioeconomics — Social Values										
Social values	Minor to moderate impacts to those with humanitarian/moralistic values; negligible impact to ranching values	Minor impact on traditional ranching lifestyles; relative positive impact on moral and humanitarian attitudes; possible major impacts on individual ranchers, tribes, those with moral/humanitarian values; possible major impact on winter visitors who support mechanized access	Minor to moderate impacts on those opposed to hunting; negligible impacts on those with humanitarian/moral values; minor impact on ranching values	Overall minor to moderate; impacts on tribes minor; ranching similar to alternative 1	Those with humanitarian/moral values, tribes, some visitors experience major impact; ranchers negligible to minor benefits from eradication of brucellosis in bison	Similar to alternative 5 during phase 2 (parkwide capture, test, and slaughter), to alternative 1 during first 12 years	Minor to moderate adverse impact on humanitarian/moral values; minor to major impact on tribes; minor impact on traditional ranching lifestyle	Similar to alternative 1, except tribes receiving more benefits from potential quarantine	Same as alternative 1	Same as alternative 1

Table 3: Summary Comparison of Impacts of Alternatives *(continued)*

Topic	Alternative 1: No Action	Alternative 2:	Alternative 3:	Alternative 4:	Alternative 5:	Alternative 6:	Alternative 7:	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implementation of Interim Plan outside Park, Modified Preferred inside Park
Impacts on Socioeconomics — Nonmarket Values										
Annual nonmarket values attributed to well-being of bison population	No impact	Estimated present value of winter range of $4.43 million	Similar to or slightly less than alternative 2	No impact	Estimated present value of capture, test and slaughter (seropositive) or vaccinate (seronegative) program of $3.57 million	Same as alternative 1 until parkwide capture and slaughter, then same as alternative 5	Similar to alternative 3	Similar to alternative 3	Similar to alternative 1	Similar to alternative 1
Nonmarket values attributed to wildlife viewing	No impact	Possible benefit; magnitude unknown	No impact	No impact	Possible adverse impact; magnitude unknown	No impact	No impact	No impact	No impact	No impact
Nonmarket values attributed to recreation or hunting	No impact	Estimated loss of $3.69 million annually	$24,000 gain from hunting	$11,000 gain from hunting	Similar to alternative 2 during capture period	Similar to alternative 2 during first 10 years, then similar to alternative 5 during capture and slaughter	Similar to alternatives 1 and 4 ($8,000 gain from hunting)	No impact	Same as alternative 1	Same as alternative 1
Impacts on Threatened, Endangered, and Sensitive Species										
Bald eagle	Potential human disturbance impacts reduced to negligible through avoidance mitigation	No impact	No impact	Same as alternative 1	Potential direct effect on wintering eagles from capture facility in Madison River area; major impact possible	Potential major adverse impact on one pair of nesting bald eagles from construction of a capture facility at Seven-Mile Bridge	Same as alternative 1	Negligible effects on the bald eagle with required mitigating measures; minor positive effect on bald eagles on Horse Butte as a result of the potential for less hazing, capture and handling of bison	Same as alternative 1	Same as alternative 1
Analysis area grizzly bear – carrion supply	Slower than natural increase to maximum bison population level would have negligible impact	Quicker growth of bison population, largest range; moderate benefit compared to alternative 1 to bears by increasing carrion foraging	Minor benefit to bears compared to alternative 1 from increased growth rate, range of bison population	Same as alternative 1	Rapid decrease in bison numbers, reduction in carrion foraging opportunities for bears from range of bison population; moderate to major adverse impact	Same as alternative 1	Bison numbers less than alternative 1, but not biologically different for grizzly bears; negligible impact	Similar to alternative 7 but less adverse because of higher target bison population	Same as alternative 1	Same as alternative 1
Park interior grizzly bear – carrion supply	Groomed roads now allow bison to leave park during severe winter; negligible impact on bear carrion supply	Closing groomed roads to snowmobiles may keep bison in interior; minor to moderate beneficial impact on bear carrion supply by increased winterkill	Same as alternative 1	Same as alternative 1	Rapid decrease in bison numbers, reduction in carrion foraging opportunities for bears from range of bison population; moderate to major adverse impact	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1

Table 3: Summary Comparison of Impacts of Alternatives *(continued)*

Topic	Alternative 1: No Action	Alternative 2:	Alternative 3:	Alternative 4:	Alternative 5:	Alternative 6:	Alternative 7:	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implementation of Interim Plan outside Park, Modified Preferred inside Park
Impacts on Threatened, Endangered, and Sensitive Species *(continued)*										
Grizzly bear — human confrontations	Possibility of human/ bear encounter and bear being shot increased by bison management actions; currently mitigated by removal of bison viscera, body parts after shooting	Fewer bison likely shot because of larger SMAs, more dispersed shooting; beneficial impact compared to alternative 1	Possibility of human/ bear encounter and bears being shot increased by bison hunting; impact reduced to negligible through hunter education	Same as alternative 3	Same as alternative 1	Same as alternative 1	Same as alternative 3	Same as alternative 1	Same as alternative 1	Same as alternative 1
Grizzly bear — bison management activities	Potential disturbance and displacement caused by hazing and shooting of bison; negligible impact; no or negligible impact from capture facilities, as bears are denning	Potential temporary disturbance and displacement caused by hazing and shooting of bison; negligible impact, as most occurs during denning period	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1
Gray wolves — human confrontation	No impact	No impact	Possibility of a human/ wolf encounter and wolf being shot increased by bison hunting; impact reduced to negligible through hunter education	Same as alternative 3	No impact	No impact	Same as alternative 3	No impact	Same as alternative 1	Same as alternative 1
Gray wolves — bison management activities	Disturbance and displacement caused by hazing and shooting; short-term, negligible impact; no or negligible impact from capture facilities	Potential displacement of wolves that may inhabit the area in the future caused by shooting bison; negligible impact	Same as alternative 2	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1	Similar to alternative 1 but less adverse as a result of the potential for less hazing, capture and handling of bison	Same as alternative 1	Same as alternative 1
Gray wolves — bison as prey and carrion	Negligible impact	Moderate benefit for wolves by increasing their opportunities to forage on carrion due to quickest growth of bison population and largest range	Similar to alternative 2, but negligible as range and growth rate of bison population would be less	Same as alternative 1	Smaller range and rapid decrease in bison population would reduce wolf foraging opportunities; moderate to major adverse impact	Same as alternative 1	Reduced size of bison herd over the long term would have a negligible impact on wolf foraging opportunities	Negligible to minor benefit for wolves due to tolerance of bison beyond park boundaries during winter months	Same as alternative 1	Same as alternative 1
Wolverine and lynx — changes in snowmobile grooming	Negligible impact	Potential shift in use to national forest caused by stopping road grooming for snowmobiles at west entrance; potential increase in packed snow routes, allowing predators to access prey now used by lynx; negligible adverse impact	Negligible impact	Negligible impact	Negligible impact	Negligible impact	Negligible impact	Negligible impact	Same as alternative 1	Same as alternative 1

Table 3: Summary Comparison of Impacts of Alternatives *(continued)*

Topic	Alternative 1: No Action	Alternative 2:	Alternative 3:	Alternative 4:	Alternative 5:	Alternative 6:	Alternative 7:	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implementation of Interim Plan outside Park, Modified Preferred inside Park
Impacts on Threatened, Endangered, and Sensitive Species *(continued)*										
Trumpeter swan — nesting pair	No impact	No impact	No impact	No impact	No impact	Major adverse impact from Seven-Mile Bridge facility	No impact	No impact	No impact	No impact
Impacts on Other Wildlife Species										
Pronghorn antelope — habitat removal	Removal of >13 acres of critical winter habitat due to Stephens Creek facility; moderate to major adverse impact	Same as alternative 1 during phase 1, then moderate to major benefit from removal of facility at Reese Creek	Same as alternative 1 unless land acquired and capture facility moved north; if so, possible major benefit	Same as alternative 1	Removal of critical winter habitat caused by Stephens Creek and other facilities; moderate to major adverse impact	Same as alternative 5	Same as alternative 3	Same as alternative 1	Same as alternative 1	Same as alternative 1
Elk, antelope, and other ungulates — capture operations	Disturbance and displacement caused by hazing, fences, and shooting; minor impact	Same as alternative 1 during phase 1, then minor benefit from removal of facility	Short term, same as alternative 1; long term, minor benefit from removal of Stephens Creek facility	Same as alternative 1	Minor impact caused by additional capture facilities	Same as alternative 5	Same as alternative 3	Moderate to major benefit to pronghorn and minor benefit to other wildlife species due to decreased use of capture facilities	Same as alternative 1	Same as alternative 1
Elk, antelope, and other ungulates — acquisition of land	No impact	Moderate to major beneficial impact on pronghorn; minor benefit to other ungulates	Moderate to major beneficial impact on pronghorn; minor benefit to other ungulates	Same as alternative 1	No impact	No impact	Same as alternative 3	Same as alternative 3	Same as alternative 3	Same as alternative 3
Predators and scavengers	Potential minor impact caused by hazing; negligible impact on carrion supply from removal of bison	No impact	Potential minor impact caused by hazing; no impact associated with changes in bison population relative to alternative 1	Same as alternative 1	Major decrease in prey/carrion; moderate adverse impact	Slight to moderate decrease in prey/carrion; minor adverse impact	Minor adverse impact from maintaining smaller bison population size over long term	Same as alternative 1 during step 1; minor benefit during steps 2 and 3	Same as alternative 1	Same as alternative 1
Impacts associated with snowmobiling	Displacement, noise, habitat modification; degree of impact unknown, likely minor	Minor to moderate impact from snowmobile use displaced to national forest	Same as alternative 1	Same as alternative 1	Moderate adverse impacts during parkwide capture and slaughter from displacement due to road closures	Same as alternative 2 for first 12 years, then additive with alternative 5; moderate impacts likely	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1
Impacts on Human Safety										
Risk of bison management personnel or hunters contracting undulant fever	Negligible to minor impact	Negligible impact	Negligible to minor impact	Minor impact	Moderate impact (phase 1); negligible impact (phase 2)	Negligible to minor impact for first 12 years; moderate impact last 3 years	With mitigation, negligible to minor	Same as alternative 1 but less adverse during step 3 when bison handling is expected to decrease	Same as alternative 1	Same as alternative 1

Table 3: Summary Comparison of Impacts of Alternatives *(continued)*

Topic	Alternative 1: No Action	Alternative 2:	Alternative 3:	Alternative 4:	Alternative 5:	Alternative 6:	Alternative 7:	Modified Preferred Alternative	State of Montana October 24, 1999 Preferred Alternative	Implementation of Interim Plan outside Park, Modified Preferred inside Park
Impacts on Cultural Resources										
Archeological resources	No additional impact	Potential disturbance from removal of capture facilities; negligible or minor impact with required mitigation	Potential disturbance from grading for capture or quarantine facilities; negligible or minor impact with required mitigation	Same as alternative 3	Potential disturbance from grading for nine capture facilities has potential for major adverse impacts; could be mitigated to negligible or minor impacts; costs could be high	Capture facility in Seven-Mile Bridge area would have major adverse impacts to archeological resources; could be mitigated at minimum estimated cost of $1 million; impacts, with mitigation, would be minor	Same as alternative 3	Potential disturbance from grading for capture or quarantine facilities; with mitigation, negligible to minor impact	Same as alternative 1	Same as alternative 1
Cultural significance of bison herd to tribes	Status quo may be considered major adverse impact to tribes viewing bison herd as culturally significant	Free ranging bison herd protected, herd size increased; minor to major positive impact compared to alternative 1	Similar to alternative 2	Similar to alternative 1	Restrictions on distribution and decreased size of herd would have major adverse impact	Similar to alternative 1 in phase 1; similar to alternative 5 in phase 2	Similar to alternative 1 and 4	Increased tolerance of bison outside park would be major benefit	Similar to alternative 1 but less bison expected to occupy public lands outside of park	Same as alternative 1
Historic landscape	Capture facilities visually intrusive on landscape; negligible impact	Dismantling capture facilities, additional bison restores scene; beneficial impact	Dismantling capture facilities inside park, some increase in bison restores scene	Similar to alternative 1	Additional capture facilities not part of historic scene inside park; major short-term adverse impact	Similar to alternative 5	Similar to alternative 3	Same as alternative 1 unless additional capture facility located north of the park; then possible adverse impact	Similar to alternative 1 but less bison expected to occupy public lands outside of park	Same as alternative 1
Impacts on Visual Resources										
Presence of capture/quarantine facilities	Minor to moderate impact on natural vista	Beneficial compared with alternative 1	Minor impact from relocated facility on north side; minor impact from quarantine, beneficial to west side	Minor to moderate impact on natural vista; quarantine minor impact	Major impact on natural vista from capture facilities parkwide.	Major impact on natural vista; major adverse impact from Seven-Mile Bridge facility	Similar to alternative 3; except on west side	Same as alternative 4	Same as alternative 4 if quarantine included	Same as alternative 1
Bison viewing	Potential increase in viewing opportunities from increase in bison population over time; minor benefit	Minor to moderate benefit for those seeking bison due to moderate increase in bison population, compared to alternative 1 and increased distribution	Similar to alternative 2	Same as alternative 1		Minor to moderate adverse impact on viewing opportunities for those seeking bison due to decrease in bison population, compared to alternative 1	Same as alternative 1 in phase 1, alternative 5 in phase 2	Minor benefit to those seeking to view bison from increased distribution of bison outside park and negligible changes in population level	Same as alternative 1	Same as alternative 1
Bison management activities	Potential major visual impact caused by hazing, shooting and gutting	No impact	Potential major visual impact caused by hunting	Similar to alternatives 1 and 3	Moderate to major visual impact from capture operations	Same as alternative 5	Similar to alternative 4	Similar to alternative 1 but less adverse due to potential reduction in management activities during step 3	Same as alternative 1	Same as alternative 1
Winter scene	Current effect on scene from snowmobiles and other winter recreationists	Minor to major benefits for the park visual scene from displaced snowmobiles, minor to major adverse impacts on the scene on adjacent U.S. Forest Service lands	Same as alternative 1, unless research indicates road closures; if so, similar to alternative 2	Same as alternative 1	Same as alternative 2, except visitors able to access park would experience moderate to major impact from capture operations on winter scene	Same as alternative 2, except visitors able to access park would experience moderate to major impact from capture operations on winter scene	Same as alternative 1	Same as alternative 1	Same as alternative 1	Same as alternative 1

2,500 the following year, when parkwide capture and slaughter began. This would represent a major short-term adverse impact (28% reduction) on the population. The herd would begin to increase following completion of the test and slaughter program; from 2,900 to 3,400 bison by 2014 (assuming 70% effectiveness), or from 2,500 to about 3,000 animals (assuming 25% effectiveness) by 2014.

Unlike other alternatives, in alternative 7 the agencies would attempt to manage the bison population within the more narrow range of 1,700 to 2,500 animals. Given the mix of management tools described above in "Alternatives," the model predicts the bison population would be expected to increase from about 2,200 bison to 2,700 (average increase 2.6%/year) in 2004, and level off at or about 2,700 throughout the remainder of the 15-year plan. This alternative would result in a bison population 12% lower than alternative 1 in 2006 and 23% lower in 2011. However, because of limitations with the deterministic model, the differences between alternatives 1 and 7 might be less. Slaughter, quarantine, agency shooting, and hunting are predicted to remove an average of 132 to 137 bison per year. If bison exited the park in larger numbers during severe winters, more would be killed if the bison population was near or above 2,500 animals. During mild winters, fewer bison would exit the park and thus fewer bison would be killed.

The modified preferred alternative provides for an increasing bison population and would maintain a population of around 3,000. The use of management tools described in volume 1, "The Alternatives" would likely maintain the population near 3,000; modelling indicated the mean population would be similar to alternative 1 in the long term and was consistently about 20% higher than alternative 7 (identified as the preferred alternative in the *Draft Environmental Impact Statement*). This is considered a moderate to major benefit of the modified preferred alternative.

Stochastic Influence on Bison Population. In the period following the release of the *Draft Environmental Impact Statement* and the publication of the final environmental impact statement, the National Park Service funded development of a stochastic model to examine the influence of random events, such as severe winters, on bison management. Table 5 shows the model predictions of impacts on the bison population for all eight alternatives.

Seroprevalence Rate. Modelling efforts using the deterministic model to predict impacts of management scenarios on seroprevalence in the *Draft Environmental Impact Statement* assumed 50% seroprevalence in the bison population. The more refined stochastic model described above was also used

to check predictions of impact on seroprevalence; however, research after the release of the *Draft Environmental Impact Statement* indicated seroprevalence in 246 bison tested in the winter of 1996–97 was 39% (NPS, unpubl. data). Both models assumed either a 70% rate of effectiveness of the bison vaccine (based on current success with cattle) or 25% rate of effectiveness (based on effectiveness in bison calves). Bison calves were assumed to be vaccinated with a safe and effective vaccine beginning in 2000 in the deterministic model; however, additional research has indicated a safe and effective vaccine for calves would probably not be available until later (2002/2003), so vaccination was assumed to begin in 2002 in the stochastic model.

Using the deterministic model, and assuming a vaccine that was 70% effective and calfhood vaccinations began in 2000, the population seroprevalence rate under alternative 1 would be expected to decline from a starting point of 50% seropositive in 1997 to at least 33% seropositive in 2006 (see table 6). If the vaccine was 25% effective, seroprevalence was predicted to drop from 50% to 40% by 2006. Continued management efforts and calfhood vaccination (assuming 70% efficacy) would reduce seroprevalence to 24% in 2011. The stochastic model predicted mean seroprevalence would fall to about 11% in 2013 (assuming 70% efficacy). This is a 69% reduction in the first 11 years of vaccination compared with a 49% reduction in 11 years of vaccination predicted by the deterministic model.

TABLE 4: POPULATION CHANGES PREDICTED TO OCCUR USING DETERMINISTIC (AVERAGING) MODEL

Alternative	Population Size (1997)	Population Size (2006)	Population Size (2011)	Number of Bison in Western SMA	Number of Bison in Reese Creek SMA
1	2,200	3,100	3,500	18–52	0
2	2,200	3,500	3,500	20–60	0–120
3	2,200	3,500	3,500	16–120	60–80
4	2,200	2,800	3,200	1–52	0
5	2,200	2,000	2,900	0	0
6	2,200	3,100	2,900	22–60	0
7	2,200	2,700	2,700	13–51	0–100
Modified Preferred	2,200	3,245	3,246	22–60	0–100

Table 5: Stochastic Model Results of Mean Bison Population for Selected Years after Implementing Alternative*

Year	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Modified Preferred
Year 1 (1997)	2108	2108	2108	2108	2108	2108	2108	2108
Year 5 (2001)	3113	3089	3186	3118	2080	3029	3033	3117
Year 6 (2002)	3326	3358	3393	3221	2157	3210	3191	3282
Year 8 (2004)	3600	3892	3616	3541	2494	3569	3331	3520
Year 10 (2006)	3825	4355	3716	3703	2828	3689	3534	3668
Year 12 (2008)	3942	4868	3803	3687	3140	3826	3539	3714
Year 14 (2010)	3831	5217	3740	3699	3357	3711	3644	3650
Year 16 (2012)	3721	5175	3726	3592	3487	3683	3575	3660
Year 18 (2014)	3734	5247	3752	3669	3587	3681	3640	3703

* Implementation of the plan was assumed to begin in the year 2000, or year 4 of the model.

Table 6: Predicted Seroprevalence Rates for Each Alternative Using Deterministic (Averaging) Model

Alternative	Seroprevalence 2006 (assuming 70% efficacy)	Seroprevalence 2006 (assuming 25% efficacy)	Seroprevalence 2011 (assuming 70% efficacy)
1	33	40	24
2	34	45	26
3	36	45	28
4	34	42	26
5	0	0	0
6*	32	40	0
7	32	40	23
Modified Preferred	33	Not calculated	25

* For both vaccine efficacies, seroprevalence would be 0% after completion of capture, test, and slaughter operations by 2013.

In alternative 2, the population seroprevalence rate would be expected to decline to at least 34% seropositive in 2006 (assuming 70% efficacy) or to 42% by 2006 (assuming 25% efficacy). Continued management efforts and calfhood vaccination (70% efficacy) would reduce seroprevalence to 26% in 2011. This would represent a minor adverse impact (3% to 8% less reduction) compared to alternative 1. The stochastic model predicted the seropositive rate would drop to about 13% by 2013, or a 62% reduction in 11 years, compared with a 42% reduction in 11 years of vaccination estimated by the deterministic model under this alternative.

In alternative 3, the population seroprevalence rate would be expected to decline to at least 36% seropositive in 2006, assuming a 70% vaccine efficacy. With calfhood vaccination and a vaccine efficacy of 25%, seroprevalence was predicted to drop to 45% by 2006. Continued management efforts and calfhood vaccination (70% efficacy) would reduce seroprevalence to 28% in 2011.

This would be a minor to moderately higher seroprevalence (9%–17% higher) than that predicted for alternative 1. The stochastic model predicted a 60% drop in seroprevalence from 11 years of vaccination to 15% seropositive, compared to a 40% reduction predicted by the deterministic model.

In alternative 4, capture and removal of seropositive bison, and calfhood vaccination (70% efficacy) was predicted to decrease seroprevalence to at least 34% in 2006 and 26% in 2011. Assuming a 25% vaccine efficacy, seroprevalence would drop to 42% by 2006. This would be a minor adverse impact (3%–5% higher seroprevalence) compared to alternative 1. The stochastic model predicted seroprevalence would fall to 13% in 11 years of vaccination. This is a 65% reduction compared to a 42% reduction predicted by the deterministic model.

In alternative 5, the seroprevalence rate in bison would be expected to drop from 50% in 1997 to 0% in 2001, assuming 70% vaccine efficacy, capture, test, slaughter operations, and whole-herd vaccination. In the 25% vaccine efficacy model the seroprevalence rate dropped to 0% by 2001. This would be a significant decrease in the seroprevalence rate and a major beneficial impact compared to alternative 1. Results using the stochastic model were comparable.

In alternative 6, the seroprevalence rate would remain similar to alternative 1 during the vaccination phase (2000–2010), and then drop to 0% by 2013. This would be a major reduction in seroprevalence compared to alternative 1. The stochastic model predicted that stabilization of seroprevalence (e.g., the end of phase 1) would take longer than the 15-year life of the plan. Phase 2 would drop seroprevalence to near zero by 2020.

In alternative 7, the population seroprevalence rate would be expected to decline from a starting point of 50% seropositive in 1997 to at least 32% seropositive in 2006 due to removal of seropositive bison leaving Yellowstone National Park in the West Yellowstone and Reese Creek area, and calfhood vaccination (70% efficacy) beginning in 2000. Continued management efforts and calfhood vaccination (70% efficacy) would reduce seroprevalence to 23% in 2011. With calfhood vaccination and a vaccine efficacy of 25%, seroprevalence was predicted to drop from 50% to 40% by 2006. This would be a negligible to minor beneficial impact (0–4% lower seroprevalence rate) compared to alternative 1. The stochastic model predicted a 61% decline to 14% in 2013 compared with a 49% decline in seroprevalence predicted in the same period of time by the deterministic model.

The deterministic model predicts that seroprevalence under the modified preferred alternative would decline to about 33% in 2006 due to removal of seropositive bison and remote calfhood vaccination. Continued management efforts and vaccination would reduce seroprevalence to 25% in 2011, similar to that predicted under alternatives 1 (24%) and 7 (23%). The stochastic model predicted a decline to about 15% in 2012 and 13% by 2013 after 11 years of vaccination. This is a reduction of 63% and is a greater reduction than the 46% drop predicted by the deterministic model in the same period.

Impacts on Recreation

United States citizens and people from all over the world spend more than 9 million visitor days of recreation in developed sites of the Yellowstone area each year. In Yellowstone National Park, recreational visitation has grown by more than 25% in the last 14 years. As is common in most other western national parks, visitor use in Yellowstone is concentrated in the summer months, with 66% of the visitation in June, July, and August. By the year 2003, estimated visitation is expected to range from 3.6 million to 4.3 million visitors per year (NPS 1994). An additional nearly 2.8 million recreation visitor days on the adjacent Gallatin National Forest were logged in 1992.

Wildlife and Bison Viewing. When Yellowstone National Park was set aside in 1872 as the world's first national park, the "wonders of the Yellowstone" were the primary motivation — spectacular geysers, colorful hot pools, and the Grand Canyon of the Yellowstone (Meagher 1974). However, in modern times, wildlife viewing is the primary activity for many visitors who come to Yellowstone National Park. Bison are ranked as one of the top 10 animals visitors hope to see on a visit to the park.

Increases and reductions in bison numbers in and around the park could directly affect visitor wildlife-viewing experiences. Alternative 1 would lead to growth in bison numbers over the next 10 years (42% increase in population by 2006). Alternatives 2 and 3 populations would be 14% greater than alternative 1 populations and lead to a minor to moderate increase in viewing opportunities. Alternative 4 would be expected to result in a population of 2,812 bison in 2006. This is 8% smaller than under alternative 1 and would lead to a minor decrease in viewing opportunities. Alternative 5 would lead to a 35% decrease in bison populations compared to alternative 1 by 2006 and a minor to moderate adverse impact on associated viewing opportunities. Alternative 6 would lead to very similar populations as alternative 1 through 2009 until seroprevalence stabilizes from vaccination (estimated at roughly 10 years), then would reduce them temporarily by 17%, a minor to moderate adverse impact. Alternative 7 calls for the lowest long-range (15+ years) bison population of all the alternatives. By 2006, the population would be nearly 23% lower. These reductions in population size would likely lead to minor to moderate reductions in bison viewing opportunities relative to alternative 1. The bison population would be slightly higher under the modified preferred alternative than under alternative 1 for the first 10 years of the plan and slightly lower for the remaining five years. This would have a negligible impact on bison viewing.

Winter Recreation. Winter use in the park has been growing at an accelerating rate, nearly doubling in the decade between 1984 and 1994, to 140,000 in the 1994–95 winter season. An estimated 46% of winter visitors liked viewing the scenery most, and 17% specifically identified wildlife viewing as what they liked most about the park in the winter (NPS 1990b). In addition, snowmobiling has become a popular sport in the town of West Yellowstone.

Winter recreational use of Yellowstone National Park would be affected under alternatives 2, 5, and 6. Alternative 2 would lead to long-term closure of winter access to the park from the popular snowmobiling town of West Yellowstone and possibly restrict access from Mammoth to the park interior. Proposed alternative 2 road and trail closures would likely affect well over 50% of current winter oversnow visitors to the park, and either displace their activities to other roads and trails in the area or cause them to go to areas other than Yellowstone for winter recreation. Alternative 2 would likely have a minor to moderate effect on winter recreation users in the Yellowstone region. During the three to four years of capture and slaughter operations, alternative 5 would have a higher negative impact on winter recreation than

alternative 2 in that the west, north, and east entrances would all be cut off from winter access to the popular Old Faithful area. For the first 10–12 years alternative 6 would have similar negative impacts on winter recreation to alternative 2. During the following two to three years, the impacts on winter recreation under alternative 6 would be similar to those for the capture and slaughter period of alternative 5. Additional site-specific analysis after the release of the *Draft Environmental Impact Statement* indicated that the construction of a capture facility at Seven-Mile Bridge (part of alternative 6 and possibly in the same or similar location as under alternative 5) would have a direct, short-term, moderate to major, adverse impact on visitor use and experience, and operation of the facilities would have moderate to major impacts on visitor use and experience, particularly during summer and winter months.

Hunting. The five-week elk general rifle season in the study area takes place in late October and November. Mean harvest of elk in and near the affected environment is 3,044. By comparison, deer harvest is 2,564, moose is 93, bighorn sheep is 22, mountain goat is 10, and pronghorn is 23.

The American bison is a trophy animal for big-game hunters. Bison hunting takes place on both public lands and private game ranches in North America. Private ranches charge relatively high prices (ranging from $2,250 to $4,000 in the Northern Rocky region) for hunting a trophy-sized bull.

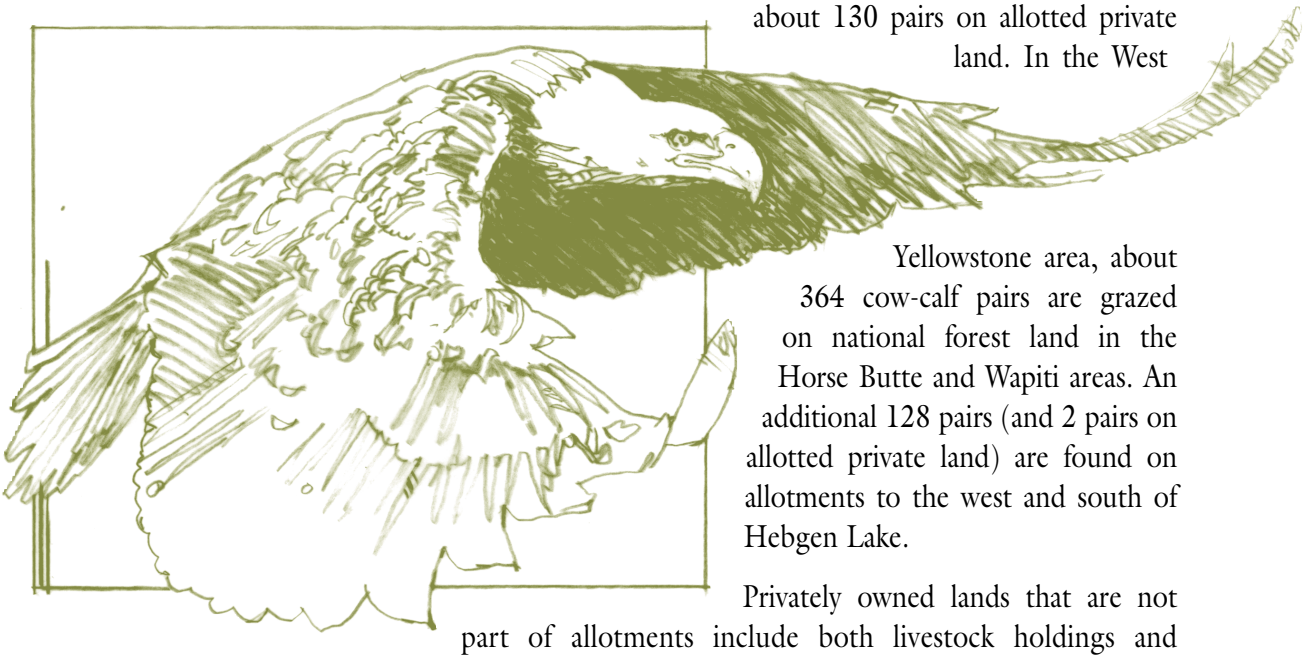
Limited hunting of bison would be allowed under alternatives 3, 4, and 7. Under alternative 3 between 75 and 85 bison hunting permits would be issued per year. Under alternative 4 the number of permits would be approximately 35. Under alternative 7 between 25 and 35 permits would be issued. This change in hunting opportunities in the area would represent a minor increase in overall big game hunting in the Greater Yellowstone Area, but would be a minor to moderate benefit for those receiving permits. No hunting of bison would occur under alternatives 1, 2, 5, 6, or the modified preferred alternative.

Impacts on Livestock Operations

In the Yellowstone area, the livestock industry is composed mainly of cow-calf operations with the exception of a few sheep producers. Cow-calf pairs are grazed on national forest allotments that can include adjacent private land, and on private holdings not associated with grazing allotments. In addition to risks of disease transmission, bison can harm livestock, as well as damage structures.

To the north of Yellowstone National Park, grazing allotments located in the broadest area included in the environmental impact statement have about 434

cow-calf pairs on national forest land and about 191 pairs on adjacent private land included as part of the allotments. When only the Reese Creek area is considered, cow-calf pairs on national forest land number about 86, with about 130 pairs on allotted private land. In the West Yellowstone area, about 364 cow-calf pairs are grazed on national forest land in the Horse Butte and Wapiti areas. An additional 128 pairs (and 2 pairs on allotted private land) are found on allotments to the west and south of Hebgen Lake.



Bald eagle in flight.

Privately owned lands that are not part of allotments include both livestock holdings and nonranch residences. North of Yellowstone National Park, the largest of the livestock operations is in the Reese Creek area on the Royal Teton Ranch. It has about 100 cow-calf pairs on unallotted private land, in addition to 150 on allotted private and public land.

In the West Yellowstone area, there are four private holdings located in the Horse Butte region between Duck Creek and the Madison River, totaling about 1,250 acres. Only the largest, with an area of about 650 acres, has a summer cattle operation with about 215 cow-calf pairs. Including producers to the west and south of Hebgen Lake, there are an estimated 800 cow-calf pairs on private land in the West Yellowstone area that could be directly affected by the most extensive of the SMAs (alternative 2).

Altogether, publicly and privately grazed cattle to the north and west of Yellowstone that could be directly affected are estimated to total about 2,019 cow-calf pairs. They comprise less than 4% of the cattle population of Gallatin and Park Counties.

The impacts of brucellosis on livestock operations involve not only the area adjacent to Yellowstone National Park, but also producers throughout Montana. The threat of disease transmission and the economic effects of disease-exposed bison entering the state have potential impacts that could indirectly affect all producers in the state.

Under alternative 1, cattle producers near Yellowstone National Park currently take precautions against the threat of brucellosis by vaccinating all female calves. In addition, herds from Idaho that graze in the West Yellowstone area are tested both when entering and leaving Montana. The cost of vaccinating and testing is relatively minor, estimated at about 2% of average yearly cow-calf production costs in the western United States. Producers' perceptions of the potentially negative consequences of grazing near Yellowstone National Park underlie recent decisions by two purebred stock owners to no longer graze their cattle in the area.

Alternative 2, characterized by minimal bison management, would involve modification of grazing allotments on the national forest, acquisition or easement of private lands, and conversion of cow-calf operations to steer or spayed heifer production. In the short term, until these changes are accomplished, the interim plan would continue. Public funds would be required for compensating producers who agreed to convert their operations and for acquiring the title or use of the private properties. These transactions would be voluntary with fair remuneration. Nevertheless, they would represent major impacts for the producers involved. Modification of public grazing allotments could affect as many as 926 cow-calf pairs. Incidents of damage by bison would be similar to occurrences under alternative 1 until susceptible cattle were removed from the areas designated as SMAs. Afterward, incidents would be fewer, since the only cattle would be those on converted holdings. Producers near SMA boundaries would likely continue to vaccinate female calves.

Under alternative 3, testing and vaccinating would continue as under the interim plan (alternative 1) in the short term. In the long term, modifications in grazing allotments on the national forest as described under alternative 2 would reduce the need for vaccinating and testing, but within less extensive SMAs. Producers near SMA boundaries would likely continue to vaccinate female calves. Whereas about 2,019 cow-calf pairs are found within the areas designated to be SMAs under alternative 2, the smaller areas of alternative 3 contain about 895 cow-calf pairs. Moderate to major impacts in the long term for these herds would result from possible conversion to steer or spayed heifer enterprises, closure or modification of grazing allotments, and private land acquisitions. Hunting could provide a minor source of income for remaining converted holdings.

Alternative 4 differs from alternative 1 in that bison hunting would be allowed. Hunting in the West Yellowstone area could provide a minor source of income for some private holdings.

Under alternative 5, livestock operators in the vicinity of Yellowstone National Park would likely perceive a reduced disease threat because no bison would be allowed outside the park. Restriction of bison to the park would lessen

concerns over brucellosis transmission, although vaccination of cattle could continue, especially in the short term. Relaxation of testing practices in the West Yellowstone area would depend on changes in Idaho's agreement with Montana. Private grazing resources might increase in value due to reduced risks of disease spread and damage by bison. Thus, the overall impact on affected livestock producers could be moderately beneficial.

Consequences of alternative 6 with respect to testing and vaccinating would be the same as in alternative 1 during the first years of vaccination of Yellowstone bison. Once capture, test, and slaughter of bison were undertaken, consequences for livestock producers would be like those of alternative 5, although seronegative bison would be allowed on public land in the West Yellowstone SMA. Cattle vaccination would probably continue, depending on producers' risk perceptions. Continued testing of herds in the West Yellowstone area would depend on Idaho's agreement with Montana. In the long term, moderate benefits overall would be realized under this alternative, as under alternative 5.

SMAs under phase 1 of alternative 7 would be the same as they are now under the interim plan (alternative 1). Testing and vaccinating would continue, as would possible incidents of damage by bison within the boundaries of the SMAs. No modifications of livestock operations would occur under phase 1. In phase 2 (following acquisition of winter range north of the Reese Creek boundary), impacts could affect at least one private holding and could modify three public grazing allotments along the western side of the Yellowstone River in the Gardiner Valley.

Under the modified preferred alternative, testing costs would be borne by APHIS, a negligible or minor benefit to producers. Monitoring and management of bison outside the park would occur seven days a week. This and a commitment to hazing would keep property damage to a minimum. The modified preferred alternative includes many measures directed at mitigating the perception of risk, as well as efforts to educate state animal professionals on the results of new research and the effectiveness of management measures. None of these measures would result in increased costs to livestock producers. Overall, the modified preferred alternative would have a slight beneficial impact on livestock operations relative to alternative 1.

In addition to direct impacts on local producers outlined above, ranchers throughout the state could suffer from increased testing or vaccinating requirements or interstate sanctions should brucellosis be transmitted to Montana cattle. The possibility of such transmission and associated indirect impacts would be considered remote in all alternatives, although it would be slightly less in alternative 5, slightly greater in alternative 2, and roughly equal in the remaining alternatives.

Impacts on Socioeconomics

Regional Economy. The affected area primarily encompasses two Montana counties, Park and Gallatin, and portions of Yellowstone National Park.

Throughout the Greater Yellowstone Area, public lands provide the basis for much of the economic activity in the region (recreation, mining, forestry, and agriculture). The area's overall economy has been changing for more than 20 years. The economy has shifted from commodity-extraction dependence to a more diversified economy based on recreation, tourism, and service industries. For example, between 1969 and 1989, more than 96% of all new jobs in the Greater Yellowstone Area came from sectors other than timber, mining, and agriculture (Rasker, Tirrell, and Kloepfer 1992).

Approximately 10% of Park County employment and 5% of Gallatin County employment is in the agriculture, forestry, and mining sectors. In addition, some component of employment in manufacturing, wholesale and retail trade, and services is derivative of activity in these resource-based sectors. Most jobs pertaining to the recreation and tourism industry are found in the retail trade and service sectors of a county's economy.

Recreation and tourism are significant to the economic viability of the area. Retail trade and services accounted for approximately 40%–45% of each county's earnings. These sectors, along with the government sector, have a strong tie to the region's resources and would likely continue to be important in sustaining segments of the economy of the Greater Yellowstone Area.

The alternatives described in the environmental impact statement would have the potential to affect jobs and income primarily through changes in visitation levels to Yellowstone National Park. Visitation levels could be affected by changes in winter road grooming, changes in wildlife viewing as a result of lowered population levels of bison, or in response to tourism boycotts. Visitors to Yellowstone National Park from outside Montana, Wyoming, and Idaho spent an average of $840 during their trips (Duffield 1992).

Expenditures related to recreation

A 1994 report on snowmobiling in Montana found nonresidents spend approximately $40 million annually in the state, and three-fourths of those nonresidents spent time in or near West Yellowstone (Sylvester and Nesary 1994). If alternative 2, which would include closing roads now groomed for snowmobile use from West Yellowstone into the park, was implemented, the total economic output in the 17-county Greater Yellowstone Area would be reduced by $13.75 million annually, and 333 jobs would be lost. While this is

a minor impact on the overall annual $12.7 billion economic output of the Greater Yellowstone Area, it would have a major adverse impact on the winter economies of the small communities where impacts would be concentrated, such as in West Yellowstone and Gardiner. Similar economic losses during the first 3–4 years under alternative 5, and for the life of the plan under alternative 6, are expected. The loss under all these alternatives would be substantially higher if not for considerable snowmobiling opportunities on the nearby national forest. Losses of winter recreation expenditures under alternatives 1, 3, 4, 7, and the modified preferred alternative would probably be negligible.

Resident elk hunters spent $54 per day while resident deer hunters spent $41 per day. Nonresident hunters expenditures associated with elk and deer hunting are $252 and $115 per day, respectively (Duffield 1988). Expenditures related to bison hunting in alternatives 3, 4, and 7 would add to this base, by as much as $440 per day. Since a maximum of 85 hunting permits for any alternative would be expected, expenditures related to it would be only a negligible benefit to the regional economy.

Expenditures related to wildlife viewing

Although alternatives resulting in a higher number and greater distribution of bison may lead to increased visitation to the park and associated expenditures in the area, the probability or extent of this is unknown. The converse is also true — that decreases in the population, particularly large-scale decreases such as would occur under alternative 5, may have adverse impacts on the number of visitors to the area and consequently on spending. However, the probability or extent of this impact is unknown. Surveys of visitors during 1999 indicated no clear relationship between the number of bison seen on a trip and the value placed on the value of the trip. However, while marginal changes in the number of bison in the park may not impact visitor trip values, a significant number of respondents indicated that seeing bison was one of their reasons for visiting the area.

The management of bison would involve killing through agency shooting, transport of seropositive animals to slaughter, hunting, and other actions that some would find objectionable. People who do take offense might object for any number of reasons: e.g., the killing of any animals is inappropriate, human management of wildlife is not needed, or bison do not need to be controlled to prevent brucellosis transmission from bison to cattle. All alternatives would involve bison management, and thus each would have some potential for adverse public reaction that might result in the call for a tourism boycott, although the potential would likely vary among alternatives. The potential for such a call and the effectiveness of such a boycott would be difficult to judge.

Minority and Low-Income Populations. As of the 1990 U.S. Census, Park County had a per capita income of $11,378, approximately equal to that of the state of Montana. Gallatin County had a substantially higher income level of $17,032 per person. The percentage of the population in poverty across the two counties and the state was relatively consistent in 1990 at between 15.2% and 17.1%. Unemployment in the two counties in 1994 was below the state average of 5.1% (Park County, 4%; Gallatin County, 2.3%).

Montana's Native American population had a much lower per capita income ($5,422) than either the two counties or the state, a much higher percentage of population living in poverty (46.1%) than the counties or the state, and an unemployment rate (26.2%) much higher than the counties or the state.

Several area tribes have expressed interest in receiving bison carcasses, or, more importantly, live bison as seed stock from the Yellowstone herd to begin their own bison operations. Bison meat sells for nearly twice the cost of beef because it is considered a health food by some consumers.

Under the interim management plan, a total of 1,084 bison were killed outside the park in Montana in 1996–97. Of this total, 590 bison were shot on the spot and donated to charities or released to Native Americans in exchange for the labor of gutting, cleaning, and transporting carcasses. Charities received 77 bison, and Indian tribes, tribal members, and affiliated organizations received 513 bison (Siroky 1997).

Alternatives 1, 3, 4, 5, 6, 7, and the modified preferred alternative all would include slaughter and the distribution of carcasses, and all alternatives would include provisions for shooting bison if they crossed boundary lines (and the subsequent gutting, cleaning, and distribution of carcasses, hides, and heads). The estimates for numbers of bison to be sold or donated for consumption would range from an incidental number per year in alternative 3 to 720 over four years under alternative 5. These numbers would represent a very minor portion of the total U.S. annual market for bison meat. The impact of charitable donations or release of carcasses to tribes would generally be negligible.

The release of live bison would require quarantining captured seronegative bison for the completion of a lengthy quarantine protocol. Quarantine facilities would be proposed for alternatives 3, 4, 7, and the modified preferred alternative, and live bison completing the procedure would be available to tribes and other requesting organizations. Live animals received after quarantine would have substantially more value to tribes than would carcasses.

Social Values. Bison are symbolically an icon for the independent, wild, and free American way of life, and are considered by some people to be "a unique symbol of the strength and determination of the people of North America" (National Bison Association 1997a).

Bison embody the culture of many native Plains peoples. They are a link to the spiritual world, spiritual power concentrated in physical form, the "great provider," and ultimately a symbol of power and strength. Bison skulls are used as altars, bone is used on traditional dress, and they are at the heart of the continuing sun dance.

Bison are important to other groups as well. To hunters, they are a trophy animal; to cattle ranchers, bison have historically represented competition with livestock for limited forage; and to many animal rights activists, they are an aesthetic and historic resource.

Written comments collected from the *Interim Bison Management Plan/Environmental Assessment* in 1995 indicated the public was strongly against the slaughter of bison. Ranchers also indicated strong feelings on the need to protect cattle from brucellosis. These are moralistic-humanistic and utilitarian values, respectively (see the "Affected Environment: Socioeconomics — Social Values" section in volume 1 for definitions). No systematic surveys have been conducted, but it appears that alternatives relying on slaughter (1, 4, 5, 6, 7, and steps 1 and 2 of the modified preferred alternative) would have a minor to major adverse impact on those having strong moralistic-humanistic values toward animals.

Attitudes in the Yellowstone region would be more balanced between utilitarian and other attitudes than in the nation as a whole (based on wolf recovery information). Native American values may be more complex, as many of the management actions are viewed as disrespectful or wasteful of bison.

Nonmarket Values. People place value on knowing a species is maintained in a viable state or has been augmented in some way. This "nonmarket" or "existence" value of the bison population was calculated based on results of three 1999 surveys of park visitors, regional residents, and national residents.

National results were not used, as the return rate failed to exceed an established threshold. This means actual nonmarket benefits would likely be significantly higher than those reported.

The benefits of having additional winter range outside the park and of improving bison health were estimated using survey results. Measurable benefits associated with the additional winter range were conservatively calculated to be about $4.43 million under alternatives where bison were allowed on additional purchased winter ranges outside the park (alternatives 2, 3, 7, and the modified preferred alternative). A separate analysis of the nonmarket value associated with aggressively reducing seroprevalence through parkwide capture, test, and slaughter (of seropositives) or vaccination (of seronegatives) like that under alternatives 5 and 6 found that resident and nonresident visitor values represent an estimated total nonmarket value of $3.57 million.

Costs and Benefits. Analysis performed in response to comments received on the *Draft Environmental Impact Statement* showed that the costs of the alternatives evaluated in the environmental impact statement would exceed the economic benefits in every case. To the extent that alternatives depend on capture, test, slaughter, quarantine, and/or vaccination, they would be increasingly expensive. Benefits were measured as the extent to which each of the objectives in the environmental impact statement were achieved. The alternative with the lowest costs for bison management was alternative 2; however, land purchase anticipated for phase 2 of this alternative would increase costs significantly. Alternatives 5 and 6 both have large costs associated with parkwide capture, test, slaughter, and vaccination operations. These costs would greatly exceed benefits, even when nonmarket benefits described above were included. Costs of implementing the modified preferred alternative would exceed benefits by about $7.4 million. This is about $1.8 million higher than the excess of costs over benefits in alternative 1.

Impacts on Threatened, Endangered, and Sensitive Species

Bald eagles, grizzly bears, Canada lynx, and gray wolves are the only known species to occur within the affected area that are protected by the Endangered Species Act. Wolverine and trumpeter swan, U.S. Forest Service sensitive species, could also occur in the affected area. These species could be directly affected by bison management actions, such as shooting, hazing, or habitat loss or modification. Because bison are an important food source, predatory species could also be indirectly affected by reduced foraging opportunities caused by changes in bison numbers, distribution, and seasonal migration

patterns. The agencies prepared a biological assessment for the modified preferred alternative and sent it to the U.S. Fish and Wildlife Service. The letter of concurrence from the U.S. Fish and Wildlife Service can be found in appendix J of volume 1.

Bald Eagles. Alternatives 5 and 6 would negatively affect bald eagles that winter and nest near Seven-Mile Bridge because of the location of a capture facility in this area. Other bald eagles in the analysis area would be protected by avoiding their nesting and wintering areas. Change in bison carrion availability would have a negligible effect because it is only a small part of the bald eagle diet. The modified preferred alternative may have a minor positive effect on bald eagles, particularly those nesting on Horse Butte, as a result of the potential for less hazing, capture, and handling of bison than under the no-action alternative.

Grizzly Bears. All alternatives could potentially disturb or displace grizzly bears from areas near bison management activities. The alternatives would affect only a small part of the Greater Yellowstone Grizzly Bear Recovery Zone, an area where seasonal or year-long grizzly activity is common and contains habitats important to the recovery of grizzly bears. Denning bears would not be affected during the winter when most activities would occur. Under alternatives 3, 4, and 7, increased human activity could increase the probability for human/bear conflicts and bear mortality. This probability would be reduced to negligible by educating hunters, removing gut piles, and implementing other mitigating measures.

The degree to which an alternative modifies bison population numbers could likewise affect grizzly bears. Bison, along with other ungulates, rank as one of the highest sources of net digestible energy for grizzly bears in the Yellowstone ecosystem. Bison are particularly important to bears because they provide a high quality food source during early spring before most vegetal foods are available to bears. From March through May, ungulates, mostly elk and bison carrion, are the most important foods in the grizzly bear's diet (Mattson et al. 1991). Grizzly bears that den in the Pelican and Hayden Valleys in the park depend on bison carrion and are most likely to be affected by changes in bison populations.

Under alternative 1, bison numbers would not be maintained within a specific range, and low population levels could result during some periods. Consequently, foraging opportunities could be reduced during some years and negatively impact grizzly bears, particularly during the spring. This impact would likely be negligible unless bison disappeared from Pelican or Hayden Valleys in the park. Alternative 2 would allow the bison population to reach a

long-term maximum of 3,500 bison quickly, and would leave park roads ungroomed, which would likely increase winter bison mortalities and carrion in the park. This would increase the availability of bison as a food source and moderately benefit grizzly bears. Alternative 3 would have minor benefits. Alternatives 4, 6, and 7 would maintain the bison populations within a specific range and cause only minor changes in the population. Thus, the impacts on grizzly bear foraging opportunities would be negligible. Alternative 5 would cause a major decrease in the first few years in the bison population and reduce the carrion supply available to grizzly bears. The modified preferred alternative would result in bison populations similar enough to those under alternative 1 that it is not likely to adversely affect the grizzly bear.

Gray Wolves. The Rocky Mountain gray wolf was reintroduced in Yellowstone National Park in March 1995 and is part of a "nonessential experimental population." This means that the species is listed and protected under the Endangered Species Act, but agencies have additional flexibility in their management. At this time, 11 named packs of wolves exist in the Greater Yellowstone Area (8 breeding pairs existed in 1999), as well as an additional 115 to 120 wolves living independently in the Greater Yellowstone Area as pairs or individuals (Smith 2000).

All alternatives could disturb or displace wolves from areas near bison management activities. However, any impact on the small wolf population would likely be negligible.

Wolves prey primarily on elk, moose, and deer. These species are abundant in the analysis area, and usually account for more than 90% of the biomass consumed. Smaller mammals may be an important alternative food during the snow-free months. Wolves rarely prey on live bison, but do eat bison carrion if it is available. Although wolves could eventually increase their take of bison as prey as the wolf population increased, impacts from changes in the bison population during the 15 years this plan was in effect would be negligible in alternatives 1, 3, 4, 6, 7, and the modified preferred alternative. Alternative 2 would have a moderate beneficial impact and alternative 5 a moderate to major adverse impact to wolves through larger-scale changes in bison population numbers.

On December 12, 1997, the United States District Court for the District of Wyoming ruled that the gray wolf reintroduction program in Yellowstone National Park and northern Idaho violated one provision of the Endangered Species Act. The court ordered the federal government to remove the reintroduced wolves and their offspring. On January 13, 2000, this decision was overturned by the 10th U.S. Circuit Court of Appeals.

Canada Lynx. Canada lynx are very susceptible to some human activities. All the alternatives could displace or disturb lynx from areas near bison management activities. Under alternatives 2, 5, and 6, snowmobile use now on the groomed trails inside the park would be displaced to trails and off-trail areas in the neighboring Gallatin National Forest where lynx occur. Lynx are specialized predators that may face competition from generalist predators given access to their habitat by following packed-snow routes such as those resulting from snowmobile use. Winter recreation activities would be monitored on the national forest and, if necessary, mitigating measures implemented to lynx. Changes in bison numbers would have a negligible impact because lynx seldom feed on bison carrion.

Wolverines. Impacts very similar to those described for lynx could also affect wolverines. These include displacement or disturbance from bison management activities or increased snowmobile activity in the Gallatin National Forest if alternative 2, 5, or 6 were implemented.

Trumpeter Swans. Trumpeter swans could be affected by the location and operation of bison management facilities. The swan occupies meadows and open fields, plus lakes, ponds, or slow-moving water inside the park on the Madison River. In particular, a breeding pair at Seven-Mile Bridge where a capture facility is proposed in alternative 6, would experience major adverse impacts from construction and operation.

Impacts on Other Wildlife Species

Ungulates. The Stephens Creek capture facility occupies 13 acres of critical pronghorn winter range, and has had adverse impacts on the antelope population through displacement, disturbance, and blocked movements. Observations from capture operations during winter 1996–97 showed pronghorn avoided using habitat in the capture facility area, and some pronghorn may have been confused by the wing fences when fleeing from predators. The capture facility at Stephens Creek would continue to exist in all alternatives except alternative 2 (in the short term only in alternatives 3 and 7), and would have a moderate to major adverse impact on the pronghorn population. In steps 2 and 3 of the modified preferred alternative, wildlife in the vicinity may experience a minor beneficial impact and pronghorn may experience a moderate to major benefit from a reduction in the use of the Stephens Creek capture facility. Other capture facilities, such as those in West Yellowstone and planned for different locations within the park in alternatives 5 and 6, could have minor adverse impacts on wildlife through displacement and disturbance.

Acquisition of additional wildlife winter range in the Gardiner Valley, which has occurred since the release of the *Draft Environmental Impact Statement*, is a part of alternatives 2, 3, 7, and the modified preferred alternative. This acquisition will make more winter habitat available to elk, mule deer, bighorn sheep, and particularly pronghorn. Although pronghorn and other ungulates have historically used the acquired area, a minor benefit to most ungulates and a moderate to major beneficial impact on pronghorn would occur from discontinuing a hunt on private lands focused on displacing pronghorn from agricultural land in the area.

Occasional hazing operations associated with all alternatives would be expected to have minor impacts on elk, mule deer, bighorn sheep, and other ungulates through disturbance and temporary displacement.

In alternatives where snowmobile use would be displaced outside the park (alternatives 2, 5, and 6), impacts on ungulates outside the park could be more intense than they are now. This is because snowmobiles would be restricted to trails inside the park, but allowed to travel off trails in many areas of adjacent public lands.

Elk, pronghorn, deer, bighorn sheep, and moose would not likely be affected through competition for forage or space with bison, as each has an ecological niche that differs from bison through food choices, occupied habitat, or tolerance of snow depth. Therefore, increases or decreases in the bison population size would not be expected to affect any other large ungulates.

Predators and Scavengers. Hazing activities directed at moving bison into capture facilities or inside the SMA boundary could disturb and displace predator and scavenger species, including black bear, mountain lion, coyote, fox, wolverine, bobcat, lynx, and a variety of smaller mammalian and avian carnivores and scavengers using those areas. Hazing should be infrequent, however, and displacement and stress would be local and temporary and would have only minor effects on those populations. Changes in the bison population size and resulting availability of carrion would not affect predators and scavengers except during the parkwide capture and slaughter phases of alternatives 5 and 6, when reductions would be severe enough to cause a moderate impact. Displaced snowmobile use associated with alternatives 2, 5, and 6 might affect some of these species more severely than at present, as this activity is restricted to trails inside the park and might not be if it was displaced outside the park. Impacts on some species could be moderate.

Impacts on Human Health

Brucellosis is a zoonotic disease that can infect people, causing undulant fever. Symptoms include intermittent fever, chills, night sweats, body and joint pain, poor appetite, and weakness. The general public would be at no risk of contracting the disease from bison. However, people responsible for carrying out proposed bison management actions such as capturing, vaccinating, gutting, loading for slaughter, and laboratory analysis, could be at moderate risk. Because step 3 of the modified preferred alternative calls for relatively little handling of bison exiting the park into established boundary areas, this alternative would pose fewer health risks to personnel involved with the capture, slaughter, testing, loading, or in-chute vaccination of bison than under alternative 1. Hunters could also be at some risk under alternatives that include hunting. Recipients of auctioned or donated meat could be at minor risk of exposure through the handling of potentially contaminated meat and the consumption of improperly prepared meat. Proper handling and cooking completely kills the bacteria.

Mitigating and preventive measures, such as proper equipment, ventilation, and information, would prevent impacts from being more than negligible to minor in all alternatives except during the parkwide capture and slaughter phases of alternatives 5 and 6, when the risk would be minor to moderate.

Impacts on Cultural Resources

The Great Plains and the northern Rocky Mountains of western Montana and Wyoming served as feeding grounds for bison. This region is also the homeland of various native peoples who hunted these herds.

Bison were and remain critical to the indigenous cultures of North America and were an important part of the landscape covering over half the continent. They once ranged from the Appalachian Mountains to the "deserts" of the Great Basin south into Mexico and as far north as the Yukon territory in Canada. English settlers arriving in what is now Georgia wrote of the "innumerable" bison they encountered. The numbers were so great that early Euro-American explorers could only describe them as "numberless," and wrote that the plains were "black and appeared to be moving" with the herds of bison. The most commonly used estimates of their numbers were between 30 and 65 million.

Bison provide not only food, clothing, fuel, tools, and shelter, but also are central to Plains tribal spiritual culture, viewed as an earthly link to the spiritual world. For many tribes, bison represent power and strength. For

example, the Shoshone believe that spiritual power is concentrated in the physical form of the bison. Many contemporary tribes maintain a spiritual connection with bison.

Traditional use of bison by humans centers on hunting and is evidenced in the archeological record. The remains of game drives, including both the fences and bison jump sites, as well as chipping stations, wickiups, and weapons, are all associated with the importance of hunting bison for tribal economy and culture.

Illustration entitled "By the Millions" by Martin S. Garretson, 1913. (NPS photo)

Most archeological sites in the Yellowstone area have not been evaluated according to the National Register of Historic Places criteria, although Obsidian Cliff, an area particularly rich in cultural remains, has been nominated as a national historic landmark. Several others, including the Yellowstone road system, one archeological site in the Stephens Creek area, and one archeological site in the Eagle Creek area, are considered to be eligible for inclusion in the national register.

Since the *Draft Environmental Impact Statement* was published, a site-specific archeological investigation of resources found in the vicinity of Seven-Mile Bridge was conducted for alternative 6. Capture facilities proposed there would have major impacts on archeological resources, but with mitigation, could be minor. However, the cost of mitigation could reach over a million dollars.

In all alternatives, bison would be killed while occupying their historic range. Bison populations would be slightly higher than under alternative 1 for the first 10 years of the modified preferred alternative and slightly lower for the remaining five years of this bison management planning period. In addition, some alternatives, including 2, 3, and the modified preferred alternative, would allow bison to occupy a greater portion of their historic range. This would have a minor to major positive impact on tribes and individuals who regard wild and free-ranging bison as culturally important. Reductions in the population size compared to the no-action alternative (alternative 1) would occur on a short-term basis in alternatives 5 and 6, might occur on a short-term basis in alternative 4, and would occur on a long-term basis in alternative 7. Alternative 5 and phase 2 of alternative 6 are also more

restrictive than under current management. Those alternatives that restrict bison movements and result in moderate or major reductions in the size of the herd would have a major adverse impact on tribes viewing bison as culturally important. These include alternative 5 and phase 2 of alternative 6.

In most alternatives, the process of monitoring and vaccinating bison would change their appearance. Bison would be marked with visible metal ear tags, paper back tags, and paint/peroxide stripes to indicate to managers and others that they have tested negative for the *Brucella* organism. These actions alter the historic image of the bison and would have a temporary, moderate impact on the historic landscapes. This would not be true of alternatives where untested bison would be allowed outside the park, including step 3 of the modified preferred alternative.

The construction of new capture or quarantine facilities would have the potential to affect archeological resources. In all alternatives proposing construction of bison management facilities (all except alternative 2), site-specific surveys would be conducted prior to ground-disturbing activities, and every effort would be made to avoid known archeological resources. Should avoidance prove impossible, the National Park Service, U.S. Forest Service, and state agencies would develop mitigating measures in consultation with the state historic preservation officer and the advisory council. Therefore, the impact would likely be negligible or minor.

Removal of the capture facilities, as proposed in alternative 2, would have a beneficial impact on the historic landscape. The construction of several new capture facilities in alternatives 5 and 6 would have a temporary but significant adverse impact on the historic landscape of Yellowstone National Park.

Impacts on Visual Resources

Visual resources consist of landform (topography and hydrology) and land cover (vegetation, buildings, roads, etc.). Visual resources are centered on significant features and intrinsic features. Also included is visibility of the undertaking, such as exposure and location.

The Greater Yellowstone Area is world renown for its scenery, wildlife, wilderness, rivers, fishing, hunting, outdoor recreation opportunities, and geologic and thermal features. The natural landscape is rugged and formidable due to the rapid gains in elevation, and most of the area remains in a wilderness state. Bison and other wildlife are frequently observed meandering through the landscape.

Visual resources within Yellowstone National Park fall into two general zones — the natural zone and the park development zone. Bison are observed within both, although they are most frequently observed within the natural zone.

Vehicle pullouts in the park are designed for visitors to stop and experience the visual resources, and are placed in areas where bison are most frequently found — e.g., valley lowlands off the main loop roads. Some locations include the open areas within Hayden Valley, Old Faithful/Firehole area, the Madison River (past Seven-Mile Bridge), Indian Creek in the Mammoth area, the Norris Campground, Gibbon Meadows, Elk Park, and others. The view from these pullouts includes an unobstructed natural setting containing habitat desirable to bison as well as other wildlife species.

The process of capturing and/or vaccinating bison would temporarily change their natural appearance. Bison would be visibly marked with tags and peroxide stripes due to vaccination and testing procedures. These processing marks would detract from the natural appearance of the animal. This would be a short-term, moderately adverse impact on the viewer, photographer, and anyone interested in seeing bison. Capture would be a part of all alternatives except phase 2 of alternative 2. In step 3 of the modified preferred alternative, there is potential for less marking and trapping of bison, and this would be a moderate to major positive impact on visual resources.

Agency shooting of bison and some hazing operations would be visible if bison ventured beyond delineated management areas. Hunting of bison outside the park in designated SMAs is also part of alternatives 3, 4, and 7. These bison management actions would have a minor to major short-term (winter only) visual impact on the landscape, or on some viewers, who might be opposed to shooting, hunting, or hazing bison, or might be sensitive to these activities.

The existing capture and test facility would continue to intrude on the viewshed at Stephens Creek in all alternatives except alternatives 2, 3, and 7. Because this facility is of a compatible design with the nearby Yellowstone National Park wrangling facilities, the impact on visual resources would be minimal. Also, this facility would not be readily visible to the majority of visitors to the park and surrounding areas.

Capture and test facilities within the viewshed on the western boundary of Yellowstone National Park would continue to adversely impact visual resources in alternatives 1, 4, 6, 7, and the modified preferred alternative. The visual impact of capture facilities at West Yellowstone would be minor to moderate. These facilities would not be visible in major viewsheds, but some park visitors, national forest users, and local residents would see them. Bison management actions, such as hazing, shooting, and gutting, could be a major adverse visual impact on some of these viewers. To the extent they do not

include these activities, alternatives, such as phase 2 of alternative 2 or 3 or step 3 of the modified preferred alternative, would have a relatively positive impact on visual resources. Construction of capture and testing facilities in the Seven-Mile Bridge viewshed near the western boundary of the park in alternative 6 would be a major impact on visual resources.

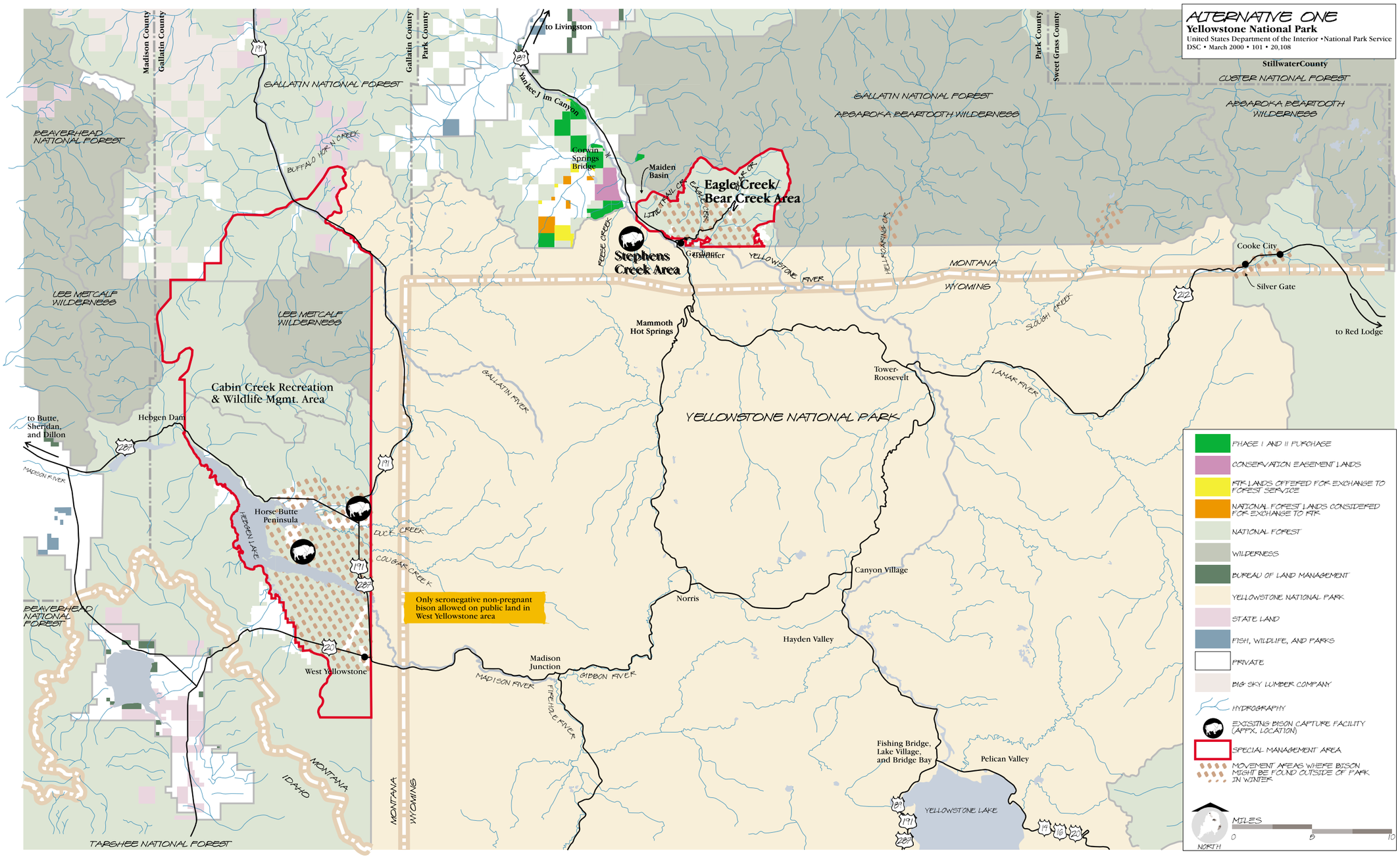
The proposed construction of capture and test facilities within Yellowstone National Park at the Lamar Valley/Crystal Bench, Blacktail Plateau, Madison River, West Yellowstone boundary area, Old Faithful/Firehole River, and Hayden/Pelican Valleys, which is part of alternatives 5 and 6, would have a major impact on visual resources. These areas are highly sensitive to visual intrusions, and while measures would be taken to minimize impacts, the presence of these facilities would be highly noticeable.

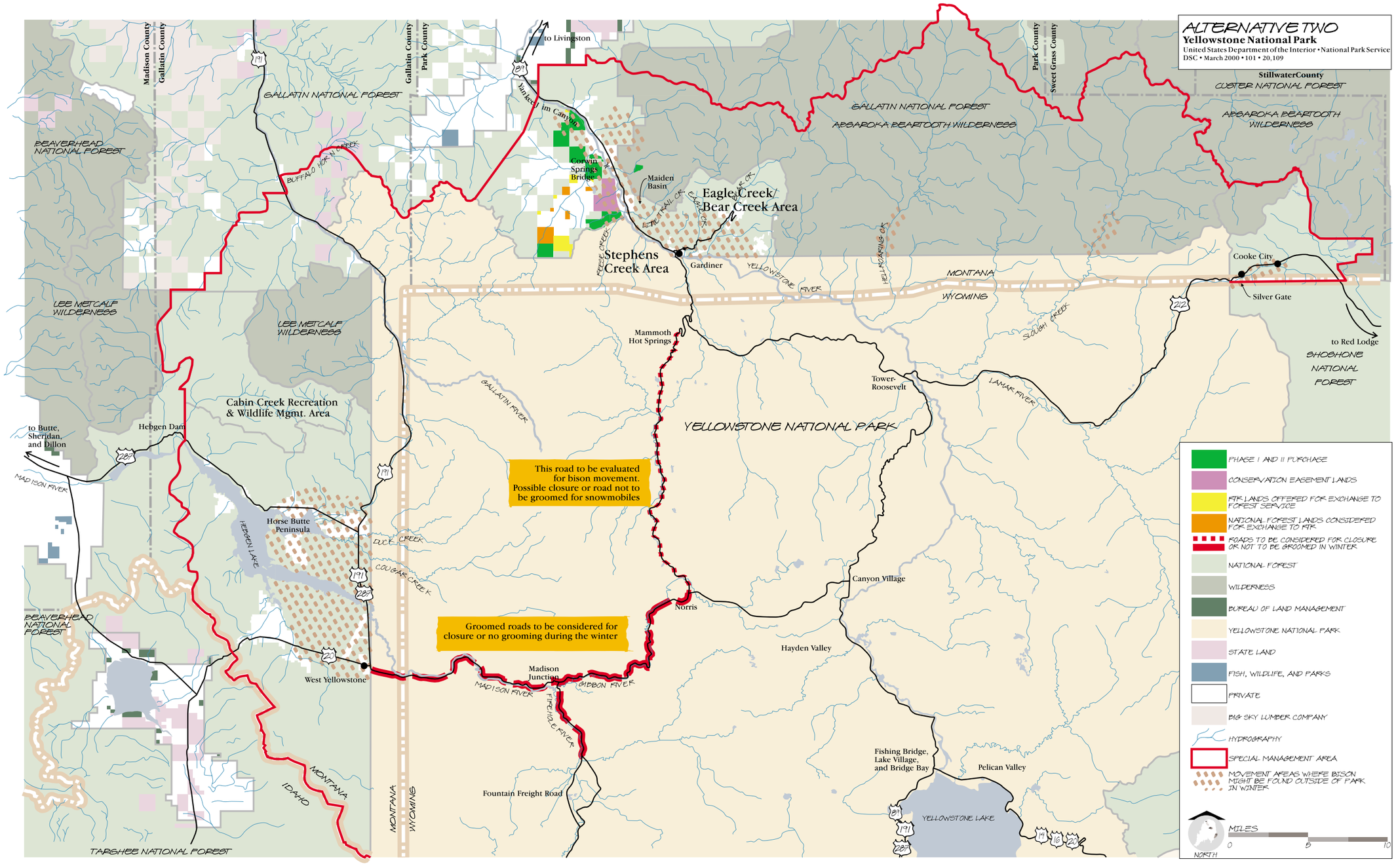
A quarantine facility is part of alternatives 3, 4, 7, and the modified preferred alternative. Although the location or design of a quarantine facility for bison has not been determined, the facility would probably appear as large-scaled corrals and pens within which bison would be visible. Siting of a relocated capture facility and a new quarantine facility would be sensitive to views and features of the viewshed; therefore, impacts are expected to be minor.

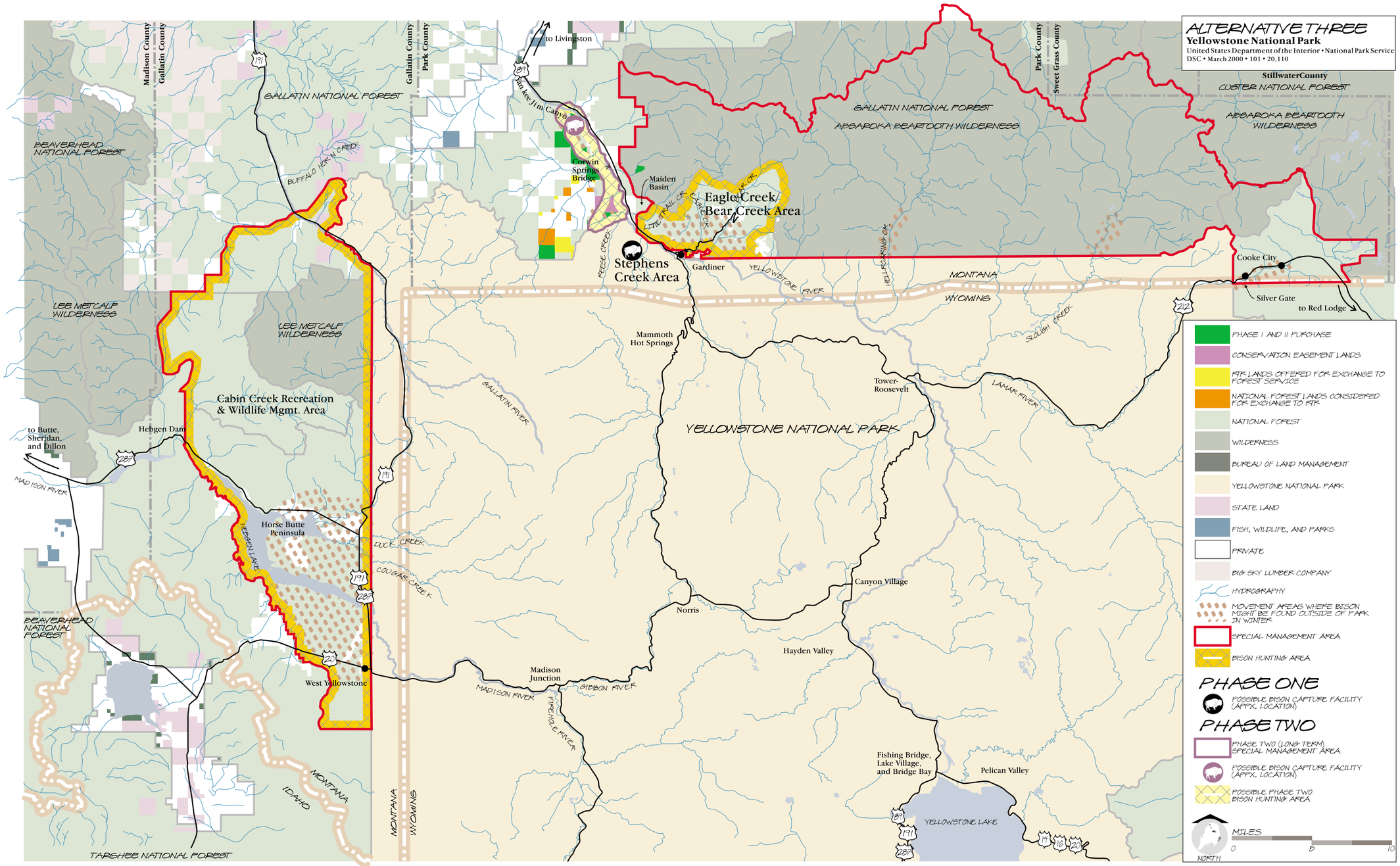
In alternatives 2, 3, 7, and the modified preferred alternative, grazing allotments might be modified and could cause negligible to minor changes in the rural landscape near park boundaries. In the long term, cattle grazing would be modified in some allotments on lands adjacent to Yellowstone National Park, and the scenery would change to views of bison and wildlife habitat.

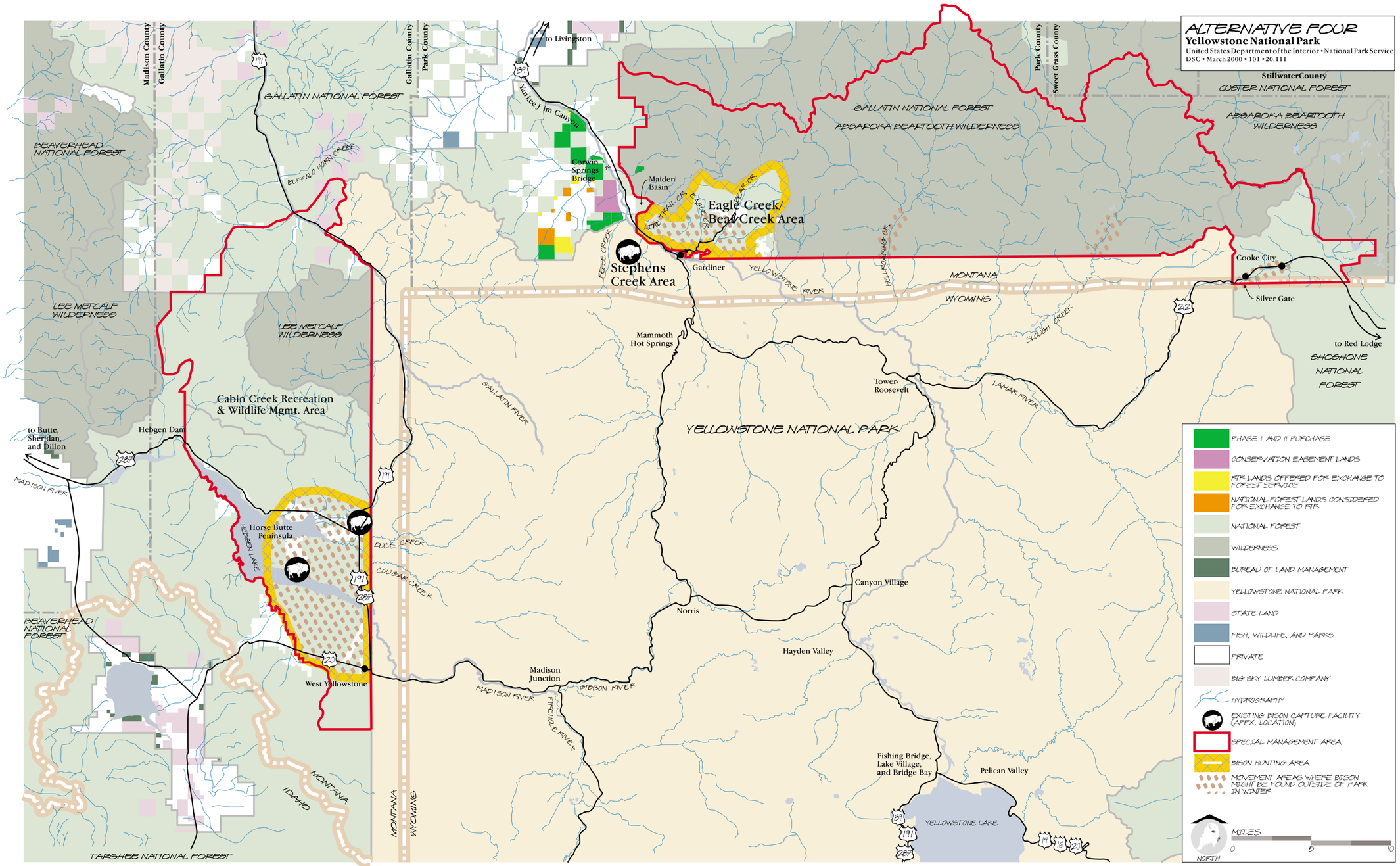
Changes in the size of the bison population could affect viewers. Although negligible or minor increases or decreases in the size of the population are not expected to affect viewing, larger scale changes are. In addition, those alternatives that allow bison outside the park are likely to have a greater positive effect on viewers. Minor or moderate benefits to visitors seeking to view bison are expected from alternatives 2, 3, and the modified preferred alternative. Minor to moderate adverse impacts to visitors seeking to view bison are anticipated from alternatives 5 and phase 2 of alternative 6.

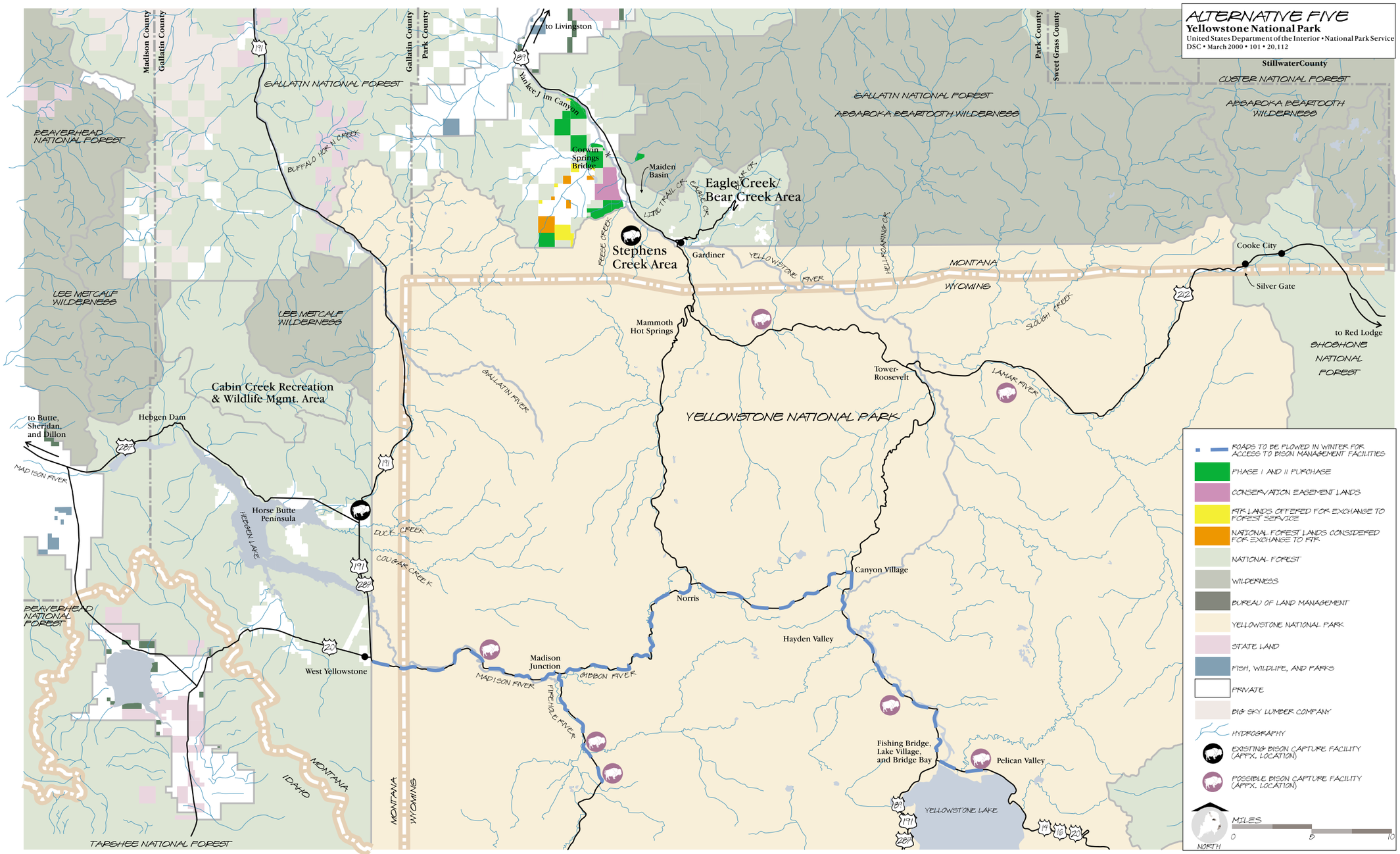
Alternatives 2, 5, and 6 include provisions for closing roads to snowmobile traffic. This would help restore the winter visual scene inside the park to a more natural one, but would adversely affect visual resources on adjacent Gallatin National Forest where much of the snowmobile traffic would be displaced.

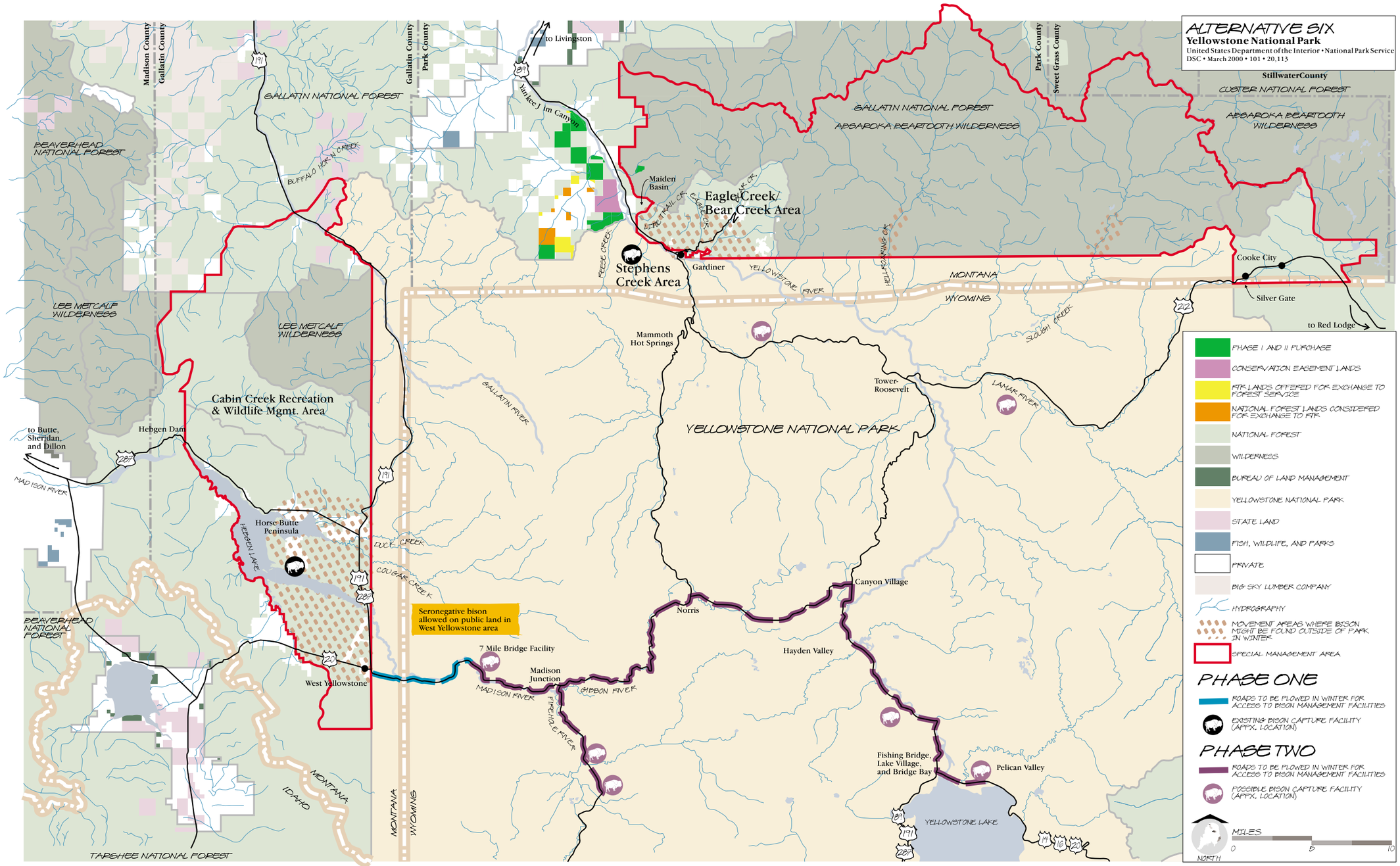

ALTERNATIVE ONE
Yellowstone National Park
United States Department of the Interior • National Park Service
DSC • March 2000 • 101 • 20,108
Only seronegative non-pregnant bison allowed on public land in West Yellowstone area
Eagle Creek/ Bear Creek Area
Stephens Creek Area
Cabin Creek Recreation & Wildlife Mgmt. Area
Horse Butte Peninsula
Corwin Springs Bridge
Maiden Basin
Mammoth Hot Springs
Tower-Roosevelt
Canyon Village
Norris
Hayden Valley
Madison Junction
West Yellowstone
Fishing Bridge, Lake Village, and Bridge Bay
Pelican Valley
Cooke City
Silver Gate
to Red Lodge
to Livingston
to Butte, Sheridan, and Dillon
Hebgen Dam
Gardiner
GALLATIN NATIONAL FOREST
ABSAROKA BEARTOOTH WILDERNESS
CUSTER NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
LEE METCALF WILDERNESS
YELLOWSTONE NATIONAL PARK
TARGHEE NATIONAL FOREST
YELLOWSTONE LAKE
YELLOWSTONE RIVER
MADISON RIVER
GIBBON RIVER
FIREHOLE RIVER
GALLATIN RIVER
LAMAR RIVER
SLOUGH CREEK
HELLROARING CR.
LITTLE TRAIL CR.
LIGHT CREEK
REESE CREEK
BUFFALO HORN CREEK
JANKEE JIM CANYON
HEBGEN LAKE
DUCK CREEK
COUGAR CREEK
MONTANA
WYOMING
IDAHO
StillwaterCounty
Park County
Sweet Grass County
Madison County
Gallatin County
Park County
PHASE I AND II PURCHASE
CONSERVATION EASEMENT LANDS
FWP LANDS OFFERED FOR EXCHANGE TO FOREST SERVICE
NATIONAL FOREST LANDS CONSIDERED FOR EXCHANGE TO FWP
NATIONAL FOREST
WILDERNESS
BUREAU OF LAND MANAGEMENT
YELLOWSTONE NATIONAL PARK
STATE LAND
FISH, WILDLIFE, AND PARKS
PRIVATE
BIG SKY LUMBER COMPANY
HYDROGRAPHY
EXISTING BISON CAPTURE FACILITY (APPX. LOCATION)
SPECIAL MANAGEMENT AREA
MOVEMENT AREAS WHERE BISON MIGHT BE FOUND OUTSIDE OF PARK IN WINTER
MILES
0
5
10
NORTH

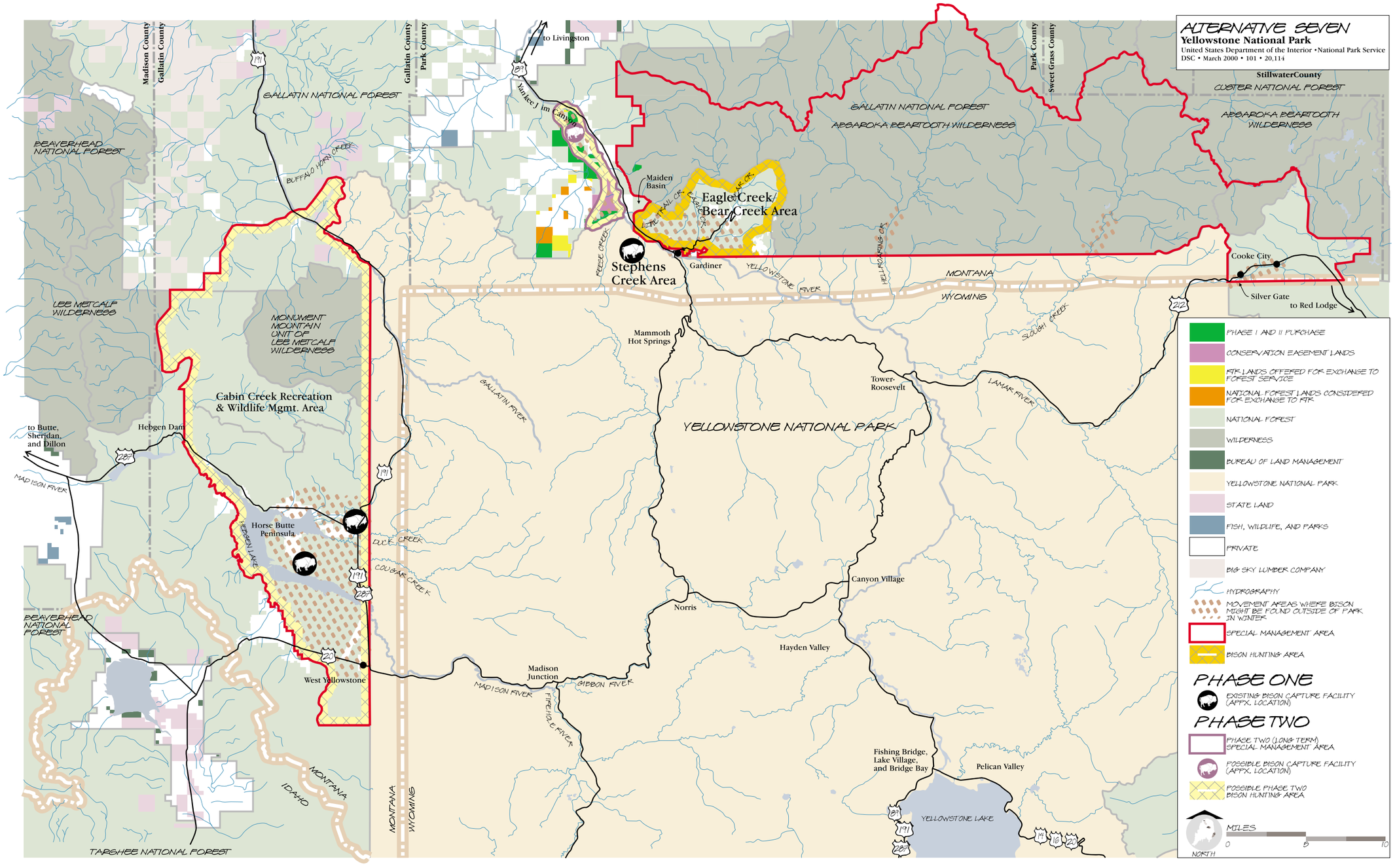

ALTERNATIVE TWO
Yellowstone National Park
United States Department of the Interior • National Park Service
DSC • March 2000 • 101 • 20,109
to Livingston
Madison County
Gallatin County
Park County
Sweet Grass County
StillwaterCounty
CUSTER NATIONAL FOREST
GALLATIN NATIONAL FOREST
ABSAROKA BEARTOOTH WILDERNESS
BEAVERHEAD NATIONAL FOREST
LEE METCALF WILDERNESS
Cabin Creek Recreation & Wildlife Mgmt. Area
Hebgen Dam
to Butte, Sheridan, and Dillon
MADISON RIVER
Horse Butte Peninsula
HEBGEN LAKE
DUCK CREEK
COUGAR CREEK
West Yellowstone
TARGHEE NATIONAL FOREST
IDAHO
MONTANA
WYOMING
Corwin Springs Bridge
Maiden Basin
Eagle Creek/ Bear Creek Area
Stephens Creek Area
Gardiner
YELLOWSTONE RIVER
Mammoth Hot Springs
GALLATIN RIVER
YELLOWSTONE NATIONAL PARK
This road to be evaluated for bison movement. Possible closure or road not to be groomed for snowmobiles
Groomed roads to be considered for closure or no grooming during the winter
Norris
Canyon Village
Hayden Valley
Madison Junction
GIBBON RIVER
FIREHOLE RIVER
Fountain Freight Road
Tower-Roosevelt
LAMAR RIVER
SLOUGH CREEK
Cooke City
Silver Gate
to Red Lodge
SHOSHONE NATIONAL FOREST
Fishing Bridge, Lake Village, and Bridge Bay
Pelican Valley
YELLOWSTONE LAKE
PHASE I AND II PURCHASE
CONSERVATION EASEMENT LANDS
FTK LANDS OFFERED FOR EXCHANGE TO FOREST SERVICE
NATIONAL FOREST LANDS CONSIDERED FOR EXCHANGE TO FTK
ROADS TO BE CONSIDERED FOR CLOSURE OR NOT TO BE GROOMED IN WINTER
NATIONAL FOREST
WILDERNESS
BUREAU OF LAND MANAGEMENT
YELLOWSTONE NATIONAL PARK
STATE LAND
FISH, WILDLIFE, AND PARKS
PRIVATE
BIG SKY LUMBER COMPANY
HYDROGRAPHY
SPECIAL MANAGEMENT AREA
MOVEMENT AREAS WHERE BISON MIGHT BE FOUND OUTSIDE OF PARK IN WINTER
MILES
0
5
10
NORTH


ALTERNATIVE THREE
Yellowstone National Park
United States Department of the Interior • National Park Service
DSC • March 2000 • 101 • 20,110
Madison County
Gallatin County
Park County
Sweet Grass County
StillwaterCounty
to Livingston
GALLATIN NATIONAL FOREST
CUSTER NATIONAL FOREST
ABSAROKA BEARTOOTH WILDERNESS
BEAVERHEAD NATIONAL FOREST
BUFFALO HORN CREEK
Jan Ace Jim Canyon
Corwin Springs Bridge
Maiden Basin
Eagle Creek/ Bear Creek Area
LITTLE TRAIL CR.
LAVA CR.
BEAR CR.
REESE CREEK
Stephens Creek Area
Gardiner
YELLOWSTONE RIVER
HELLROARING CR.
MONTANA
WYOMING
Cooke City
Silver Gate
to Red Lodge
LEE METCALF WILDERNESS
Mammoth Hot Springs
SLOUGH CREEK
Cabin Creek Recreation & Wildlife Mgmt. Area
Hebgen Dam
to Butte, Sheridan, and Dillon
GALLATIN RIVER
Tower-Roosevelt
LAMAR RIVER
YELLOWSTONE NATIONAL PARK
MADISON RIVER
Horse Butte Peninsula
HEBGEN LAKE
DUCK CREEK
COUGAR CREEK
Canyon Village
Norris
Hayden Valley
BEAVERHEAD NATIONAL FOREST
West Yellowstone
Madison Junction
GIBBON RIVER
FIREHOLE RIVER
Fishing Bridge, Lake Village, and Bridge Bay
Pelican Valley
YELLOWSTONE LAKE
IDAHO
MONTANA
WYOMING
TARGHEE NATIONAL FOREST
PHASE I AND II PURCHASE
CONSERVATION EASEMENT LANDS
F&P LANDS OFFERED FOR EXCHANGE TO FOREST SERVICE
NATIONAL FOREST LANDS CONSIDERED FOR EXCHANGE TO F&P
NATIONAL FOREST
WILDERNESS
BUREAU OF LAND MANAGEMENT
YELLOWSTONE NATIONAL PARK
STATE LAND
FISH, WILDLIFE, AND PARKS
PRIVATE
BIG SKY LUMBER COMPANY
HYDROGRAPHY
MOVEMENT AREAS WHERE BISON MIGHT BE FOUND OUTSIDE OF PARK IN WINTER
SPECIAL MANAGEMENT AREA
BISON HUNTING AREA
PHASE ONE
POSSIBLE BISON CAPTURE FACILITY (APPX. LOCATION)
PHASE TWO
PHASE TWO (LONG TERM) SPECIAL MANAGEMENT AREA
POSSIBLE BISON CAPTURE FACILITY (APPX. LOCATION)
POSSIBLE PHASE TWO BISON HUNTING AREA
MILES
0
5
10
NORTH


ALTERNATIVE FOUR
Yellowstone National Park
United States Department of the Interior • National Park Service
DSC • March 2000 • 101 • 20,111
Madison County
Gallatin County
Park County
Sweet Grass County
StillwaterCounty
to Livingston
Yankee Jim Canyon
GALLATIN NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
BUFFALO HORN CREEK
Corwin Springs Bridge
Maiden Basin
LITTLE TRAIL CR.
BEAR CR.
LAMAR RIVER
Eagle Creek/ Bear Creek Area
REESE CREEK
Stephens Creek Area
Gardiner
YELLOWSTONE RIVER
HELLROARING CR.
ABSAROKA BEARTOOTH WILDERNESS
CUSTER NATIONAL FOREST
Cooke City
Silver Gate
MONTANA
WYOMING
SLOUGH CREEK
to Red Lodge
SHOSHONE NATIONAL FOREST
LEE METCALF WILDERNESS
Mammoth Hot Springs
Tower-Roosevelt
LAMAR RIVER
Cabin Creek Recreation & Wildlife Mgmt. Area
GALLATIN RIVER
YELLOWSTONE NATIONAL PARK
to Butte, Sheridan, and Dillon
Hebgen Dam
MADISON RIVER
Horse Butte Peninsula
HEBGEN LAKE
DUCK CREEK
COUGAR CREEK
Canyon Village
Norris
Hayden Valley
West Yellowstone
Madison Junction
MADISON RIVER
GIBBON RIVER
FIREHOLE RIVER
Fishing Bridge, Lake Village, and Bridge Bay
Pelican Valley
YELLOWSTONE LAKE
BEAVERHEAD NATIONAL FOREST
IDAHO
MONTANA
WYOMING
TARGHEE NATIONAL FOREST
PHASE I AND II PURCHASE
CONSERVATION EASEMENT LANDS
RTF LANDS OFFERED FOR EXCHANGE TO FOREST SERVICE
NATIONAL FOREST LANDS CONSIDERED FOR EXCHANGE TO RTF
NATIONAL FOREST
WILDERNESS
BUREAU OF LAND MANAGEMENT
YELLOWSTONE NATIONAL PARK
STATE LAND
FISH, WILDLIFE, AND PARKS
PRIVATE
BIG SKY LUMBER COMPANY
HYDROGRAPHY
EXISTING BISON CAPTURE FACILITY (APPX. LOCATION)
SPECIAL MANAGEMENT AREA
BISON HUNTING AREA
MOVEMENT AREAS WHERE BISON MIGHT BE FOUND OUTSIDE OF PARK IN WINTER
MILES
0
5
10
NORTH


ALTERNATIVE FIVE
Yellowstone National Park
United States Department of the Interior • National Park Service
DSC • March 2000 • 101 • 20,112
to Livingston
Madison County
Gallatin County
Park County
Sweet Grass County
StillwaterCounty
GALLATIN NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
ABSAROKA BEARTOOTH WILDERNESS
CUSTER NATIONAL FOREST
Yankee Jim Canyon
BUFFALO HORN CREEK
Corwin Springs Bridge
Maiden Basin
Eagle Creek/ Bear Creek Area
LITTLE TRAIL CR.
EAGLE CR.
REESE CREEK
Stephens Creek Area
Gardiner
YELLOWSTONE RIVER
HELLROARING CR.
MONTANA
WYOMING
Cooke City
Silver Gate
to Red Lodge
SHOSHONE NATIONAL FOREST
LEE METCALF WILDERNESS
Mammoth Hot Springs
SLOUGH CREEK
Cabin Creek Recreation & Wildlife Mgmt. Area
GALLATIN RIVER
Tower-Roosevelt
LAMAR RIVER
YELLOWSTONE NATIONAL PARK
to Butte, Sheridan, and Dillon
Hebgen Dam
MADISON RIVER
Horse Butte Peninsula
HEBGEN LAKE
DUCK CREEK
COUGAR CREEK
Canyon Village
Norris
Hayden Valley
West Yellowstone
Madison Junction
MADISON RIVER
GIBBON RIVER
FIREHOLE RIVER
Fishing Bridge, Lake Village, and Bridge Bay
Pelican Valley
YELLOWSTONE LAKE
IDAHO
MONTANA
WYOMING
TARGHEE NATIONAL FOREST
ROADS TO BE PLOWED IN WINTER FOR ACCESS TO BISON MANAGEMENT FACILITIES
PHASE I AND II PURCHASE
CONSERVATION EASEMENT LANDS
R/R LANDS OFFERED FOR EXCHANGE TO FOREST SERVICE
NATIONAL FOREST LANDS CONSIDERED FOR EXCHANGE TO R/R
NATIONAL FOREST
WILDERNESS
BUREAU OF LAND MANAGEMENT
YELLOWSTONE NATIONAL PARK
STATE LAND
FISH, WILDLIFE, AND PARKS
PRIVATE
BIG SKY LUMBER COMPANY
HYDROGRAPHY
EXISTING BISON CAPTURE FACILITY (APPX. LOCATION)
POSSIBLE BISON CAPTURE FACILITY (APPX. LOCATION)
MILES
0
5
10
NORTH


ALTERNATIVE SIX
Yellowstone National Park
United States Department of the Interior • National Park Service
DSC • March 2000 • 101 • 20,113
Madison County
Gallatin County
Park County
Sweet Grass County
StillwaterCounty
to Livingston
Yankee Jim Canyon
GALLATIN NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
BUFFALO HORN CREEK
ABSAROKA BEARTOOTH WILDERNESS
CUSTER NATIONAL FOREST
Maiden Basin
Eagle Creek/ Bear Creek Area
LITTLE TRAIL CR.
EAGLE CR.
BEAR CR.
HELLROARING CR.
REESE CREEK
Stephens Creek Area
Gardiner
YELLOWSTONE RIVER
MONTANA
WYOMING
Cooke City
Silver Gate
to Red Lodge
212
SLOUGH CREEK
LEE METCALF WILDERNESS
Mammoth Hot Springs
Cabin Creek Recreation & Wildlife Mgmt. Area
GALLATIN RIVER
Tower-Roosevelt
LAMAR RIVER
YELLOWSTONE NATIONAL PARK
to Butte, Sheridan, and Dillon
Hebgen Dam
MADISON RIVER
Horse Butte Peninsula
HEBGEN LAKE
DUCK CREEK
COUGAR CREEK
Seronegative bison allowed on public land in West Yellowstone area
Canyon Village
Norris
7 Mile Bridge Facility
Hayden Valley
Madison Junction
GIBBON RIVER
FIREHOLE RIVER
West Yellowstone
Fishing Bridge, Lake Village, and Bridge Bay
Pelican Valley
YELLOWSTONE LAKE
IDAHO
TARGHEE NATIONAL FOREST
PHASE I AND II PURCHASE
CONSERVATION EASEMENT LANDS
F/F LANDS OFFERED FOR EXCHANGE TO FOREST SERVICE
NATIONAL FOREST LANDS CONSIDERED FOR EXCHANGE TO F/F
NATIONAL FOREST
WILDERNESS
BUREAU OF LAND MANAGEMENT
YELLOWSTONE NATIONAL PARK
STATE LAND
FISH, WILDLIFE, AND PARKS
PRIVATE
BIG SKY LUMBER COMPANY
HYDROGRAPHY
MOVEMENT AREAS WHERE BISON MIGHT BE FOUND OUTSIDE OF PARK IN WINTER
SPECIAL MANAGEMENT AREA
PHASE ONE
ROADS TO BE PLOWED IN WINTER FOR ACCESS TO BISON MANAGEMENT FACILITIES
EXISTING BISON CAPTURE FACILITY (APPX. LOCATION)
PHASE TWO
ROADS TO BE PLOWED IN WINTER FOR ACCESS TO BISON MANAGEMENT FACILITIES
POSSIBLE BISON CAPTURE FACILITY (APPX. LOCATION)
MILES
0
5
10
NORTH


ALTERNATIVE SEVEN
Yellowstone National Park
United States Department of the Interior •National Park Service
DSC • March 2000 • 101 • 20,114
Madison County
Gallatin County
Park County
Sweet Grass County
StillwaterCounty
to Livingston
Yankee Jim Canyon
GALLATIN NATIONAL FOREST
ABSAROKA BEARTOOTH WILDERNESS
CUSTER NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
BUFFALO HORN CREEK
Maiden Basin
Eagle Creek/ Bear Creek Area
LITTLE TRAIL CR.
LAMAR CR.
HELLROARING CR.
REESE CREEK
Stephens Creek Area
Gardiner
YELLOWSTONE RIVER
MONTANA
WYOMING
Cooke City
Silver Gate
to Red Lodge
LEE METCALF WILDERNESS
MONUMENT MOUNTAIN UNIT OF LEE METCALF WILDERNESS
Cabin Creek Recreation & Wildlife Mgmt. Area
Mammoth Hot Springs
SLOUGH CREEK
BALLATIN RIVER
Tower-Roosevelt
LAMAR RIVER
YELLOWSTONE NATIONAL PARK
to Butte, Sheridan, and Dillon
Hebgen Dam
MADISON RIVER
Horse Butte Peninsula
HEBGEN LAKE
DUCK CREEK
COUGAR CREEK
Canyon Village
Norris
Hayden Valley
BEAVERHEAD NATIONAL FOREST
West Yellowstone
Madison Junction
GIBBON RIVER
MADISON RIVER
FIREHOLE RIVER
Fishing Bridge, Lake Village, and Bridge Bay
Pelican Valley
YELLOWSTONE LAKE
IDAHO
MONTANA
WYOMING
TARGHEE NATIONAL FOREST
PHASE I AND II PURCHASE
CONSERVATION EASEMENT LANDS
RTC LANDS OFFERED FOR EXCHANGE TO FOREST SERVICE
NATIONAL FOREST LANDS CONSIDERED FOR EXCHANGE TO RTC
NATIONAL FOREST
WILDERNESS
BUREAU OF LAND MANAGEMENT
YELLOWSTONE NATIONAL PARK
STATE LAND
FISH, WILDLIFE, AND PARKS
PRIVATE
BIG SKY LUMBER COMPANY
HYDROGRAPHY
MOVEMENT AREAS WHERE BISON MIGHT BE FOUND OUTSIDE OF PARK IN WINTER
SPECIAL MANAGEMENT AREA
BISON HUNTING AREA
PHASE ONE
EXISTING BISON CAPTURE FACILITY (APPX. LOCATION)
PHASE TWO
PHASE TWO (LONG TERM) SPECIAL MANAGEMENT AREA
POSSIBLE BISON CAPTURE FACILITY (APPX. LOCATION)
POSSIBLE PHASE TWO BISON HUNTING AREA
MILES
0
5
10
NORTH

Illustrations by

Roy Reynolds.

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NPS D-655a/August 2000

United States
Department of the Interior

National Park Service