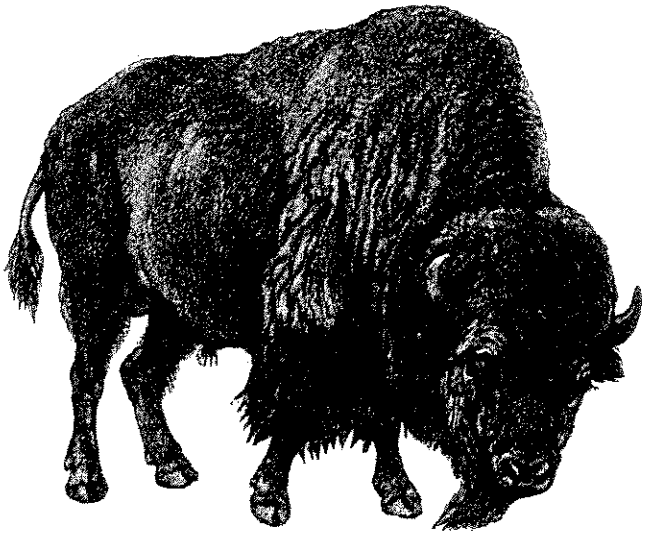
FINAL BISON HUNTING ENVIRONMENTAL ASSESSMENT



SEPTEMBER 30, 2004

Montana Fish, Wildlife & Parks

EXECUTIVE SUMMARY

Introduction

This Environmental Assessment (EA) has been prepared to evaluate the feasibility of a limited public hunt for bison from the Yellowstone herd that enter Montana. While some people oppose hunting of bison by licensed sportsmen, others believe that it is the best option available if the Yellowstone population has to be controlled (see National Park Service 2000, volume 2 for comments from both viewpoints). The perceived need for control of bison in and outside YNP has varied substantially over the past 40 years (Meagher 1973, Yellowstone National Park 1997, National Research Council 2002), but agencies with responsibility for bison occupying the Montana – YNP boundary area, NPS, Montana Fish, Wildlife, and Parks (MFWP), and Montana Department of Livestock (MDOL), have accepted the necessity of controlling both numbers and distribution of bison. The agreement under which bison numbers and distribution are currently managed (State of Montana and Yellowstone National Park 2000a, 2000b) emphasizes hazing, brucellosis testing, and removal of bison from the population (either by capture and shipping to slaughter facilities or shooting by agency personnel) when specific spatial, temporal, or numeric limits are exceeded. Hunting by the public was analyzed in the Final EIS for bison management (National Park Service 2000) and is considered to be one of the tools available for management of numbers and distribution of Yellowstone bison when biological and social conditions are appropriate. The Environmental Assessment process will be used to determine if conditions are suitable for introducing public hunting.

SB395 was submitted to the 2003 Montana Legislature to give Montana residents the opportunity to harvest bison that migrate from YNP. The bill passed, and a statute (MCA 87-2-730) consistent with earlier statutes related to management of wild bison in Montana (see MCA 81-2-120) was drafted that authorized MFWP to explore the potential for developing a hunting season for bison that: 1) does not interfere with management efforts by YNP, MDOL, or MFWP personnel; 2) is compatible with accepted land uses on public and private lands; and 3) can be conducted under ethical hunting conditions (i.e. fair chase). MCA 81-2-120 requires MDOL and MFWP authorization for a bison hunt and requires that both agencies cooperate in developing rules for such a hunt. Any hunt configuration approved would have to minimize bad publicity such as that generated by the public hunt authorized by the 1985 Montana Legislature and rescinded by the 1991 Montana Legislature. The hunt would not be the primary mechanism for controlling the Yellowstone bison population unless and until the brucellosis issue has been resolved and substantial numbers of bison are allowed to reside outside YNP, but it would allow a limited number of hunters the opportunity to harvest a native species that was a historically important source of protein.

Bison from the Yellowstone herd were legally hunted in Montana in the early 1950s and late 1980s (Montana Fish, Wildlife, and Parks 2001). Public hunts in 1953 and 1954 corresponded with the initiation of an aggressive program to eliminate brucellosis in cattle herds in Montana but did not result in substantial harvests of bison. The second

public hunt period (1986-1991) occurred ~20 years after YNP adopted a policy of minimal management of bison (1967-1968). Annual harvests were modest except in the winter of 1988-1989. Negative publicity from this winter led to closure of the public hunt by the 1991 Montana legislature and a greater concern for agency cooperation in bison management.

In 1989, MFWP and YNP personnel began developing an Environmental Impact Statement (EIS) on management of the Yellowstone bison herd. This resulted in a "Final Interim Operating Plan" signed by YNP, Gallatin National Forest (GNF), MFWP, and MDOL in 1992. EIS development continued, and a "Revised Interim Bison Management Operating Plan" was signed by the same agencies in 1994. Although concern over loss of brucellosis-free status spurred Montana to sue the federal government over bison management in YNP, concern over excessive bison removals led to suits by non-governmental organizations, and inter-agency disputes slowed selection of preferred alternatives in the EIS, bison were managed under the revised interim plan (which allowed MDOL and YNP to remove bison by capture and shooting) through 1999.

The draft EIS on bison management was released in 1998. Public comment and negotiations among agencies on the preferred alternative occurred until late 2000. MDOL, MFWP, and YNP signed a final record of decision on the preferred alternative in December 2000 and began managing bison under the new document in January 2001. The preferred alternative described in this document (State of Montana and National Park Service 2000b) emphasized risk control. Bison and cattle were to be separated in time and space, but some bison in areas with no cattle were to be tolerated outside YNP. Brucellosis incidence was to be reduced through capture and slaughter of sero-positive bison and vaccination of sero-negative bison. The plan emphasized adaptive management and phase-based changes in management tools. More bison would be tolerated outside YNP as managers became more efficient at controlling sero-positive animals. Hunting was not included in the early phases of the management plan, but it was not precluded, and the Final EIS (National Park Service 2000) included an intensive analysis of hunting that implied that hunting could be adopted as a management tool when conditions were appropriate.

This EA will allow managers to determine if conditions are appropriate for public hunting. After evaluating alternatives presented in this EA and the public response to alternatives, MFWP will pursue one of three actions: 1) implement a hunt; 2) reject any hunt at this time; or 3) develop a complete Environmental Impact Statement (EIS) from which a decision on the feasibility of a bison hunt will be reached at a later date.

Issues raised in scoping, comments on the draft EA, and public meetings

Public input directly related to this EA was initiated at the MFWP Commission meeting on September 11, 2003 when MFWP personnel were directed to determine the feasibility of a limited public hunt for bison in southern Gallatin and Park Counties. This EA will allow a decision on the hunt to be reached by the MFWP Commission in October 2004 and possibly authorize a public bison hunt by January 2005. Public comment was sought

during the scoping process (February – March 2004), during the comment period for the Draft EA (June – July 2004), and at two public hearings (Bozeman – 38 registered attendees; Butte – 22 registered attendees) and one public meeting (West Yellowstone – 25 registered attendees) held in MFWP Administrative Region 3 during June and July 2004. Additional public comments will be accepted following release of the Final EA, and the public is welcome to attend MFWP Commission meetings and Board of Livestock (BOL) public meetings where the issue is scheduled to be discussed.

During the scoping process, 232 letters and e-mails arrived by the closing date (including 6 unrelated to bison hunting). These documents were used to identify issues included in the Draft EA. The Draft EA drew 891 valid written responses, including e-mails and letters from individuals (870) and organizations (21). Sixty-nine individuals signed 13 petitions requesting consideration of a different alternative than those included in the Draft EA, a "citizen's alternative." Multiple documents by the same individuals or organizations were only included once in these totals, and mail that did not include opinions on the bison hunt (those requesting information but not expressing opinions on the hunt and messages on topics unrelated to bison hunting) were not included in totals Comments received during the scoping process were approximately evenly split between those favoring and those opposed to a bison hunt. The majority of responses to the Draft EA opposed a public hunt, at least at this time and under conditions described in the Draft EA. The "citizen's alternative" was the only new issue identified in comments we received in response to the Draft EA.

We categorized issues raised by the public as: 1) issues appropriate for evaluation in this EA; 2) issues considered but not evaluated in this EA; and 3) issues determined to be beyond the scope of this EA. The issues we evaluated included concerns about the impact of a limited hunt on YNP bison numbers, population viability, and genetic integrity; questions about the ethics and humaneness of killing bison; questions related to the legality of a hunt for bison in Montana; worries about the edibility of meat due to brucellosis vaccination; the potential for contracting brucellosis while handling bison carcasses; public safety issues; impacts of a bison hunt on other species; the potential of a hunt to impact (positively or negatively) bison damage to private property; impacts of a recreational bison hunt on activities mandated under the Interagency Bison Management Plan; problems specifically associated with hunting bison near the boundary of Yellowstone National Park; and economics and social impacts not directly associated with YNP.

Issues considered but not evaluated included allowing "natural" control mechanisms to limit bison numbers, the role of brucellosis in elk, and the impacts of designating bison as wild animals on private ownership of bison. Alternatives to human action as mechanisms for controlling bison numbers in the Yellowstone area were not evaluated because the policy of "limited management" under which bison were managed in YNP from 1967-1996 did little to control the population or emigration into Montana. Brucellosis in elk was not evaluated because it is not directly related to hunting bison and it is not a major problem in Montana. Elk do not seem to be able to support self-sustaining infections with brucellosis unless they are lured to feed grounds. Montana does not allow elk feed

grounds. A few respondents were worried about loss of bison as livestock if they were hunted by the public. This would not be a problem since bison are defined as "wild" (currently animals in the Yellowstone herd) and domestic (animals owned by private individuals). Questions about the authority of MDOL to manage bison were not addressed in this EA since MDOL has specific legislated authority to prevent bison that carry brucellosis from jeopardizing Montana's compliance with livestock disease control efforts on private and public land (MCA 81-2-120).

A "citizen's alternative" presented in petition form called for four specific changes in bison management (1) MFWP must be the sole agency responsible for bison management in Montana; 2) bison must be allowed unfettered access to public lands outside YNP year-round; 3) additional habitat (beyond that identified in the IBMP) must be designated for bison; and 4) MFWP should cease participating in the Interagency Bison Management Plan). While we do appreciate the concerns expressed by the people who signed petitions supporting the citizen's alternative, MFWP cannot meet any of the four conditions without legislative action in Montana and/or changes in cooperative agreements with other federal and state agencies. Because these actions cannot be completed in the time period under consideration in this EA, the citizen's alternative would, in effect, require MFWP to adopt the "no action" alternative at this time.

Several respondents raised issues that were clearly beyond the scope of this EA. Morality of hunting, the role of bison in reparations for ill treatment of Native Americans, tribal hunting rights, wolf management, corruption in public agencies, and the need for educating ranchers to tolerate damage from bison were not appropriate to address in this EA. Distribution of bison captured, sent to slaughter, or shot by agency personnel and hazing and capture protocols were determined in the Interagency Bison Management Plan. A suggestion to establish a state bison management plan is a good idea but best covered in other forums.

Alternatives

Four alternatives were evaluated (no action and three limited hunt scenarios). All alternatives that permitted hunting include 13 common conditions/restrictions:

1. Hunting will be restricted to individuals with permits issued via a drawing process similar to that employed for other special permits issued by MFWP. Hunts will not be administered via a call-up list.

2. Fee structure will follow MCA 87-2-113: $75 for residents, $750 for non-residents.

3. Hunters will not be allowed to harvest bison that have been vaccinated for brucellosis within the mandated withdrawal period (the time interval between vaccine administration and proven safety for meat consumption by humans. The withdrawal period for the vaccine, RB51, is 21 days).

4. Initially, weapons will be limited to firearms (required by Statute 81-2-120). Firearms will be restricted to those capable of propelling bullets with sufficient force to produce a quick kill.

5. Hunting will be allowed on public land and on private land with landowner permission.

6. No bison hunting will be allowed within 100 yards of major highways in areas open to bison hunting to protect public safety and minimize traffic obstructions. This would initially include segments of Highways 20, 191, and 287 on the western boundary of Yellowstone National Park (YNP) and Highway 89 near the northern boundary of YNP. Hunting on National Forest lands will follow restrictions in USFS order 36 CFR 261.10 (d) (firearm discharges are prohibited within 150 yards of a residence, building, campsite, developed recreation site, or occupied area or across a forest service road or body of water).

7. All hunters will be advised of restrictions and special problems that might be encountered in a bison hunt near YNP in application announcements.

8. Applicants who draw permits will be provided with information on the most effective ways to kill bison and on carcass handling procedures that will minimize meat spoilage and brucellosis infections in humans.

9. If a preference system is created, hunters that apply and do not draw permits will be given preference in the same manner that preference points are awarded in other special permit hunts.

10. Initially, bison hunting will be allowed only between November 15 and February 15.

11. Bison permits will be valid in both areas open to hunting near West Yellowstone (on the western boundary of YNP) and areas near Gardiner (on the northern boundary of YNP).

12. Agencies involved in bison or land management in areas of Montana with wild bison will be informed or, in the case of MDOL (a legislatively mandated partner in bison management in Montana), consulted on changes in hunting regulations.

13. Permit numbers, hunting district boundaries, and season structure can be modified by the MFWP Commission (*i.e.* If bison numbers in the Yellowstone herd drop below 2,500, permit number can be reduced. When bison are tolerated outside YNP in larger areas and in greater portions of the year, more permits can be issued).

In general, a public hunt for bison associated with the Yellowstone herd would be limited to permit holders drawn by lottery, would involve a minimum of supervision by agency personnel, would mirror administrative procedures used in other permit hunts in Montana, and would rely on educating hunters to avoid problems with brucellosis, public safety, trespass, and damage to public natural resources.

Six alternatives for hunting seasons were considered but not selected for analysis.

1) Unlimited permits issued via over-the-counter-purchase was rejected because the hunting area and number of bison available would not support an open hunt.

2) The option of limited permits available on a first-come-first serve basis was rejected because there was no way to fairly administer this type of hunt.

3) Preference for Native Americans was not considered because of Montana's equal opportunity laws.

4) Primitive weapons permits were not considered at this time because of the legislative language requiring firearms to be used in the hunt and the request by MFWP enforcement personnel to simplify regulations to insure that weapons with adequate power to make quick kills are used As MFWP gains experience with managing bison hunts (and assuming the legislature modifies statutes to allow use of bows) use of muzzle-loading firearms and bows may be permitted.

5) An early fall season was eliminated from consideration because few bison leave YNP in September and October, meat can easily spoil, and carcasses could serve as attractants to grizzly bears.

6) A late winter – early spring season was rejected because of the stress that could be placed on pregnant females, the chance of attracting emerging grizzly bears to carcasses and viscera, and the problems of identifying animals vaccinated in spring programs brucellosis vaccination programs that have been or will be initiated by MDOL and YNP (animals vaccinated with the RB51 vaccine are not considered safe for human consumption during the first 21 days following vaccination).

Alternative 1: No action

The first alternative evaluated (Alternative 1: no action) maintains the *status quo*. Bison in "no tolerance" areas (Zone 3 as defined in the Interagency Bison Management Plan of 2000) would be hazed into traps, chased into areas where they were tolerated, or shot by agency personnel.

Maintaining the *status quo* is not impact-free. The substantial economic, social, and environmental costs and benefits of the current bison management plan are described in the Final EIS on bison management released in 2000 (National Park Service 2000). In the absence of hunting, environmental, social, and economic costs and benefits would be driven by the factors that currently influence them: 1) the number of bison leaving Zones1 (lands inside YNP where bison are tolerated and cattle prohibited throughout the year) and 2 (specifically designated lands where cattle are absent, at least in winter and spring, and limited numbers of bison are tolerated in seasons when contact with cattle is unlikely); 2) the movement patterns of bison before and during control operations, and 3)

the activities of people opposed to actions mandated by the Interagency Management Plan. Predictions for both positive and negative impacts outlined in the Interagency Bison Management Plan Final EIS (National Park Service 2000) provide a reasonable estimate of conditions expected under the "no action" alternative.

Hunting by the public would have no impacts because hunting would not be allowed. The bison population would continue to be regulated by climate, predation, disease, accident, and management actions approved in the Interagency Bison Management Plan.

Alternative 2. Bison hunting by permit only in a late fall/early winter (November 15 – February 15) season limited to areas outside YNP where bison presence is currently tolerated under the Interagency Bison Management Plan (State of Montana and Yellowstone National Park 2000a, 2000b) .

If this alternative were approved, hunting would be permitted in areas where bison are currently tolerated outside YNP including: 1) lands defined as "Zone 2" in the Interagency Bison Management Plan - except the Zone 2 area west of the Yellowstone River including the Royal Teton Ranch where cattle are still grazed; 2) portions of the Absaroka Beartooth Wilderness north of YNP (including the upper portions of the Hellroaring and Slough Creek drainages); and 3) public land with no cattle allotments in the Cabin Creek Recreation and Wildlife Management Area, the Monument Mountain Unit of the Lee Metcalf Wilderness, and the upper Gallatin River drainage south of the mouth of Taylor Fork. Only sero-negative and vaccinated bison are tolerated in the Zone 2 areas of the West Yellowstone Basin. In other "tolerance" areas, bison are not subject to hazing, capture, or shooting during specified seasonal periods (generally winter and spring) except when they threaten public safety, cause significant property damage, or exceed numbers agreed to by agencies bound by the Interagency Bison Management Plan (State of Montana and Yellowstone National Park 2000a, 2000

Applicants would apply for permits as they do in other limited entry hunts administered by MFWP, and one to 25 applicants would receive permits. The MFWP Commission would set the number of permits each year prior to the season. Permits would be valid for the entire season (November 15 – February 15), valid for both the northern and western hunting area, and would be valid for any wild bison (i.e. no age or sex restrictions) unless vaccination program are active during the hunting season. If bison are being vaccinated without being conspicuously marked, hunters will be restricted to harvest of adult males (adult males are not scheduled to be vaccinated by MDOL or YNP personnel and can be reliably identified by most hunters). When bison are tolerated in higher numbers and in greater areas outside YNP, areas open to hunting and numbers of permits may be expanded.

Under this alternative, a maximum of 25 bison would be harvested in any year and impacts on population size and genetic structure would be minimal. "Fair chase" hunts will be facilitated by defining large hunting areas (including areas where bison can move to escape hunting pressure) and prohibiting hunting from vehicles (although vehicles may be used to access hunting areas and retrieve carcasses). Spring vaccination programs

initiated by MDOL and YNP should not be affected by a winter hunt. If vaccination programs occur in other seasons, hunters may be limited to harvesting adult males, which are not scheduled to be vaccinated and can be identified by most hunters. Threats to public safety, property damage, disturbance of other animal and plant species, and interference with agency management actions mandated under the Interagency Bison Management Plan would be minimal because of the low number of hunters. Education of hunters in handling carcasses can limit the potential for spreading brucellosis. As with environmental impacts, economic and social impacts would be small under this alternative. A few hunters would have an opportunity to harvest bison. Some funds would be spent in Gardiner and West Yellowstone by hunters pursuing bison. A few non-hunters might be sufficiently offended by hunting to avoid visiting Montana. No significant short, mid, or long-term negative impacts would be expected under this alternative.

Alternative 3. PREFERRED ALTERNATIVE - Late fall – early winter season (November 15 – February 15), limited entry hunt with permits valid for the entire season, and hunting open in areas in which bison presence does not trigger agency management actions and Zone 3 areas where bison presence is not tolerated.

Impacts of this alternative would be very similar, especially under present management rules where bison are not allowed to remain in Zone 3 lands for long periods, to Alternative 2. This alternative would allow hunters to harvest bison they happen to see in Zone 3 areas that are open to hunting (public lands and private lands in which owners permit hunting and in situations that do not endanger public safety or private property) as well as in lands outside YNP in which bison are tolerated in specific seasons. Hunting would not be used to replace efforts by agency personnel to remove bison from Zone 3. On rare occasions, agency personnel hazing bison in Zone 3 could interfere with hunters stalking bison, but given the low number of hunting permits, this problem would likely be small.

As with Alternative 2, applicants would apply for permits as they do in other limited entry hunts administered by MFWP, and one to 25 applicants would receive permits. The MFWP Commission would set the number of permits each year prior to the season. Permits would be valid for the entire season (November 15 – February 15), valid in both the northern and western hunting areas, and valid for any wild bison (i.e. no age or sex restrictions) unless vaccination program are active during the hunting season. If bison are being vaccinated without being conspicuously marked, hunters will be restricted to harvest of adult males (adult males are not scheduled to be vaccinated by MDOL or YNP personnel and can be reliably identified by most hunters). When bison are tolerated in higher numbers and in greater areas outside YNP, areas open to hunting and numbers of permits may be expanded.

As with Alternative 2, a maximum of 25 bison would be harvested in any year under Alternative 3. Impacts would be similar to Alternative 2 (minimal impacts on population size, age/gender structure, and genetic makeup) The influence of hunting on population distribution would also be similar to that described for Alternative 2, but under

Alternative 3, hunters would be able to kill bison in more areas than in Alternative 2. The impacts of Alternative 3 on environmental, social, and economic concerns in short to long-range time periods would be the same as those described for Alternative 2.

Alternative 4. Late fall – early winter season (November 15 – February 15) for a limited entry hunt with permits valid for 10-day intervals.

Permits would be valid in areas outside YNP where bison are allowed to remain without triggering management agency and opportunistically in areas designated as Zone 3 (no bison tolerance). Permits would be limited to one to 25 per 10-day period between November 15 and February 15. This would create 9 hunting periods and would allow 9 (1 permit per period) to 225 (25 permits per period) hunters to pursue bison in each hunting season. This alternative would provide more opportunity for hunters to receive permits but would likely reduce hunter success because bison are not usually available outside YNP during all days between mid- November and mid-February. No more than 25 hunters would be in areas open to hunting on any given day so most positive and negative impacts would be low during each hunting period.

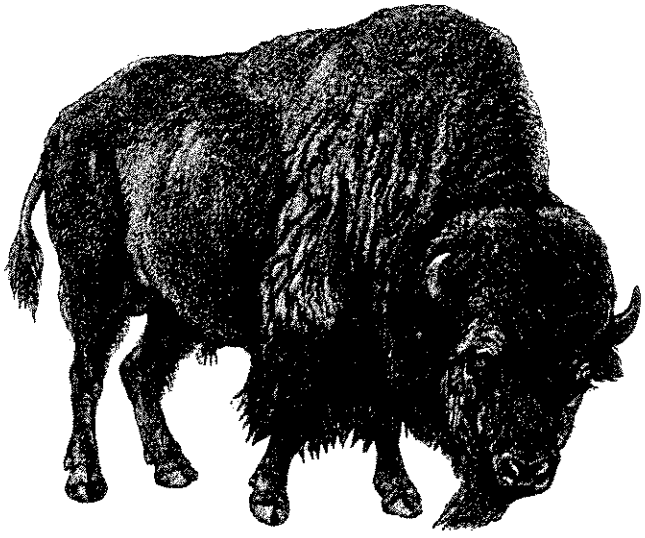
As with Alternatives 2 and 3, applicants would apply for permits via procedures established for other limited entry hunts administered by MFWP. The MFWP Commission would set the number of permits each year prior to the season. Permits would be valid for both the northern and western hunting areas and would be valid for any wild bison (i.e. no age or sex restrictions) unless a vaccination program is active during the permit period. If bison are being vaccinated without being conspicuously marked, hunters will be restricted to harvest of adult males (adult males are not scheduled to be vaccinated by MDOL or YNP personnel and can be identified by most hunters).). When bison are tolerated in higher numbers and in greater areas outside YNP, areas open to hunting and numbers of permits may be expanded.

In this alternative, a maximum of 225 bison would be harvested in any year. Fewer bison would likely be harvested because: 1) few bison leave YNP during early to mid winter (November – January) except in the most severe winters so success rates in the early hunting periods are likely to be low; 2) hunters would remove some of the bison that currently move in and out of the Park during November – February and contribute to inflation in total bison counts in Zone 2; 3) public hunting would not be allowed in months (March – April) when the highest number of bison leave YNP; and 4) even if large bison herds enter areas open to hunting, no more than 25 hunters could take advantage of the ingress in each 10-day hunting period. Although hunter selection for adult bulls and differential probability of emigration among sub-populations increase the possibility of concentrating harvest within one or more genotypes, hunter impacts would not equal the impacts of capture operations mandated under the Interagency Bison Management Plan (State of Montana and Yellowstone National Park 2000a, 2000b), and hunter harvest would replace some agency-mandated removals . By varying hunter permit numbers as bison population size changes (i.e. more permits issued when population size exceeds 3,000 and fewer when the population is lower), risks of substantial impacts on bison numbers or genetic variability can be reduced.

The restrictions on hunter distribution and the potential for "fair chase" hunting would be similar to those described for Alternative 3. Although Alternative 4 would allow more hunters to participate, maximum hunter number on any day during the season would be no different than under Alternatives 2 and 3. Impacts on the environment would be greater for this alternative than for Alternatives 2 and 3, but when impacts are considered in relation to the large number of human activities currently occurring in potential hunting areas, bison hunters would be unlikely to add measurable amounts to environmental impacts that already occur. Adding 2,250 bison hunter-days (maximum) to a system that supports millions of recreation days from hunters seeking other species, anglers, skiers, snowmobilers, hikers, wildlife watchers, mushroom hunters, antler collectors, and a dozen other outdoor activities is very unlikely to create additional irreparable environmental impacts on short, medium, or long time scales.

The positive social and economic impacts of Alternative 4 would be approximately nine times greater than for Alternatives 2 and 3 (i.e. a linear relationship), Negative social and economic impacts, however, would likely be much greater under Alternative 4 than under Alternatives 2 and 3. Negative impacts would be magnified primarily because opponents of hunting would have much greater opportunity to plan and carry out protests of hunting. Alternatives 2 and 3 would spread a low number of hunters over a 90-day hunting season. Alternative 4 would give protesters nine groups of hunters to confront and nine "opening days" on which to stage protests.

FINAL BISON HUNTING ENVIRONMENTAL ASSESSMENT



MONTANA FISH, WILDLIFE & PARKS

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CHAPTER 1: PURPOSE AND NEED FOR ACTION

Introduction

Controversy surrounding bison (*Bison bison*) management in and near Yellowstone National Park (YNP) has increased since the National Park Service (NPS) reduced efforts to control bison distribution and numbers beginning in 1967 (Yellowstone National Park 1997, National Park Service 2000, National Research Council 2002). Bison in YNP are known to harbor the bacteria responsible for the bovid form of brucellosis (*Brucella abortus*), a disease with serious economic implications for the livestock industry and a disease to which humans are susceptible (Meagher 1973, Meagher and Meyer 1994, National Research Council 1998, National Park Service 2000). In addition, bison have the potential to over-graze federal and private lands and are capable of causing serious damage to private property (National Park Service 2000). Management of bison distribution and numbers by conventional means, such as public hunting, lethal control by agency personnel, or capture and removal, has attracted negative attention from individuals and organizations that do not understand or sympathize with the idea of regulating bison populations, especially the population associated with YNP (National Park Service 2000).

Even though many people in the United States are unaware of ecological constraints on the size of animal populations (National Park Service 2000), YNP and the public and private land adjoining it can only support a finite number of grazing ungulates. If herbivore populations are not regulated by intrinsic (declines in productivity or increases in mortality associated with increasing population size/density) or extrinsic (mechanisms in which the severity of the impact is not necessarily proportionate to population size such as disease, weather, and predation) factors (Taper et al. 2000, Taper and Gogan 2002), land managers with responsibility for protecting plant communities in YNP, national forests, state lands, and private lands would be remiss in their duty if they did not implement some form of population control. The impacts of intrinsic and extrinsic regulatory factors in the population dynamics of bison in Yellowstone have been extensively studied and endlessly debated (see National Resource Council 1998, 2002; National Park Service 2000), but no definitive answers are available. When the problems and uncertainties associated with control of brucellosis are included in the issue, the only rational approach managers can take is to develop plans to control bison numbers and distribution when necessary.

Numbers and distribution of bison along the boundary between YNP and Montana are currently regulated under the Interagency Bison Management Plan (IBMP) (State of Montana and Yellowstone National Park 2000a, 2000b). This plan is designed to be modified as more data on bison management are collected. Where control measures should be applied (inside and/or outside YNP), the appropriate numbers of bison inside and outside of YNP, the temporal and spatial distribution of animals tolerated outside the Park, and the mechanisms used to maintain target numbers and distributions have been, and will be, a source of public debate.

Purpose and Need for the Proposed Action

While some people oppose hunting of bison by licensed sportsmen, others believe that it is the best option available if the Yellowstone population has to be controlled (see National Park Service 2000, volume 2 for comments from both viewpoints). The perceived need for control of bison in and outside YNP has varied substantially over the past 40 years (Meagher 1973, Yellowstone National Park 1997, National Research Council 2002), but agencies with responsibility for bison occupying the Montana – YNP boundary area, NPS, Montana Fish, Wildlife, and Parks (MFWP), and Montana Department of Livestock (MDOL), have accepted the necessity of controlling both numbers and distribution of bison. The agreement under which bison numbers and distribution are currently managed (State of Montana and Yellowstone National Park 2000a, 2000b) emphasizes hazing, brucellosis testing, and removal of bison from the population (either by capture and shipping to slaughter facilities or shooting by agency personnel) when specific spatial, temporal, or numeric limits are exceeded. Hunting by the public was analyzed in the Final EIS for bison management (National Park Service 2000) and is considered to be one of the tools available for management of numbers and distribution of Yellowstone bison when biological and social conditions are appropriate. The Environmental Assessment process will be used to determine if conditions are suitable for introducing public hunting.

SB395 was submitted to the 2003 Montana Legislature to give Montana residents the opportunity to harvest bison that migrate from YNP. The bill passed, and a statute (MCA 87-2-730) consistent with earlier statutes related to management of wild bison in Montana (see MCA 81-2-120) was drafted that authorized MFWP to explore the potential for developing a hunting season for bison that: 1) does not interfere with management efforts by YNP, MDOL, or MFWP personnel; 2) is compatible with accepted land uses on public and private lands; and 3) can be conducted under ethical hunting conditions (i.e. fair chase). MCA 81-2-120 requires MDOL and MFWP authorization for a bison hunt and requires that both agencies cooperate in developing rules for such a hunt. Any hunt configuration approved would have to minimize bad publicity such as that generated by the public hunt authorized by the 1985 Montana Legislature and rescinded by the 1991 Montana Legislature. The hunt would not be the primary mechanism for controlling the Yellowstone bison population unless and until the brucellosis issue has been resolved and substantial numbers of bison are allowed to reside outside YNP, but it would allow a limited number of hunters the opportunity to harvest a native species that was a historically important source of protein.

Benefits of the Proposed Action

The benefits of public hunting for bison in the YNP – Montana boundary area are: 1) increased recreational opportunities for resident and non-resident hunters; 2) generation of additional funds for bison management from license fees; 3) potential reduction in damage to public and private property (by influencing distribution and behavior of bison as they learn to avoid people and by removal of persistent problem animals); 4) return of public hunting as a management tool for bison; and 5) increased

interest in and support for bison reintroduction in other geographic areas by the hunting public.

The first two benefits, increased hunting opportunity and license fees, at first glance may appear to be relatively unimportant given the low number of permits expected to be available in this hunt. In other states and on private lands in Montana, interest in hunting bison frequently exceeds supply. In areas where hunting of bison in public herds occurs, permits can be obtained at prices ranging from $0 to $4,000 dollars (National Park Service 2000, Appendix A). Hunting conditions range from penned shoots (Arizona – Lee 1993) to physically demanding, challenging hunts on free-ranging animals (Alaska – DuBois and Stephenson 1998; Arizona – Lee 1993; Utah - Hodson and Karpowtiz 1998). A summary of bison hunts held on public lands is given in Appendix A. The Montana legislature instituted fees of $75 for resident and $750 for non-residents if a public bison hunt is reinstituted in Montana. As hunters have the opportunity to harvest bison, demand for permits will likely increase and, if the public agrees, increases in license fees may follow.

The hunt could produce some declines in property damage by bison. Bison are capable of transmitting brucellosis to livestock, injuring livestock, destroying fences and stackyards, removing forage (in fields and hay stacks) reserved for livestock, and may even threaten humans. Hunters can reduce all of these problems by removing specific offending animals or by encouraging bison to be more wary of humans in general. Currently, taxpayers and sportsmen pay MDOL, NPS, and/or MFWP personnel to perform this service. Recreational hunters would willingly pay (through license fees and perhaps through trespass fees on private property) to reduce problems associated with bison presence.

The success of the North American public hunting model (Posewitz 1994, Geist 2001) is largely due to hunter interest in maintaining huntable populations of game animals. Hunters are aware of and willing to participate in and pay for management activities designed to insure sustainable yields of the species they hunt. Bison have been largely relegated to the status of a park novelty or livestock. Because of the rarity of hunting as a management tool and the limited opportunities to hunt free-ranging bison, sportsmen have not made the commitment to bison populations that they have to every other large indigenous herbivore in North America. Creating a public hunt held under fair-chase conditions in a highly visible area such as southern Montana would likely spur interest by sportsmen in establishing additional wild bison populations that can be hunted and would increase the likelihood that management activities needed to insure the sustainability of these populations would be instituted.

Decisions to Be Made

Use of hunting as a management tool at some point in time was approved in principle in the Final EIS on bison management (National Park Service 2000); therefore, YNP does not have to formally approve a public hunt in Montana. The public hunt would not replace the Interagency Plan as the primary regulatory mechanism for bison numbers and

distribution in the Yellowstone population in the immediate future so hunting regulations would have to be configured so that agreed upon regulatory actions could take place in a timely manner.

This Environmental Assessment (EA) has been authorized to determine if a limited public hunt for bison from the Yellowstone herd conducted outside YNP boundaries is desirable and feasible at the present time and if it would require an EIS, rather than an EA, to make this determination based on criteria given in MFWP Administrative Rule 12.2.431 (Montana Fish, Wildlife, and Parks 2003). Any hunt authorized should not reflect badly on sport hunting or Montana's commitment to managing native species and would require that hunting be conducted under very specific conditions: 1) bison would have to have some reasonable opportunity to avoid hunters; 2) hunters would be required to avoid shooting near (or from) roads, campsites, occupied buildings, and in other situations that would endanger public safety; 3) density of hunters would have to be limited to maintain safety standards and esthetic hunting conditions; 4) hunters would have to be knowledgeable enough to shoot bison humanely, process carcasses efficiently, and avoid spreading brucellosis to themselves or within the environment: and 5) areas open to hunting and access to these areas would have to be agreed upon by public and private landowners.

Other Agencies that Have Jurisdiction or Responsibility

Management of bison along the boundary between Montana and YNP requires participation by YNP, United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS), MDOL, and MFWP as outlined in the Bison Management, Final Environmental Impact Statement (National Park Service 2000, pages 46-51). In brief, the NPS manages bison within the boundaries of YNP. MFWP has primary responsibility for management of wildlife on federal, state, and private lands in Montana outside YNP. Because bison may carry brucellosis and APHIS is charged with controlling livestock disease within the United States, APHIS may require testing or quarantine of bison. MDOL is charged with controlling disease in livestock in Montana and, under legislative statute 81-2-120 MCA, has the authority to test and remove bison infected with brucellosis from privately and publicly owned herds. The joint responsibilities of YNP, MFWP, and MDOL personnel involve hazing bison to move them back into YNP, capturing bison at facilities maintained inside (Stephens Creek) and outside (Horse Butte) YNP, and monitoring bison numbers and distribution. APHIS personnel cooperate in testing captured bison. MDOL personnel are called on to shoot bison in "no tolerance" situations (temporal or spatial) and to arrange shipment of captured bison to slaughter when that option is triggered by specific conditions (time of year, location, bison population size) (National Park Service 2000; State of Montana and Yellowstone National Park 2000a, 2000b).

Indirect responsibility for bison management falls on the landowners in areas outside YNP. The United States Forest Service (USFS) is the primary public landholder although the Bureau of Land Management (BLM) and Montana State Lands Department (MSLD)

have minor holdings in areas bison utilize. Private land holdings are scattered throughout the area surrounding YNP with highest concentrations along river corridors. The size of and management goals for private land parcels vary widely. Some landowners are willing participants in control of bison. Others actively oppose any regulation of bison numbers or movement.

Responsibility for regulation of people in areas occupied by bison is shared by NPS (Ranger Division in YNP), Gallatin National Forest, MFWP (Enforcement Division), the Gallatin and Park County Sheriff's Departments, and occasionally (when bison hazing or protesters are located near highways) the Montana Highway Patrol.

Native American tribes (and organizations representing several tribes such as the Inter-tribal Bison Cooperative), non-government organizations, and numerous individuals have expressed interest in management of bison near YNP (National Park Service 2000, vol. 2). These individuals and groups will have an opportunity to comment on the proposed bison hunt through the environmental assessment process, but they have no direct legal standing in management of such a hunt if it is approved.

Public Involvement Process

The development of the I IBMP (National Park Service 2000; State of Montana and National Park Service 2000a, 2000b) required extensive and intensive public input. The public hunt assessed in this document represents a management tool that was not included in the preferred alternative in the Interagency Plan but was intensively evaluated and implicitly assumed to be available to management agencies at some point (National Park Service 2000, vol.1, pp 186-187). This EA will be used to determine if it is time to utilize public hunting in management of the Yellowstone bison herd in Montana.

Public input directly related to this EA was initiated at the MFWP Commission meeting on September 11, 2003 when MFWP personnel were directed to determine the feasibility of a limited public hunt for bison in southern Gallatin and Park Counties. Table 1 includes a proposed timeline for additional public comment leading to a decision on authorization of the hunt by the MFWP Commission in October 2004 and, if the hunt is authorized, a tentative schedule for beginning the hunt. Public comment was sought during the scoping process (February – March 2004), during the comment period for the Draft EA (June – July 2004), and at two public hearings (Bozeman – 38 registered attendees; Butte – 22 registered attendees) and one public meeting (West Yellowstone – 25 registered attendees) held in MFWP Administrative Region 3 during June and July 2004. Additional public comments will be accepted following release of the Final EA, and the public is welcome to attend MFWP Commission meetings and Board of Livestock (BOL) public meetings where the issue is scheduled to be discussed.

During the scoping process, 232 letters and e-mails arrived by the closing date (including 6 unrelated to bison hunting). These documents were used to identify issues included in

Table 1. Outline of steps leading to a decision on a public hunt for bison in Montana and to implementation of the hunt if the decision by MFWP and MDOL is favorable.

STEP DESCRIPTION	TIMELINE	COMMENTS/ASSUMPTIONS
1. Obtain MFWP Commission direction on whether or not to proceed with the implementation of SB 395	Sep 11, 2003	If Commission does not wish to proceed, process stops here
2. Obtain Board of Livestock (BOL) direction on whether or not to proceed with implementation of SB 395	Sep 15/16, 2003	If Board does not want to allow hunting, process stops here
3. Conduct public scoping for Environmental Assessment (EA)	Feb –Mar '04	Advertised through press release
4. Draft EA on decision to incorporate hunting into bison management	Mar-Apr '04	Draft EA is contracted to outside source and overseen by MFWP & MDOL. EA is determined to be appropriate level of analysis based on MFWP Administrative Rule 12.2.431.
5. Public input on draft EA	Jun-Jul '04	Hold public meetings/hearings and take comments (mail and e-mail)
6. Analyze input, final EA, and draft Decision Notice (DN)	Sep '04	BOL and MFWP Commission kept fully informed
7. DN reviewed by BOL and MFWP Commission	Oct '04	Concurrence by both BOL and MFWP Commission necessary to proceed
8. DN signed by Executive Director MDOL and Director MFWP	Oct'04	Assumes concurrence of BOL and MFWP Commission
9. MFWP Commission approves tentative regulations	Oct '04	Recommendations will come from MFWP based on input from Step 5
10. Public comment on tentative season structure and quota	Oct-Dec '04	Provides additional opportunity for public input on hunt specifics
11. MFWP Commission approves final regulations	Dec '04	
12. Application period	Dec '04 - Jan '05	Assumes all applications must be submitted "on-line" or over the counter at MFWP offices
13. Drawing	Jan '05	
14. Implement hunt	Jan – Feb 15 '05	Specific dates and details to be determined in steps 8-10

the Draft EA. The Draft EA drew 891 valid written responses, including e-mails and letters from individuals (870) and organizations (21). Sixty-nine individuals signed 13 petitions requesting consideration of a different alternative than those included in the Draft EA, a "citizen's alternative." Multiple documents by the same individuals or organizations were only included once in these totals, and mail that did not include opinions on the bison hunt (those requesting information but not expressing opinions on the hunt and messages on topics unrelated to bison hunting) were not included in totals Comments received during the scoping process were approximately evenly split between those favoring and those opposed to a bison hunt. The majority of responses to the Draft EA opposed a public hunt, at least at this time and under conditions described in the Draft EA. The "citizen's alternative" was the only new issue identified in comments we received in response to the Draft EA.

Issues Identified through Public Scoping, the Draft EA, and Public Meetings that Have Been Evaluated in the Final EA

Potential impacts of hunting on bison population size/survival

Some respondents perceived hunting as a threat to the survival of Yellowstone bison while other respondents viewed it as a justifiable means of limiting the population to an appropriate size. Some opponents of hunting were unwilling to acknowledge that the uncontrolled market hunting of the 19th century could have different impacts on animal populations than the tightly controlled public hunts held on big game species today. Views on an appropriate population size for the Yellowstone herd varied from infinite (no control justified or unlimited population growth until bison repopulated the West viewed as desirable) to limiting numbers to those that could survive within the boundaries of YNP without damaging plant communities in YNP. Several comments indicated that studies were needed to determine exactly what constitutes a sustainable population.

Potential impacts of hunting on bison genetics

Many letters expressed concern about loss of unique gene combinations in Yellowstone bison that might occur as a result of hunting. While bison in the Yellowstone herd may preserve some alleles unique to the Yellowstone area, introductions of bison from captive herds in western Montana and Texas in the early 20th century (Meagher 1973) preclude bison in the Yellowstone herd from being considered a "pure" geographic sub-population. After >100 years of isolation from other bison herds, however, the Yellowstone herd may have allele frequencies that differ from herds in other areas of the United States, even though bison from YNP served as the only founders for several other public herds in the United States.

Three other concerns related to genetics were raised by respondents to the scoping announcement and the Draft EA. 1) A few respondents mentioned that hunting might be detrimental to one or more of the three genetic sub-populations identified in the

Yellowstone herd (Dierschke Halbert 2003). 2) Several respondents noted that Yellowstone bison have not been "polluted" with genes from domestic cattle and that hunting could place a source of "pure" bison in jeopardy (Fortunately, the Yellowstone herd is not the only population that is free of bison – cattle hybrids). 3) Two letters hypothesized that hunting could remove genetically superior animals thus leading to long-term degradation of population quality.

Humaneness/ethics of hunting bison

Comments reflected a diversity of views on the relationship between bison and humans. Some respondents felt that any attempt to control bison, especially lethal control, was immoral. One letter noted that killing bison not only caused pain and suffering to bison, but the thought of bison suffering caused pain to the respondent.

A number of people who opposed killing bison from the Yellowstone herd did not object to killing animals but felt that bison in YNP had been persecuted since European explorers entered the area and now deserved more consideration than livestock. Many writers in this group believed that bison in YNP were the last wild bison in the United States, and some were convinced that these were the last bison anywhere. Most of the respondents in this group regarded YNP bison as much a cultural icon, important to both Indians and Euro-Americans, as a population in need of protection and insisted that YNP bison deserved more respect and tolerance than domestic ungulates, other native ungulates, or privately owned bison.

The injustices experienced by Native Americans at the hands of Euro-Americans and the extirpation of bison over most of their range in the United States were inextricably tied together in many peoples' minds. Typical letters from this group of people demanded that bison be given freedom to roam outside YNP and that cattle be removed rather than bison if conflicts develop. Several letters suggested that excess bison should be given to Native Americans for establishing or increasing herds on reservations or that, if hunting had to be imposed, Native Americans should be given priority for harvest of bison in or near YNP.

Many respondents, including some who identified themselves as hunters, would not support recreational hunting by the public because they do not believe bison are behaviorally capable of providing a "fair chase" hunt. This group of respondents frequently compared bison hunting to shooting large, inanimate objects (sofas, Volkswagens, *etc.*). Some letters also suggested that introduction of public hunting was a thinly veiled plot to detract attention from activities of MDOL personnel.

Other respondents believed that bison could, given exposure to hunting and sufficient space to evade hunters, develop avoidance behavior as effective as hunter avoidance strategies used by elk and deer (*Odocoileus* spp.). Some respondents in this group believed sufficient acreage exists now to begin a hunt. Others noted that land purchases or removal of livestock from lands near YNP would have to be completed before a public hunt is permitted.

One group of respondents noted that bison should be treated as other native big game animals. This group considered bison hunting as ethical as hunting moose (*Alces alces*), another species that is not overly wary of humans. They indicated that hunting should be permitted if populations are not jeopardized, kills can be made humanely, and meat is utilized. Some letters from this group noted the value of meat from bison as a source of food and the cultural link to western history (and pre-history) provided by bison hunting. Several people noted that hunting was a more dignified way to treat bison than hazing, corralling, and shipment to slaughter. One respondent indicated that MFWP had a moral responsibility to allow hunters, who have funded a large share of costs of restoration of large mammals in Montana, to harvest bison now that bison numbers have recovered.

A number of hunters opposed bison hunting because of the potential for anti-hunting groups to use films and photos of hunts to portray hunters in a negative fashion. The negative publicity generated by hunts in the 1980s was frequently mentioned – by hunters and as a threat from anti-hunters.

Legal issues

We addressed two issues relative to the legality of hunting bison in this EA: 1) the legal roles of MFWP and MDOL in bison management; and 2) the legality of relying on an environmental assessment (EA) rather than an environmental impact statement (EIS) for determining if a bison hunt is feasible and desirable. Some respondents questioned the legality of MFWP managing bison as a big game species when they have been classified by the Montana legislature as a "species in need of disease management" and MDOL has been designated as the agency in charge of bison. Other respondents believed that a hunt could not be held because MDOL had not been consulted in developing the bison hunt EA.

The second issue involved the adequacy of the environmental assessment process as a means of determining whether a public bison hunt in Montana should be held. Several organizations indicated they would sue to force the state of Montana to conduct a full EIS process. MFWP believes this EA is adequate to meet the statutory requirements for deciding if a public hunt for wild bison in the Yellowstone herd is desirable and feasible. Specifically, MFWP statute 12.2.431 notes that:

(1) The agency shall consider the following criteria in determining the significance of each impact on the quality of the human environment:

(a) the severity, duration, geographic extent, and frequency of occurrence of the impact;

(b) the probability that the impact will occur if the proposed action occurs; or conversely, reasonable assurance in keeping with the potential severity of an impact that the impact will not occur;

(c) growth-inducing or growth-inhibiting aspects of the impact, including the relationship or contribution of the impact to cumulative impacts;

(d) the quantity and quality of each environmental resource or value that would be affected, including the uniqueness and fragility of those resources or values;

(e) the importance to the state and to society of each environmental resource or value that would be affected;

(f) any precedent that would be set as a result of an impact of the proposed action that would commit the department to future actions with significant impacts or a decision in principle about such future actions; and

(g) potential conflict with local, state, or federal laws, requirements, or formal plans.

(2) An impact may be adverse, beneficial, or both. If none of the adverse effects of the impact are significant, an EIS Is not required. An EIS is required if an impact has a significant adverse effect, even if the agency believes that the effect on balance will be beneficial. (History: Sec. 2-3—103, 2-4—201, MCA; , Sec. 2—3—104, 75—1—201, NCA; j 1988 MAR p. 2692, Eff. 12/23/88.)

The alternatives described in this EA are unlikely to cause impacts that would be severe enough, extensive enough, or frequent enough to necessitate an EIS. The extent of impacts relative to conditions in Statute 12.2.431 are included in Chapter 4 (the "impacts" chapter) of this EA.

Impacts of proposed brucellosis vaccination program on edibility of meat.

Few respondents were concerned about brucellosis vaccination and its impact on edibility of bison meat. RB51 has a labeled 21-day withdrawal period (the time between vaccination and use of meat from a vaccinated animal for human consumption). A few respondents suggested that some visible mark would be necessary to identify vaccinated animals if hunting is allowed while bison are being captured and vaccinated. Other respondents suggested the need for educational programs and/or research to identify risks of eating meat from vaccinated bison. Because MDOL plans to vaccinate only calves and yearlings, MDOL personnel suggested that the problem could be avoided by allowing only adult male bison to be hunted during periods and years when vaccinations are being administered.

Logistics of hunting bison

Comments on how hunts should be organized were made by both advocates and opponents of hunting. Comments by opponents of hunting generally included conditions that would essentially preclude a public hunt such as allowing hunting only by Native Americans or by agency personnel who did not enjoy hunting, not opening hunting until all federal lands (presumably lands close to YNP but not specifically stated) are occupied by bison, delaying any hunt until guarantees that the costs of administering the hunt would be lower than the revenue generated by the hunt were in place, and allowing public hunting outside YNP only when Indians are allowed to hunt bison inside YNP. One respondent even suggested that "fair chase" conditions could only be met if bison had a chance to kill hunters.

Comments by proponents of hunting frequently included suggestions for avoiding the negative publicity that occurred during the bison hunts held in the 1980s. These suggestions included limiting hunting in areas where the public could view hunters, opening as much land as possible to hunting to avoid concentrating hunters, avoiding "firing line" situations associated with YNP boundaries, launching public relations or educational campaigns to give the public a more balanced view of the role of hunting in bison management, labeling the hunt as a "population control" or "problem harvest" operation rather than a "sport hunt," requiring hunters to be competent (by certifying that hunters use appropriate weapons, are competent shots, can safely handle carcasses, and do not waste meat), setting regulations to avoid concentrating hunters in time or space, and strict enforcement of laws related to hunting, harassment of hunters, and trespass on private property.

Comments on season structure generally favored long seasons with permits issued via a lottery system and "reasonable" fees for residents. Several respondents suggested modeling the bison hunt on elk, bighorn sheep (*Ovis canadensis*), and mountain goat (*Oreamnos americanus*) hunts in Montana or on bison hunts conducted by wildlife agencies Wyoming, Utah, and the Fort Belknap Indian Reservation. Hunting advocates were divided on weapons restrictions (some favoring only large caliber rifles; other promoting bows, black powder, and/or atlatls) and special consideration in permit lotteries (preferences for groups such as Native Americans or applicants who had applied and failed to be drawn; limiting permits to residents of Montana; allowing only one permit in-a-lifetime or 7 years exclusion from lottery following successfully harvesting a bison versus no preference or point system). Respondents who mentioned non-resident fees generally favored higher fees for non-residents than for residents. Respondent opinions varied on permit notification systems (specified time period drawn before hunting season versus call list when bison are available) and extent of agency supervision (agency personnel required to accompany all hunters, guides only for out-of-state hunters, or minimal supervision by agency personnel). No respondents suggested specific numbers of permits to be issued, but some respondents implied they would support very liberal numbers while others appeared to be satisfied with allowing population control to remain in the hands of agency personnel. One e-mail suggested that agency personnel reduce numbers of bison to levels suitable for range available in YNP then allow hunters to maintain the population at this level by hunts within YNP.

Public safety

Only one respondent noted that bison pose a threat to human safety outside YNP. No respondents mentioned the two best-documented threats bison pose to human safety, bison – vehicle collisions and bison aggression towards tourists in YNP. A few opponents of hunting noted that hunters would pose a threat to other recreationists using areas open to bison hunting. Few advocates of hunting mentioned public safety issues, but when they did, they did not consider them serious, given the low number of permits expected to be issued, or believed that problems were easily controllable (require hunter orange for hunters and/or require hunters to complete an orientation course that includes safety issues).

Exposure of hunters to brucellosis

Few respondents (including hunters) were worried about the risk of contracting brucellosis. The ones that mentioned this subject suggested taking precautions while handling carcasses, education of hunters in carcass handling, or research into risks of contracting brucellosis.

Property damage (by hunters or by bison during the hunt)

The issue of property damage was not a major concern for most respondents, but several letters and attendees at the public meeting in West Yellowstone did raise this issue. Speakers at the West Yellowstone meeting who owned property in the West Yellowstone area were concerned with damage to property from hunters and/or MDOL personnel. The perceptions of damage in written responses were tightly linked to the feelings of the respondent about hunting bison. Opponents of hunting either did not consider property damage by bison serious or did not believe that hunting would change bison distribution or behavior enough to reduce damage. A few suggested that property owners either institute management changes to minimize damage or learn to tolerate damage before resorting to harassing bison or allowing bison to be killed. Hunters believed that hunting would reduce property damage by bison and that hunters were unlikely to cause much property damage. Several hunting proponents mentioned the need to obtain permission to hunt on private land. No respondents mentioned the damage caused by bison-vehicle collisions, the greatest documented economic loss attributable directly to bison (National Park Service 2000).

Impacts of bison hunters or activities associated with hunting on other species (including threatened and endangered species)

As with property damage, perceptions of impacts of bison hunting on other animal species in the Yellowstone ecosystem varied with the view of respondents towards hunting. Hunting advocates either believed impacts were minimal or positive (providing gut piles for wolves and bears; reducing bison herbivory on plant communities essential to other animal species). Opponents of public hunting feared that hunters would remove potential prey items for carnivores or winter-killed carcasses for scavengers from the ecosystem and that the presence of hunters could disturb threatened and endangered species. One respondent noted that grizzly bears could be drawn to bison kills as they are to elk kills. This creates a potentially dangerous situation for both hunters and bears.

Impacts of a recreational bison hunt on activities mandated under the Interagency Bison Management Plan

MDOL personnel contacted in the course of preparing this EA did not believe that limited public hunting would be a serious problem for agency personnel involved in bison control. Some respondents noted that hunting could help MDOL efforts by reducing the number of bison that needed to be captured, hazed, or vaccinated and by reducing presence of *Brucella*-infected animals available to infect livestock. One respondent

believed that hunting would encourage communication and cooperation among public agencies because hunters would be involved in the process and, therefore, more inclined to support MDOL activities.

Other respondents saw public hunting as incompatible with MDOL management mandates. Some believed that public hunting would be precluded under the current management plan (State of Montana and Yellowstone National Park 2000a, 2002b) because the plan did not specifically authorize public hunting. Others felt that public hunting would interfere with elimination of brucellosis by exposing animals with natural immunity to brucellosis and vaccinated animals to mortality from hunting, thus reducing the proportion of YNP bison that are not threats to the livestock industry, and by encouraging brucellosis-positive animals to enter new areas (where they might encounter livestock) to avoid hunters.

Problems specifically associated with hunting bison near the boundary of Yellowstone National Park

YNP occupies a special place in the culture of the United States. As such, some activities that would produce virtually no response from the public if carried out on private land, state land, or land managed by other federal agencies, can create a public outcry if Yellowstone is involved. Respondents noted both positive and negative consequences that bison hunting near Yellowstone could generate. Negative impacts predicted by respondents included declines in tourism from people opposed to hunting, people opposed to hunting a cultural icon such as bison, and people opposed to hunting YNP bison specifically. Hunting opponents frequently mentioned opposition to a public hunt near Yellowstone by recognized pro-hunting groups during hearings before the Montana legislature. These groups feared that the reputations of hunters, Yellowstone National Park, and Montana would be damaged by a poorly conceived bison hunt near YNP. Other fears, such as hunting reducing visibility of bison to Yellowstone visitors and hunting eliminating the last wild herd in America, while not likely to be valid, were based on sincere concern for Yellowstone.

Proponents of hunting perceived a bison hunt as a chance to demonstrate local values to people in other regions of the USA. They did not believe that a limited bison hunt would precipitate a tourist boycott (or did not care if it did) and believed that hunter activity would generate welcome off-season income to businesses in towns near areas where bison would be hunted (Gardiner and West Yellowstone).

Economics and social issues not associated with YNP

Several respondents offered comments, pro and con, relative to a public bison hunt that were not specifically linked to YNP. Opponents of hunting threatened an economic boycott of the whole state of Montana if hunting were allowed. They also predicted that a bison hunt would be detrimental to the image of hunting in general and to the reputation of the state of Montana. One opponent noted that the costs of the hunt were grossly

under-estimated and that revenue from tags could never cover costs. Another opponent protested taxpayer money being used to kill bison rather than protect them.

Proponents of hunting noted that Wyoming receives approximately $2 for each dollar it spends on bison hunting and that Montana could generate a similar profit. They also noted that hunting is a major economic boost to many small towns in Montana. One pro-hunting respondent proposed donating excess bison meat from hunters to food banks and Indian reservations.

Issues Considered but not Evaluated in the Final EA

Use of "natural control" rather than human control of the YNP bison population

YNP did not actively control bison distribution or numbers between the late 1960s and 2000. Numbers increased from a few 100 to over 4,000. Bison began to routinely move outside YNP, and the potential for contact with cattle increased substantially. Reliance on natural forces did not resolve problems with bison inside or outside YNP. After several years of negotiation, YNP and the State of Montana agreed to a plan that would minimize risk of transmission of brucellosis from bison to cattle. Hunting by the public at levels proposed in this EA does not replace actions by MDOL and YNP in population control and would be unlikely to have measurable impacts if a "natural control" policy were someday reinstated. Therefore, we have not evaluated this issue.

Bison and elk role in brucellosis transmission

Although this EA is not designed to address the brucellosis issue, many respondents brought it up. Several respondents noted that bison have never been shown to cause an outbreak of brucellosis and that bison should be treated the same as elk, which have been demonstrated to carry brucellosis and are suspected as the source of an outbreak of brucellosis in Wyoming. One respondent noted that the proportion of positive results for brucellosis in blood tests of elk have increased over the past few years. Bison advocates proposed solutions to the "brucellosis issue" ranging from vaccinating all cattle near YNP (and accepting a local loss of brucellosis-free status), removing all cattle from land near YNP, and purchasing all private land near YNP for bison range.

Many bison advocates (including both opponents and supporters of hunting) evidently do not realize that elk in Montana are not baited to feed grounds (where infected elk are easily able to pass brucellosis to other elk) and have very low incidences of brucellosis. The incidence of positive blood tests for elk from the Northern Range in Montana has increased from <2% to ~4%, but this increase is as, or more, likely to be attributable to instituting a new, more sensitive blood test or to demographic changes in harvest (fewer calves, which are less likely to have been exposed to brucellosis that older elk, have been harvested in the last four years) as to an increase in brucellosis in the Northern Yellowstone elk herd (Aune, personal communication). Many bison advocates are also unaware that ranchers with cattle in the West Yellowstone and Gardiner Basins are

currently vaccinating yearling females (the cattle most at risk for brucellosis) under voluntary herd management plans.

Because vaccination of cattle and elk and removal of cattle from the Gardiner and West Yellowstone Basins are beyond the scope of this EA, and elk in the northern Yellowstone ecosystem pose a very small risk to cattle, the only sources of brucellosis transmission we have evaluated are the threat posed by entrails left by hunters and transmission of brucellosis to hunters that handle bison carcasses.

Impacts of allowing bison hunts on private ownership and sales of bison

One respondent was worried that authorization of hunts for "wild" bison would preclude sale or ownership of bison. Montana statutes (MCA 81-2-120 and 87-2-730) specifically distinguish between domestic bison and wild bison. Bison in private ownership are considered livestock and can be bought and sold as any other livestock are. Wild bison in Montana are limited to those associated with the Yellowstone herd. This issue, therefore, does not need to be evaluated.

"Citizen's alternative"

The citizen's alternative was advanced in 13 letters (formatted as petitions) that contained 69 signatures. The proposal included four conditions that would have to be met before a public hunt for bison was authorized:

1)MFWP must be the sole agency responsible for bison management in Montana.
2) Bison must be allowed unfettered access to public lands outside YNP year-round.
3) Additional habitat (beyond that identified in the IBMP) must be designated for bison.
4) MFWP should cease participating in the Interagency Bison Management Plan.

While we do appreciate the concerns expressed by the people who signed petitions supporting the citizen's alternative, MFWP cannot meet any of the four conditions without legislative action in Montana and/or changes in cooperative agreements with other federal and state agencies. Because these actions cannot be completed in the time period under consideration in this EA, the citizen's alternative would, in effect, require MFWP to adopt the "no action" alternative at this time. We, therefore, have not evaluated potential impacts associated with the citizen's proposal.

Issues Raised in Scoping, Public Meetings/Hearings, and Comments on the Draft EA but Determined to be Beyond the Scope of this EA

Morality of hunting

Each individual has to determine his or her attitude towards taking the life of an individual of another animal species. MFWP is not a person but an organization charged with management of wildlife species. Managing species so that they persist over time is

not the same as preserving the lives of individual animals. Hunting is an acceptable wildlife management practice and is a culturally and economically important activity in Montana. People who do not believe recreational hunting is a moral activity will never be forced to participate in a bison hunt and can legally attempt to change other peoples' minds. They cannot force their views on individuals who view hunting differently.

Treatment of Native Americans

Several respondents opposed bison hunting by Euro-Americans or requested special treatment of Native Americans in allocation of permits because of the poor treatment native peoples received at the hands of Euro-American settlers. MFWP is not qualified to assess the extent of reparations that might be owed Native Americans and is prohibited by law from discriminating against any ethnic, racial, or gender group.

Tribal hunting rights in and around YNP

Questions were also raised about the legality of using public hunting to harvest YNP bison when treaty rights of Native Americans related to hunting in YNP have not been resolved. This issue has been debated for decades and cannot be settled based on bison hunting alone. MFWP cannot legally discriminate on the basis of race, ethnicity, or gender; therefore, it cannot unilaterally address tribal rights by giving Native Americans special treatment in a public bison hunt not offered to other races/ethnicities.

Distribution of bison captured by NPS or MDOL

Some respondents requested that bison captured in the Yellowstone area be sold to private individuals or translocated to tribal lands. This issue was addressed in the IBMP (State of Montana and Yellowstone National Park 2000a, 2000b; National Park Service 2000) and is beyond the scope of this EA.

Hazing and capture protocols

Several respondents objected to the hazing and capture of bison in the Yellowstone area by NPS and MDOL personnel. This issue was addressed in the IBMP (State of Montana and Yellowstone National Park 2000a, 2000b; National Park Service 2000) and is beyond the scope of this EA.

Management of wolves

Although a few respondents suggested ways to manage wolves or implied that wolves would manage bison, this EA is specifically directed towards evaluating the potential for public bison hunts. Consideration of wolf management or impacts of wolves on bison (which may be increasing but have not resolved population size or distribution issues) is beyond the scope of this EA.

Development of a state bison management plan

Some respondents believed that more space was needed for a true "fair chase" hunt and suggested that the space could be increased by establishing other bison herds or allowing bison to expand beyond boundaries agreed to in the Interagency Bison Management Plan (State of Montana and Yellowstone National Park 2000a, 2000b). MFWP would support establishment of additional wild bison herds, but the issue in this EA is limited to bison in the Yellowstone area, and MFWP cannot unilaterally change restrictions on distribution agreed to by all agencies.

The role of corruption in driving bison control efforts near YNP

A few respondents perceived bison hunting as a part of a conspiracy by MDOL to eliminate all bison and all public wildlife. One respondent was convinced the hunt was an attempt to provide hides and horns for commercial interests. We have no evidence to support these contentions and do not consider an investigation within the scope of this EA.

Education of ranchers to tolerate bison

One respondent proposed education of ranchers as an alternative to hazing, trapping, or shooting bison. If ranchers were less afraid of brucellosis or more tolerant of damage, she reasoned, bison could be left alone. This hypothesis is beyond the scope of this EA.

CHAPTER 2: AFFECTED ENVIRONMENT

Introduction

This chapter describes the history and impacts of bison hunting in the upper Yellowstone, Madison, and Gallatin River drainages after the establishment of YNP. The headwaters of these river systems currently provide summer range and some winter range for bison within YNP. Additional winter range and lesser amounts of other seasonal ranges outside YNP have been utilized by bison for the past 30 years or more. These areas include private and public lands with management objectives that may or may not be compatible with bison presence. A brief history of brucellosis and its control is included with the history of hunting because of the linkage between this disease and the demand for control of bison in Montana. Information on population regulation and on economic and social impacts of bison in the Yellowstone ecosystem was included because the "no action" alternative imposes significant impacts on the environment and culture of YNP and surrounding areas. The small scale of impacts associated with alternatives that include public hunting cannot be appreciated unless the large-scale effects of bison and human activities in the Yellowstone ecosystem on the *status quo* are considered.

This review relies heavily on information from the Draft and Final EIS for the Interagency Bison Management Plan (IBMP) for the State of Montana and Yellowstone National Park (National Park Service 2000, State of Montana and Yellowstone National Park 2002a, 2000b) and an unpublished Chronology of Bison Management produced by MFWP (Montana Fish Wildlife and Parks 2002).

History and Status of Bison in the Greater Yellowstone Ecosystem

A Review of Bison Hunting in the Yellowstone Park Area

Only a few dozen wild bison were present in YNP in 1902 when additional animals from domesticated herds were introduced (Meagher 1973). Introductions consisted of 18 adult females from the Pablo – Allard herd in western Montana and three adult males from the Goodnight herd in Texas (Skinner and Alcorn 1942, Meyer and Meagher 1995). *Brucella abortus*, the bacteria responsible for brucellosis, was identified in bison from YNP in 1917 (Mohler 1917 as cited in Dobson 1993). The bacteria has presumably been present since at least that date although the initial source, incidence, impacts to bison, and the threat posed by bison as a source for transmission of *Brucella* to livestock in areas adjacent to YNP have been fiercely debated (Meyer and Meagher 1995, Dobson and Meagher 1996, National Research Council 1998, Roffe et al. 1999, National Park Service 2000, Kreeger 2002).

Until the 1950s, brucellosis was endemic in cattle herds in Montana. Its incidence was not high, but livestock operators routinely accommodated themselves to its presence. Sero-positive cattle, and in some programs, herds with sero-positive animals, were slaughtered. Livestock producers in Montana routinely vaccinated calves after an

effective vaccine (Strain 19) was developed in1930 (Hagan and Bruner 1961). In 1952, Montana began an aggressive program to achieve "brucellosis-free" status. States that achieve this status are no longer required to engage in testing of herds and have increased ease of shipment of livestock across state lines (National Park Service 2000, Montana Fish Wildlife and Parks 2002).

In 1953 and 1954, public hunts were held in Montana. No information was available on whether these hunts were initiated to discourage bison infected with brucellosis from entering the state from YNP (Montana Fish, Wildlife, and Parks 2001), but only a few bison (3 in 1953, no number given for 1954) were harvested. The hunt was discontinued in 1955, presumably because of low success rates.

Brucellosis in YNP bison was not regarded as a major problem while cattle herds in Montana, Idaho, and Wyoming also harbored the disease and while bison numbers in YNP were actively regulated. Between 1902 and 1967, YNP managed bison in the Park within fenced pastures in the Lamar Valley and in free-ranging herds that contained a mix of genotypes from bison resident in the Park when it was founded and animals from the Lamar herd. A variety of husbandry techniques, including winter feeding and culling (in slaughter facilities and via free shooting), were used to control numbers of bison within the pasture system and the distribution of bison outside fenced pastures. Although control measures were reported as primarily undertaken to limit vegetation damage, by the 1950s, bison in the Lamar Valley were routinely tested for brucellosis when they were handled, and calves were vaccinated before movement outside the Park or to other areas in the Park (Meagher 1973, Meagher and Meyer 1995, National Park Service 2000

In 1967, YNP adopted a policy of minimal interference in ungulate population sizes in Yellowstone (Meagher 1973, National Park Service 2000). Bison numbers and distribution increased thereafter (Table 2).

In June 1972, MFWP agreed to cooperate with YNP on a boundary control program that included killing bison that appeared to be moving into or had moved into Montana. YNP rangers killed several bison near YNP boundaries before the Secretary of the Interior rescinded their authority in 1978. MFWP wardens and/or Park rangers killed a few bison in winters between 1967-1968 and 1983-1984. In late 1984, MFWP wardens killed 88 bison outside YNP. Sportsman groups in Montana noted this kill and believed that if bison were to be killed outside YNP, licensed hunters should be allowed to harvest them. Proponents of this view lobbied legislators in the 1985 Montana legislature to institute a bison hunt in Montana. In a parallel development, Montana's livestock industry was certified brucellosis-free in 1985 – after spending more than $30 million to achieve this status.

The 1985 Montana legislature authorized a public hunting season for bison. In fall 1985, licensed hunters were drawn randomly from a pool of applicants. When bison were reported outside YNP, MFWP notified hunters on the list. The hunters were then asked if they could hunt on specific dates and were accompanied by MFWP personnel as they searched for animals. Hunting was legal on public land and on private land with owner

permission. There were no restrictions on distance from roads (beyond normal hunting restrictions on firing weapons from or in the right-of-way of public roads).

The hunt went smoothly for the first three years. In 1985-1986, 57 bison were killed outside YNP, mostly by licensed hunters. In 1986-1987, six bison were killed. In 1987-1988, 35 bison were killed. Bison winter counts over these years increased from 2,291 (1985-1986) to 2,644 (1987-1988) despite these harvests.

In 1988, drought created conditions that led to massive forest fires in the Yellowstone ecosystem. Over 3,000 bison were counted in YNP. Forage loss to fires and snow accumulations in YNP encouraged emigration. A total of 569 bison were killed outside YNP, and most of those were killed by licensed hunters. Negative national attention was focused on the hunt by non-governmental conservation and animal rights organizations and media personnel.

Hunts by licensed Montana hunters in 1989-1990 (4 bison harvested) and 1990-1991 (14 bison harvested) had minimal impacts on bison numbers but still attracted attention from animal rights activists. Although the state of Montana and YNP began to develop a long-term management plan for bison associated with YNP in late winter 1989, the 1991 Montana Legislature rescinded the authority for the bison hunt in response to the negative publicity that the bison hunts generated for hunters and the state of Montana.

Eliminating the recreational hunt did not eliminate the threat posed by bison infected with *Brucella* entering a state, which had achieved "brucellosis-free" status for its livestock. While officials from Montana and the NPS continued to develop interim plans and initiated the EIS process for more permanent solutions, 3,426 bison were counted in winter 1991-1992. Agency personnel (MFWP, MDOL, and YNP) killed 271 bison when hazing and limited boundary fencing failed to keep them in the Park. The winters of 1992-1993 and 1993-1994 were moderate, and fewer bison left YNP despite relatively high numbers (>3,000 in early winter counts). With reduced emigration, fewer bison were killed (Table 2). In September 1994, the State of Montana and YNP signed a revised interim management plan.

In the 1994-1995 winter, a slightly more severe winter in which the early winter bison count approached 4,000, agency personnel removed 426 bison. When state veterinarians in at least six states imposed new restrictions on import of cattle from Montana, Montana filed a complaint in U. S. District Court against the federal government. The complaint alleged that the Department of the Interior allowed bison potentially carrying brucellosis to enter the state and that the Department of Agriculture might revoke Montana's brucellosis-free status solely on the basis of bison presence, whether they transmitted the disease to cattle or not. The 1995 Montana Legislature amended the authorities of MFWP and MDOL to increase the role of MDOL in regulating numbers and distribution of bison entering Montana from YNP.

Table 2. Bison counts and removals from the Yellowstone herd, winters 1901-1902 to 2003-2004 (based on an expansion of Table 17, p. 285, in National Park Service 2000 with recent data provided by R. Wallen, Yellowstone National Park).

Winter	Bison counted	Bison removed	Winter	Bison counted	Bison removed	Winter	Bison counted	Bison removed
1901—02	44	0	1937—38	755	25	1971—72	713	0
1902—03	47	1	1938—39	811	67	1972—73	837	0
1903—04	51	7	1939—40	868	3	1973—74	873	0
1904—05	74	0	1940—41	809	213	1974—75	1068	0
1905—06	nc	nc	1941—42	869	202	1975—76	1125	8
1906—07	84	2	1942—43	964	11	1976—77	1252	nc[2]
1907—08	95	1	1943—44	747	407	1977—78	1626	Nc
1908—09	118	5	1944—45	932	nc	1978—79	1727	Nc
1909—10	149	3	1945—46	791	238	1979—80	1803	Nc
1910—11	168	2	1946—47	Nc	nc	1980—81	2396	Nc
1911—12	192	28	1947—48	960	237	1981—82	2239	0
1912—13	215	8	1948—49	1126	nc	1982—83	2160	0
1913—14	nc	nc	1949—50	1094	228	1983—84	2229	0
1914—15	270	4	1950—51	Nc	nc	1984—85	2114	88
1915—16	348	18	1951—52	976	250	1985—86	2291	57
1916-17	397	11	1952—53	Nc	nc	1986—87	2433	6
1917—18	nc	nc	1953—54	1477	139	1987—88	2644	35
1918—19	504	46	1954—55	1350	288	1988—89	3159	569
1919—20	501	17	1955—56	1258	373	1989—90	2606	4
1920—21	602	7	1956—57	543	273	1990—91	3178	14
1921—22	647	56	1957—58	Nc	12	1991—92	3426	271
1922—23	748	14	1958—59	800[1]	44	1992—93	3304	79
1923—24	nc	nc	1959—60	800[1]	nc	1993—94	3551	5
1924—25	830	109	1960—61	869	nc	1994—95	3956	427
1925—26	931	23	1961—62	975[1]	148	1995—96	3398	433
1926—27	1008	41	1962—63	819[1]	370	1996—97	3436	1084
1927—28	1057	58	1963—64	821[1]	6	1997—98	2105	11
1928—29	1109	106	1964—65	388	392[3]	1998—99	2239	94
1929—30	1124	132	1965—66	226	54	1999—00	2444	0
1931—32	nc	nc	1966—67	397	3	2000—01	2800	6
1932—33	nc	nc	1967—68	418	4	2001—02	3330	202
1934—35	nc	nc	1968—69	556	0	2002—03	3899	244
1935—36	847	109	1969—70	592	0	2003—04	4250	274
1936—37	674	17	1970—71	565	0			

Sources:, Meagher 1973; Meagher, unpublished data; Montana Department of Fish, Wildlife and Parks, Montana Department of Livestock, and National Park Service, unpublished data. Note: Sources of removals include culling from the semi-domestic Lamar Ranch, hunting, shooting by agency personnel, and capture and slaughter of bison by agency personnel.

nc = not counted or information unavailable

1. Estimates, rather than actual counts.

2. During 1976-81 a few bulls were removed.

3. Includes 38 deaths from natural mortality

The severe winter of 1996-1997 resulted in large-scale emigration of bison from YNP. More than 1,000 bison were shot or captured and sent to slaughter by NPS and MDOL personnel. Several hundred bison died of malnutrition related to severe winter conditions. Early spring counts indicated bison numbers in YNP were below 2,000 (National Research Council 1998, National Park Service 2000). Concern for the integrity of the YNP bison herd by private citizens and agency personnel, negative publicity for the state of Montana, and concern about maintaining order in clashes between people protesting bison control, landowners, and agency personnel involved in the control operation spurred agencies involved to seek a permanent bison management plan that would insure both the brucellosis-free status for Montana and avoid placing the YNP bison herd in jeopardy.

Information on bison ecology and the epidemiology of brucellosis produced by research initiatives funded by MFWP, YNP, and The United States Geological Survey (USGS) Biological Resources Division (BRD) provided the basis for a new bison management plan, which was approved in December 2000 (National Park Service 2000; State of Montana and National Park Service 2000a, 2000b). The plan allowed different responses to bison movement out of YNP depending on the overall bison population size, numbers leaving YNP, location of bison exiting the Park, and the time of year in which bison moved into Montana (National Park Service 2000; State of Montana and Yellowstone National Park 2000a, 2000b). A range of responses (hazing, capture and hold, capture and test, capture and ship to slaughter, vaccinate and release, lethal control in the field) were outlined for specific circumstances with the overall goals of: 1) maintaining separation between sero-positive bison and cattle in time and space; 2) maintaining bison numbers at levels compatible with available seasonal ranges; and 3) decreasing the incidence of sero-positive bison in the YNP herd. The plan allowed for tolerance of bison in some areas and seasons outside YNP. Hunting by the public was analyzed in the Final EIS for bison management (National Park Service 2000) and is considered to be one of the tools available for management of numbers and distribution of Yellowstone bison when biological and social conditions are appropriate.

In 2003, the Montana Legislature passed SB395, a bill that gave the MFWP Commission the authority to establish a bison hunt in areas where bison moved from YNP into Montana (Statute 87-2-730, Montana Fish, Wildlife, and Parks 2003). MFWP was directed by the Commission to proceed with planning for this hunt at the September 11, 2003 meeting of the MFWP Commission. The intent of the law authorizing the hunt was to allow Montana hunters to harvest wild bison under fair-chase conditions. As envisioned, this hunt would not only provide an opportunity for citizens to harvest a native species that has historically been an important source of protein in Montana, but it would provide a means of decreasing damage to private property by altering bison behavior and distribution and would restore the role of public hunting as one of the tools available for management of free-roaming bison. The proposed hunt would not be designed to regulate bison populations. Population regulation would continue to be achieved through the IBMP (State of Montana and Yellowstone National Park 2000a, 2000b).

Bison Population Status and Distribution

The IBMP (State of Montana and Yellowstone National Park 2000a, 2000b) has been the primary mechanism for management of bison near the YNP – Montana boundary since 2000. Although this EA will concentrate on bison associated with the Montana – YNP boundary, bison do cross national park boundaries into Wyoming and Idaho. Wyoming has a comparable formal plan for dealing with bison in the Jackson – Grand Teton National Park area (Ladd et al. 2002). Bison entering Wyoming from the eastern boundary of YNP are controlled by public hunting or Wyoming Game and Fish Department (WGFD) personnel (National Park Service 2000, Wyoming Game and Fish Department 2004). In this hunt, applicants are assigned a draw number and called when bison enter Wyoming. Hunters are required to complete a 2-hour orientation program and to demonstrate shooting proficiency (requirements which may be abandoned when regulations are revised). After completion of these tasks, hunters are allowed to hunt without supervision. This hunt has not been the target of protests presumably because it involves low numbers of bison (<20 harvested per year through 1999), does not have specific opening or closing dates, and relies on hunters to pursue bison without agency personnel accompanying them. The few bison that have entered the Sunlight Basin in Wyoming via the northeast corner of YNP have been hazed back into YNP or shot by WGFD personnel. Yellowstone bison have entered Idaho through Targhee Pass (via the northwest corner of YNP), Island Park (via the western boundary) and Ashton (via the southwestern boundary) (Hendry 2002). To date, numbers have been low, and animals that do not return to Yellowstone or Montana have been controlled by Idaho Fish and Game Department (IFGD) personnel.

The IBMP agreed upon by the State of Montana and YNP (State of Montana and Yellowstone National Park 2000a, 2000b) relies on spatial-temporal separation of cattle and bison as a means of preventing transmission of brucellosis from bison to cattle. The plan includes provisions for adaptive management. As mechanisms that reduce brucellosis incidence in bison and/or potential contact between sero-positive bison and cattle are demonstrated to be effective, management agencies will increase tolerance of bison outside YNP. Strategies for instituting management changes differ between the west boundary (West Yellowstone Basin) and the northern boundary (Gardiner Basin). Currently, in the Gardiner Basin, the interagency plan allows up to 100 bison to reside in the Eagle Creek/Bear Creek drainage (Fig. 1). It notes that an undefined number will be tolerated in the Absaroka Beartooth Wilderness Area and that additional bison will be allowed on the Royal Teton Ranch and adjacent public lands south of Yankee Jim Canyon when livestock are no longer grazed on the ranch. On the western boundary of YNP, up to 100 sero-negative and/or vaccinated bison are tolerated in portions of the West Yellowstone Basin designated as Zone 2 (Fig. 1) when no livestock are present. Bison are also tolerated on public lands which have no cattle allotments in the Cabin Creek Recreation and Wildlife Management Area north of West Yellowstone, the Monument Mountain Unit of the Lee Metcalf Wilderness Area, and in the upper Gallatin drainage south of Taylor's Fork (Fig. 1).

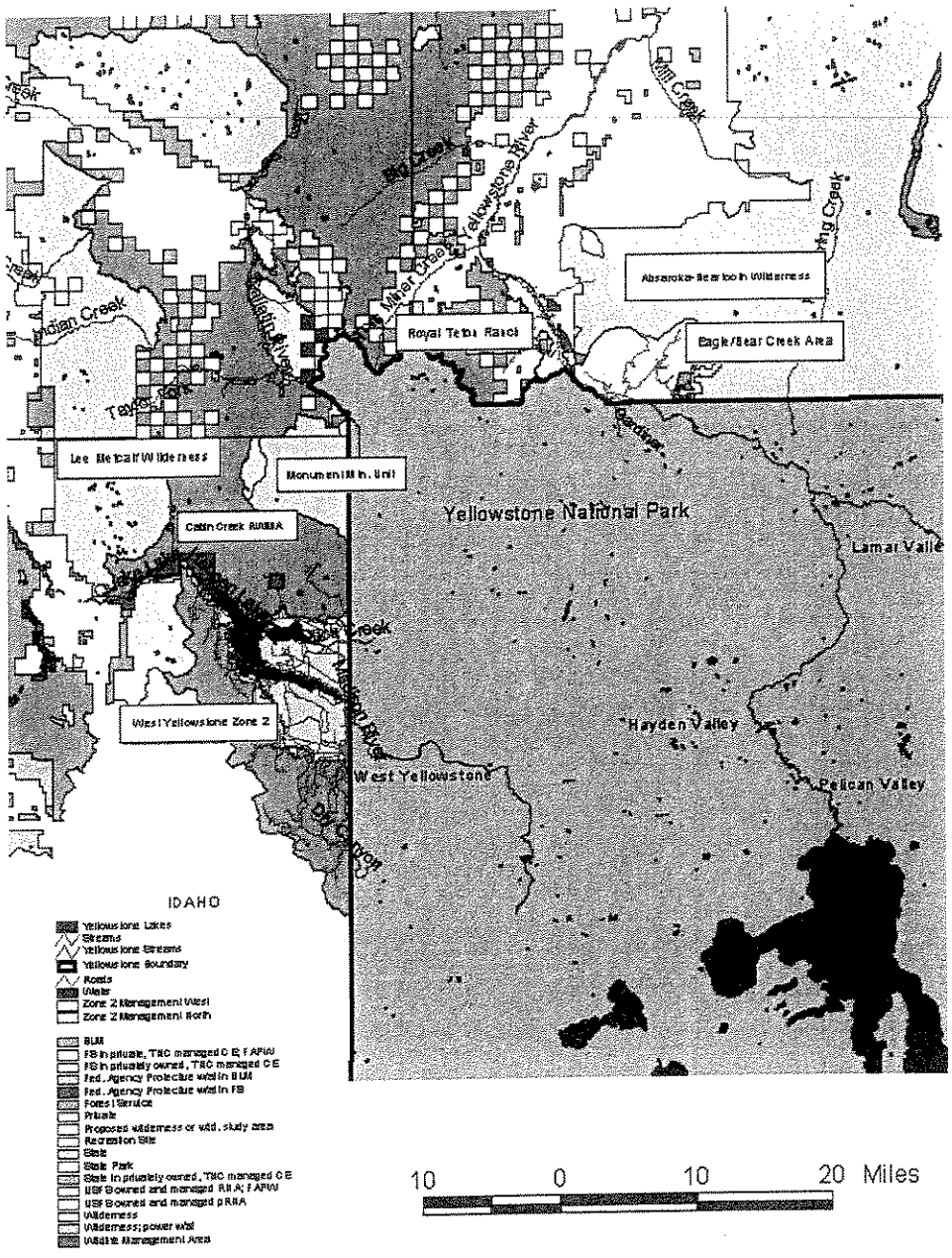

Figure 1. Map of the area considered in this EA showing areas where bison are tolerated and not tolerated.

At present, bison are tolerated outside YNP only during late fall, winter, and spring (periods when cattle are not present on most grazing lands near YNP) to prevent contact between bison and cattle. During the winters of 2000-2001 through 2003-2004, the four winters in which the Interagency Plan has been in force, bison entering Zone 3 (non-tolerance lands) have been hazed into YNP or herded onto Zone 2 or wilderness lands as soon as they are detected. In some areas, bison in YNP that approach Park boundaries are herded away from boundaries to prevent them from leaving the Park. If hazing fails, trapping facilities set up outside YNP (in the West Yellowstone Basin near the northwest boundary) and inside YNP (Stephens Creek near the north boundary) are used to capture bison. When overall population size exceeds 3,000, captured bison may be sent to slaughter. When the population is under 3,000, bison are tested for brucellosis, and sero-negative individuals are marked and released outside YNP (West Yellowstone Basin) or held until spring (125 or more can be accommodated at the Stephens Creek facility). Sero-negative bison in the West Yellowstone Basin are tolerated in Zone 2 lands until May 15. After this date, they are hazed into YNP. Bison that cannot be hazed into areas where they are tolerated (YNP, Zone 2 from late October to mid May, and designated public land with no cattle allotments) or cannot be captured in established traps are killed by management agency personnel. Bison in YNP will not be subject to lethal control except when captured and tested in the Stephens Creek facility or, in the case of mature bulls, when hazing and capture efforts fail to resolve emigration or property damage problems.

Beginning in winter 2003-2004, sero-negative calves and yearlings captured in the Stephens Creek facility were vaccinated using the RB51 vaccine. Vaccinated animals were held in capture facilities until April 2004 then released in YNP. The IBMP (State of Montana and Yellowstone National Park 2000a, 2000b) called for shipping all sero-positive animals and sero-negative animals in excess of the 125 that the Stephens Creek facility was designed to hold, but in 2004, YNP personnel held ~200 animals until spring. More than 600 bison were captured at Stephens Creek including not only animals from the Lamar Valley sub-population but animals from the interior Park population (R. Wallen, personal communication). MDOL is evaluating vaccination and, if a decision is made to vaccinate, will begin a program in winter 2004-2005. If a vaccination program is approved, MDOL will likely vaccinate calves and yearlings captured in the West Yellowstone Basin facility using the RB51 vaccine. YNP proposes to begin field vaccination of bison in YNP using the RB51 vaccine delivered via "biobullets" upon completion of NEPA evaluation.

The opportunities for public hunting under the IBMP (State of Montana and Yellowstone National Park 2000a, 2000b) are limited to areas where bison are currently tolerated (the Eagle Creek/Bear Creek drainage, the Absaroka Beartooth Wilderness Area, portions of the West Yellowstone Basin, the Cabin Creek Recreation and Wildlife Management Area, the Monument Mountain Unit of the Lee Metcalf Wilderness Area, and in the upper Gallatin drainage south of Taylor's Fork) and possibly in adjacent areas classified as Zone 3. Private lands would only be accessible with landowner permission. Most use in these areas would be expected in open vegetation types at lower elevations, but bison in the Yellowstone ecosystem do not hesitate to move through forested areas to reach

open habitats. Bison may also move into forested habitats to avoid hazing and hunters. The presence of extensive private grazing land and the likely opposition of landowners will make tolerance of bison extremely unlikely in Zone 3 areas west of Hebgen Lake, north of Yankee Jim Canyon, or North of Big Sky (Fig. 1).

Excluding areas in Zone 3 with low probability of any tolerance of bison and areas at high elevation, recreational hunting could take place on more than 460,000 acres (>186,000 ha) (Table 3). Considering only Zone 2 areas currently open to use by bison, the West Yellowstone basin would provide 34,101 acres (13,801 ha) of potentially huntable land <8,500 feet (~2,600 m) in elevation, and the Eagle Creek/ Bear Creek area would provide 25,800 acres (10,441 ha) meeting the same conditions (Table 3). The third potential hunting area, the upper Gallatin River drainage (Fig. 1) has no designated Zone 2 acreage, but bison on public lands south of Big Sky have been tolerated during winter for several years. The area south of the Porcupine Wildlife Management Area (east side of Gallatin River) and south of the Taylor's Fork of the Gallatin (west side of river) could provide >97,000 acres (>39,000 ha) of potential bison hunting lands. No bison would be tolerated north of Big Sky because of the risk of wild bison from the Yellowstone herd mixing with domestic bison on the Flying D Spanish Creek Ranch.

The availability of bison in these potential hunting areas is dependent on bison movements. Although several factors have been proposed as drivers for bison emigration from YNP (National Park Service 2000), numbers in YNP and numbers leaving YNP have increased over the past 35 years (Table 4). Under provisions of the IBMP (State of Montana and Yellowstone National Park 2000a, 2000b), a count of 3,000 bison may trigger the most extreme brucellosis risk management strategy (capture and slaughter without testing; shooting bison in Zone 3 and, under some conditions, Zone 2 "on sight"). The decision to use a count of 3,000 as the trigger for maximum population control efforts is based on the assumption that bison are most likely to emigrate in response to deep snow or ice crusting when populations are above 3,000 (National Research Council 1998). Aune (unpublished) presents an alternative interpretation, which indicates that bison are likely to leave YNP any time population numbers exceed 2,000 (Table 5). Meagher (1998) suggests that once bison learn that foraging conditions are easier somewhere outside the Park, they may return to those areas even though snow or forage conditions inside YNP are reasonable. This introduces the possibility that a large proportion of the YNP bison population will leave the Park even when bison numbers are low.

Whatever the mechanism or combination of mechanisms that drive bison emigration, numbers of bison that leave YNP have increased over the past 35 years, and it appears that winters in which more than 2,000 bison are counted during surveys in YNP will likely result in emigration of bison out of YNP (Tables 5 and 6). When and where bison leave the Park were not closely monitored until the 1999-2000 winter. During the past six winters YNP and MDOL personnel have monitored bison movements along the northern and western boundaries of YNP. These data do not represent a total census of bison outside YNP and do not provide coverage for all days or even all months since

Table 3. Potential areas available for public hunting of bison near the Yellowstone National Park boundary in Montana. Acreage (hectares in parentheses) for currently designated Zone 2 areas (where free-ranging bison are tolerated under specified seasonal restrictions) and total area where bison potentially could be hunted (Zone 2, wilderness areas where bison are tolerated, and adjacent Zone 3 areas where bison would not be tolerated for extended periods) are included (State of Montana and Yellowstone National Park 2002a, 2002b). Acreages (hectares in parentheses) are given for all land below 8,500 feet (~2,600 m) and for all areas below 8,500 feet and 320 feet (100m) from public roads. ArcView layers digitized for the Interagency Bison Management and Brucellosis Management Plans were used to develop estimates.

Hunting area	Zone	<2,600 m (~8,500 feet)			<2,600m (~ 8,500 feet) and >100m (~320 feet) from public roads		
		Public	Private	Total	Public	Private	Total
Western	W. Yel. Basin	27,996 (11,330)	6,105 (2,471)	34,101 (13,801)	17,573 (7,111)	3,446 (1,394)	21,019 (8,505)
	Total[a]	165,988 (67,173)	11,010 (4,455)	176,998 (71,628)	138,678 (56,121)	6,177 (2,500)	144,855 (58,621)
Northern	Eagle/Bear Creek	24,383 (9,867)	1,417 (574)	25,800 (10,441)	22,612 (9,150)	934 (378)	23,546 (9,528)
	RTR[b]	2,235 (904)	4,820 (1,950)	7,055 (2,854)	2,049 (829)	4,136 (1,674)	6,185 (2,503)
	Total[c]	72,606 (29,382)	21,486 (8,694)	94,092 (38,076)	69,286 (28,038)	18,704 (7,571)	87,990 (35,609)
Gallatin	Total[d]	89,878 (36,371)	7,785 (3,150)	97,663 (39,521)	86,650 (36,065)	7,220 (2,922)	93,870 (38,987)

[a]Public lands west to the Idaho border and north to Hebgen Dam.

[b]Currently closed because of cattle on Royal Teton Ranch.

[c]Assumes bison will never be allowed north of Yankee Jim Canyon.

[d]Includes public lands north to Taylor's Fork (west of the Gallatin) and the Porcupine Wildlife Management Area (east of the Gallatin).

implementation of the IBMP, but they do represent the best data available to describe bison movements from YNP into Montana.

MDOL data for all or parts of the past six winters provide some basis for estimating the number, distribution, and timing of bison leaving YNP via the Madison drainage on the west boundary (Fig. 2). At base population levels above 2,000, bison males should be available to hunters in September through May of most years. Females and calves tend to remain in YNP until December or January. Numbers of cows and calves leaving YNP is heavily influenced by winter severity, but substantial numbers leave YNP in April and May in most years, at least when population levels are >2,000.

YNP data (Fig. 3) indicate that bison approach or move across the northern boundary in January through April in most years. Movement of the larger mixed herds is most likely to occur west of the Yellowstone River where cattle on the Royal Teton Ranch preclude tolerance of bison, but male groups and small mixed herds regularly move into Zone 2 lands where bison presence is tolerated in the Eagle and Bear Creek drainages during winter to early spring and occasionally during other seasons.

Bison Ecology in the Yellowstone Ecosystem

Bison are the largest native ungulate in North America. They historically occupied open grasslands, savannah, and shrub steppe from the Northwest Territories of Canada to northern Mexico (Reynolds, et al. 1982). The majority of bison were located in the plains east of the Rockies at the time of European exploration of North America, but scattered populations occupied open plant communities as far west as eastern Washington and as far east as the Appalachians. In YNP, bison occupy open areas throughout the Park and are willing to traverse forested areas to reach isolated open plant communities (Meagher 1973, Dawes 2000). Bison most likely to move into Montana are associated with sage steppe and riparian meadows in the Hayden Valley, Lamar Valley, Pelican Valley and along tributaries in the Yellowstone, Madison, and to a lesser extent, the Gallatin River drainages (Fig. 1) (National Park Service 2000).

Bison are social animals with a maternal hierarchal herd structure (Meagher 1973, Reynolds et al. 1982). Large herds generally consist of numerous matriarchal units with adult females, calves, yearlings, and sub-adult males and females. Young males eventually leave maternal herds and forage in small groups or singly, joining maternal groups for the breeding season and sometimes during other seasons. Maximum herd cohesion occurs during the summer rut. Bison in YNP typically concentrate in the Hayden and Lamar Valleys for the July – August rut. Winter concentrations may occur in the upper Madison drainage and the Yellowstone drainage from the Lamar River Valley downstream to the Yellowstone River Valley north of Gardiner, Montana (Fig.1).

Bison are classified as bulk feeders (i.e. herbivores able to subsist on relatively low quality vegetation because they have large rumens and rely on ruminant symbionts to extract usable nutrients from cellulose and hemi-cellulose) and feed predominantly on

Table 4. Winter severity indices (LNR = Lower Northern Range, UNR = Upper Northern Range, HP = Hayden – Pelican Valley, Mean SI = average of previous 3 indices), bison counts, and numbers of bison removed by humans (public hunting, agency shooting, and capture and shipping) for YNP bison, 1981-82 to 2003-04. Severity indices were developed by Farnes et al. (1999) and vary from +4 (mildest winter) to –4 (most severe winter) recorded. Indices included are spatially explicit and are based on variables hypothesized to have the most direct impact on bison. Acronyms are: nc = a set of years when records note only "a few bulls shot"; na = data not available.

Winter	LNR	UNR	HP	Mean SI	Count	N removed
1966-67	-3.0	-2.7	-2.8	-2.8	397	3
1967-68	-1.9	-0.4	2.3	0.0	418	4
1968-69	-1.6	-1.2	-2.2	-1.7	556	0
1969-70	0.9	-0.3	1.4	0.7	592	0
1970-71	-1.9	-1.3	-2.4	-1.9	565	0
1971-72	-3.1	-1.4	-2.0	-2.2	713	0
1972-73	1.3	2.2	1.8	1.8	837	0
1973-74	-0.9	1.7	-2.0	-0.4	873	0
1974-75	-0.6	-1.4	-0.4	-0.8	1068	0
1975-76	-2.8	-1.2	-1.1	-1.7	1125	8
1976-77	1.5	2.2	1.6	1.8	1252	nc
1977-78	-1.7	-1.7	-1.4	-1.6	1626	nc
1978-79	-1.6	-1.6	-0.3	-1.2	1727	nc
1979-80	0.3	-0.8	-0.6	-0.4	1803	nc
1980-81	1.9	3.0	3.5	2.8	2396	nc
1981-82	11.0	-1.1	2.1	4.0	2239	0
1982-83	2.3	2.3	1.5	2.0	2160	0
1983-84	2.1	2.7	2.3	2.4	2229	0
1984-85	0.2	1.0	1.4	0.9	2114	88
1985-86	1.6	0.1	-0.7	0.3	2291	57
1986-87	3.3	2.0	3.2	2.8	2433	6
1987-88	1.8	2.9	3.2	2.6	2644	35
1988-89	-2.0	-1.2	-3.1	-2.1	3159	569
1989-90	-0.7	-0.1	0.5	-0.1	2606	4
1990-91	1.0	1.0	1.4	1.1	3178	14
1991-92	0.0	-1.1	0.9	-0.1	3426	271
1992-93	-0.6	2.1	1.1	0.9	3304	79
1993-94	0.3	2.1	2.4	1.6	3551	5
1994-95	0.4	0.3	-0.7	0.0	3956	427
1995-96	0.9	-0.9	-1.9	-0.6	3398	433
1996-97	-1.9	-3.8	-2.8	-2.8	3436	1084
1997-98	1.3	2.4	1.9	1.9	2105	11
1998-99	-1.4	-0.7	-2.3	-1.5	2239	94
1999-00	1.4	-1.6	-0.9	-0.4	2444	0
2000-01	2.2	2.2	2.2	2.2	2800	6
2001-02	0.3	2.3	1.0	1.2	3330	202
2002-03	0.4	0.5	0.1	0.3	3899	244
2003-04	na	na	Na	na	4250	274

Table 5. Emigration of bison from Yellowstone National Park and mean numbers of bison removed from the population by human action (hunters, capture/slaughter, agency shooting) for three population ranges, 1966 - 2003.

Category	Bison count		
	<2,000	2,000-3,000	>3,000
Number of winters	14	13	10
Adjusted change in N[a]	142	220	258
(se)	(44)	(69)	(99)
Adjusted % change in N[b]	14.1	8.8	7.5
(se)	(3.4)	(2.7)	(2.8)
% of years with emigration out of YNP	33[c]	83[d]	100

[a] Change in number between maximum count in winter 1 and maximum count in winter 2 plus animals removed by human action in winter 1.

[b] Adjusted change in numbers between winter 1 and winter 2 divided by maximum count in winter 1 multiplied by 100.

[c] No data on emigration in 4 winters (1976-77, 1977-78, 1978-79, 1979-80). Records only mention "a few bulls" out of YNP in 1 or more of the years.

[d] No data on emigration for winter of 1980-81.

grasses and sedges throughout their range (Reynolds, et al. 1982). In the Yellowstone area, >90% of food reported eaten by bison in YNP consists of grasses and sedges in all seasons (Meagher 1973, Olenicki unpublished).

Most females in the YNP herd reach reproductive maturity as 2 ½ or 3 ½ - year-olds (National Park Service 2000). Pregnancy rates for "mature" females (2 ½ -years or older in most reported studies) in YNP are reported to range from ~40% to 90% with some variability attributed to population size (higher pregnancy rates at lower populations sizes) and herd unit (higher for bison associated with the Lamar Valley than those associated with the Hayden – Madison – Firehole complex). Brucellosis does lead to abortions in female bison, at least in the reproductive season in which a female is first infected (Dobson and Meagher 1996, Gross, et al. 2002), but the incidence of abortion is not sufficient to stop population growth (Table 5). Estimates of calves as a percentage of bison noted in summer counts have varied from 11 to 22%. Estimates from winter data vary from 14 to16% (National Park Service 2000). Where yearling percentages have been estimated, they varied from 7 to14% of the population.

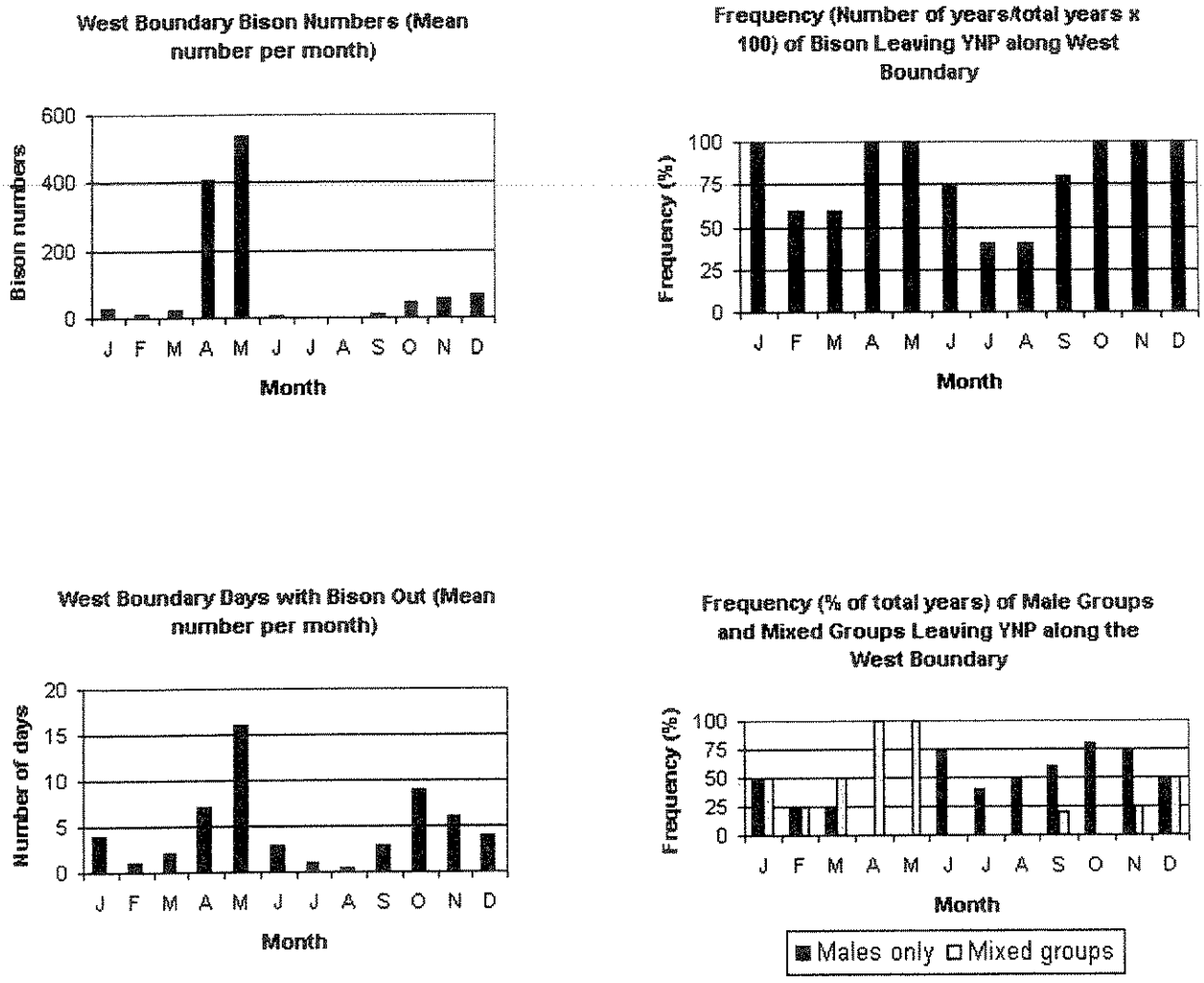

Figure 2. Summary of MDOL reports on bison leaving YNP (or near boundary) along the western boundary 1999-2004. Data do not cover all days in all months. Reports include multiple notations on the same bison; therefore, mean numbers do not represent independent counts but do reveal patterns of high and low emigration.

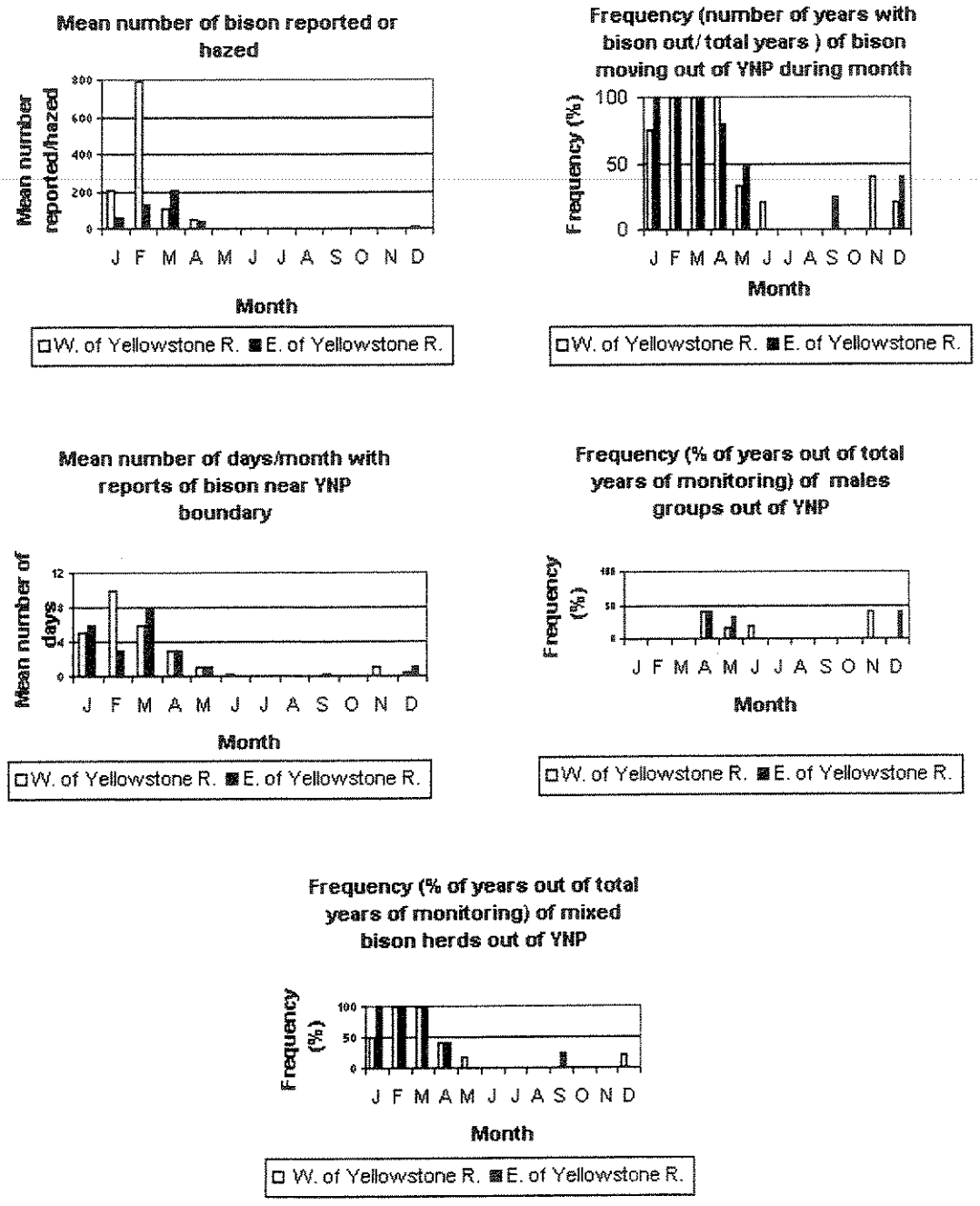

Figure 3. Summary of YNP reports on bison in the northern boundary area 1999-2004. Data do not cover all days in all months. Reports include repeated hazing and repeated notes of the same bison; therefore, mean numbers do not represent independent counts but do reveal patterns of high and low emigration (or potential emigration). Data have been divided into animals outside YNP or within 5 km of the Zone 2 area (area where bison presence is tolerated in winter and spring) in the Eagle Creek and Bear Creek drainages (data defined as "E. of Yellowstone R.") and animals outside YNP or within 5 km of the Royal Teton Ranch, a potential Zone 2 area when cattle grazing is terminated (defined as "W. of Yellowstone R.").

Although Meagher (1973) estimated non-hunting mortality for calves through sub-adults (≤ 2 ½ years old) sometimes reaches 50%, more recent estimates (National Park Service 2000) indicate much lower rates of "natural" mortality. Severe winter conditions do lead to starvation, particularly among young, old (>12-15 years of age in YNP), and injured animals. Predation by wolves and grizzly bears has been documented but does not, to date, constitute a major mortality source (D. Smith, personal communication). Most bison mortality in YNP herds over the past 25 years is directly attributable to humans. Population trend is determined by the relationship between natality, immigration, mortality, and emigration. Bison immigration has not been a factor for YNP since 1902. Emigration has been curtailed due to intolerance of bison in lands surrounding YNP. Data related to bison natality and mortality (including capture and removal from the system) have been used to develop several models of bison population dynamics (see National Research Council 1998, Taper et al. 2000, Taper and Gogan 2002), but the simplest approach to determining the expected number of bison that would have to be removed from the population to maintain a population of 3,000, which the IBMP (State of Montana and Yellowstone National Park 2000a, 2000b) recognizes as a population level likely to trigger emigration from YNP, or 2,000, which Aune (unpublished) believed to be a better predictor of emigration, is to examine changes in population between consecutive years – including adjustments for human removals between years. This approach is a deterministic application of the "finite rate of increase" model for population growth ($N_t = N_0 \lambda^t$) (Pianka 1994). Changes between consecutive years have been displayed as percent change in winter bison counts with year 1 designated as the base year and with bison removals attributed to humans in year 1 added to the count from year 2 (Table 5). This approach does not attempt to account for impacts of weather on bison movement or to distinguish the potential impacts of compensatory mortality.

Using only data collected after YNP adopted a strategy of minimum management of bison (*circa* 1966), adjusted population change between years averaged 14.1% for years with a base of <2,000 bison, 8.8% for years with a base of 2,000 – 3,000, and 7.5% for years with a base of >3,000 bison (Table 5). This implies that maintaining a stable population of bison would require management actions to remove an average of 142 animals per year to maintain a base of 2,000 or 258 animals to maintain a base of 3,000 bison. Some of these bison could be removed by recreational hunters.

The number of bison leaving YNP in winter has been hypothesized to be driven by snow depth, snow crusting, forage (quantity, quality, and/or accessibility), bison population size, human trail grooming, herd tradition, or some combination of these factors (Meagher 1998, National Research Council 1998, Farnes et al.1999, Bjornlie and Garrott 2001). A simple examination of relations between population size, winter severity, and bison emigration, and human control operations associated with bison movements outside YNP (Table 6) provides support for all of the hypotheses advanced. A multiple regression model incorporating 3 independent variables (year, maximum bison count, and the average of 3 winter severity indices) and all linear interactions among these variables explained >90% of the variability in numbers of bison removed per year ($F_{7,29} = 43.9$, $p < 0.001$, $R^2 = 0.93$). Unfortunately, not only were all the independent variables significantly related to bison removal, but so were all interactions among variables. This

suggests that bison emigration is controlled by a complex relationship between weather (the more severe the winter, the greater the number of bison removed by human actions) and population size (the higher the population count, the greater the number of bison that are removed from the population) that has probably changed over time, but it does not elucidate the exact structure of the relationship. Bjornlie and Garrott (2001) noted that increases in population size would encourage more bison to seek areas with easier foraging conditions outside YNP in winters with deep snow or heavy snow crusting, but because winter conditions cannot be predicted, the number of bison actually exiting YNP cannot be predicted based solely on population size.

Table 6. Pearson correlations between population size and winter severity and bison removed from the population by human action for the winters of 1966-1967 through 2002-2003. YNP records for 5 winters (1976-77 through 1980-81) did not give specific numbers on bison control actions. Removal of bison in this period was limited to a "few bulls" shot by agency personnel. These years have been arbitrarily assigned a value of 2 bison removed in correlations (r) presented here. Deleting the 5 winters from the analysis (the other option for handling the missing data) did not change correlations substantially. P-values are based on 1-factor regressions assuming number of bison removed by human actions is the dependent variable. R^2 (coefficient of determination) is the proportion of variation from a perfect linear association explained by the correlation (i.e. if $r = 0.5$, $R^2 = 0.25$, and the association explains 25% of the total deviation from a perfect linear association). Winter severity is based on indices developed by Farnes et al. (1999). Bison counts are maximums recorded in YNP files.

Potential explanatory variable	Correlation with bison removals		
	r	R^2	p
Winter severity			
Lower Northern Range	-0.18	0.03	0.28
Upper Northern Range	-0.37	0.14	0.02
Hayden – Pelican Valleys	-0.40	0.16	0.01
Mean of 3 indices	-0.36	0.13	0.03
Maximum count	0.53	0.28	<0.01
Temporal correlation (effect due to time series)	0.43	0.18	0.01

Determining optimum bison population size

Allowing unlimited growth of the Yellowstone bison herd is not a realistic option because of potential problems with over-use of plant communities, negative impacts on other wildlife species, and land-use conflicts, especially on private property. Deciding on an appropriate population size for Yellowstone bison is difficult. Three frequently mentioned rationales for determining an optimum bison population size are: 1) minimizing egress of bison from YNP to reduce chances of transmitting brucellosis to livestock; 2) minimizing over-use of plant communities on seasonal ranges used by bison; and 3) minimizing loss of genetic diversity/fitness.

Results of studies noted in the Bison Management EIS (National Park Service 2000), the National Resource Council report on brucellosis (National Research Council 1998), and more recent data (Aune, personal communication; YNP, unpublished reports) indicate that some bison are likely to leave YNP in severe winters even when population size is <2,000. When the population reaches 2,000 -3,000, bison are likely to leave YNP in average to severe winters. When numbers exceed 3,000, bison are likely to emigrate in all but the mildest winters. If exposure of cattle to contact with bison were the only criterion determining optimum bison population size, "optimum" would be defined at some level below 2,000.

Several studies (Singer and Harter 1996, Dawes and Irby 2000, Olenicki, unpublished) have noted >50% utilization of standing biomass by bison and elk on seasonal ranges within YNP during years with overall bison populations of ~2,000 to 4,000. In conventional range management terms this would indicate an appropriate cap might exist somewhere in the range of 2,000 – 4,000 - if the herd is limited to habitat currently available and elk numbers remain in the range occurring during the period (1988 – 2001) when these studies were done.

Arguments could be developed for several different optimum population sizes based on genetics. A large minimum might be desirable for a population that represented the only gene pool for a species, sub-species, or ecotype. The population in Yellowstone is not the only population of "wild" bison in North America nor is it a "pure" gene pool representing the Yellowstone area. Bison from western Montana and Texas were translocated into YNP early in the 20th century (Meagher 1973). Because YNP has served as a major source of stock for establishing new bison herds (Meagher 1973), alleles from bison in the Yellowstone herd will persist in other public herds, including at least two public herds that were founded solely from YNP bison and have never included bison from other areas (Dierschke Halbert 2003, Gogan, personal communication) even if bison were extirpated from the Yellowstone system.

A process that could selectively remove animals based on genetically linked characteristics, such as trophy hunting in which the largest adult males in a population are selected for harvest, could decrease the fitness of a population by disproportionately removing genetically superior animals. Experience with game species in the United States and Europe indicates that changing the genetics of populations through hunting

requires high selectivity for specific genetically-linked characteristics and the harvest of a substantial proportion of the population that carries the genetically-linked characteristic over a number of generations (Ryman, et al. 1981, Fitzsimmons et al. 1995). If the proportion of animals removed from a breeding population each year is low or if selectivity of the removal processes (Capture by management agencies, collisions with vehicles, and predation by grizzly bears and wolves are the major mechanisms that remove bison from the Yellowstone herd at present. Hunting, if authorized, could become a mechanism in the future) is low to moderate, changes in genetic quality of a population are unlikely to occur.

Many bison herds in the United States have been degraded by introgression of genes from domestic cattle via hybridization. This has not occurred in the Yellowstone herd (Dierschke Halbert 2003). If the Yellowstone herd represented the only, or one of a few, public herds without cattle genes, a high minimum population size might be desirable to preserve a reservoir of "pure" bison. Fortunately, more than half of the public herds (state or federally managed bison) have no cattle genes or have removed bison hybrids (Derr, unpublished).

Yellowstone bison do represent a population with a gene pool that has been isolated from other populations for more than 100 years, which has likely led to gene frequencies different from other bison populations, and it does evidently have three genetic sub-populations (Dierschke Halbert 2003). The Bison Management EIS (National Park Service 2000) identified 580 as the minimum population size necessary to preserve genetic diversity in YNP if bison are considered members of a single population. If three genetically distinctive sub-populations persist (the latest data indicate that bison from different sub-units in the Park are mixing more frequently in winter but may not be mixing during the breeding season, Wallen, personal communication), an argument could be made for a minimum population of ~1,800. This assumes that each sub-population would require ~600 animals to maintain distinctive genetic characteristics.

The Interagency Bison Management Plan (IBMP) calls for bison to be maintained in a range of 2,500 – 3,500 animals (State of Montana and Yellowstone National Park 2000a, 2000b; National Parks Service 2000). This range is generally consistent with the plant community and genetic diversity maintenance rationales, but is higher than the population that will minimize bison egress from YNP.

Social and Cultural Environment

Bison are regarded as a species central to Native American cultures of the Great Plains. Dozens of tribes depended on bison for survival for well over 10,000 years (National Park Service 2000). The bison was so intimately woven into the economic and social lives of Native Americans that strategies for overcoming Native American resistance to Euro-American expansion into the Great Plains relied on elimination of bison for success. Native Americans have no better opportunity to view large numbers of free-ranging bison in the United States than in YNP. Tribal representatives have been allowed to accept

meat and process carcasses of bison killed in brucellosis control operations, and they have requested live animals for transport to Native American lands. Requests for live bison have been denied because of the problems associated with moving animals potentially harboring *Brucella* to areas with brucellosis-free status (National Park Service 2000).

To Euro-Americans and visitors to YNP from other countries, bison are integral to the history of European exploration and settlement of the New World and with the culture of the "Old West". Bison are arguably the most frequently observed large mammal in YNP and contribute substantially to the experience of Park visitors. Bison in YNP provide viewing opportunities to more than 2 million Park visitors per year and one of the few opportunities to easily view large numbers of bison under free-ranging conditions.

Economic Environment

Negative impacts of bison are largely associated with their impacts on agricultural operations. The most substantial economic impacts are associated with threats to Montana's "brucellosis-free" status. Movement of bison carrying *Brucella* into Montana places local livestock operations in jeopardy of infection. Testing for brucellosis and vaccinating susceptible animals was estimated (in 2000 dollars) to cost individual operators adjacent to YNP from $2,500 to $5,000 per year (National Park Service 2000). If Gallatin and Park Counties were to lose brucellosis-free status, the costs to producers in only those two counties was estimated at $168,000 to $536,000 per year in 2000, assuming a "split-status" ruling (i.e. only affected counties required to test and vaccinate while the rest of the state retains its brucellosis-free status) by USDA. If the entire state lost brucellosis-free status, losses to producers were estimated to be $5.1 million to $16.3 million per year (National Park Service 2000)

If brucellosis were introduced to livestock in Montana and not controlled via testing, slaughter, and vaccination, ranchers would lose additional income from abortions (a high percentage of animals infected lose the first calf after infection), decreased weight gains (calves that do survive may weight 100 pounds or less at sale than non-infected calves), and delays in calf production (infected cows are likely to lose at least one year of calf production). The presence of brucellosis also leads to long-term increased costs for culling herds. Brucellosis tests have to be administered repeatedly once brucellosis is identified in a herd, and infected cows frequently have reduced productivity even if they do not lose additional calves).

Brucella abortus can infect a wide variety of mammals and birds, but bovids (cattle-like herbivores) appear most likely to support sustainable infections. Transmission between animals is usually affected by ingestion of live bacteria from infected animals, aborted fetuses, or exudates (including milk) of infected animals (National Research Council 1998). Cattle and bison appear to maintain infections indefinitely (Hagan and Bruner 1961, Dobson and Meagher 1996). Elk herds managed using winter feeding programs are much more likely to sustain herd infections than elk managed without winter feeding

(Ferrari 1999). It appears that while deer, elk (at least those not fed in winter), native carnivores, and native scavengers could contract brucellosis from contact with exudates from bison or viscera of dead bison, the probability of passing infections from one individual to another is so low (National Research Council 1998) that measurable population consequences, and any associated economic impacts, are unlikely to occur.

The human form of brucellosis, undulant fever, is difficult to treat and was once a common disease of humans in the United States. Pasteurization of milk eliminated undulant fever as a common human disease, but humans can contract brucellosis by handling infected tissues or exudates (most likely by transferring bacteria from hands to mouth). However, humans have handled hundreds of infected bison and thousands of infected elk carcasses over many years in the Yellowstone ecosystem with only one subsequent report of undulant fever (National Research Council 1998, Alt personal communication). This indicates that the likelihood of economic impacts due to health costs is negligible.

Brucellosis is not the only potential negative economic impact attributable to bison. Bison can impose significant non-disease costs on agriculture. The may consume forage and hay intended for livestock, destroy fencing, and injure cattle and horses. Although these losses are difficult to accurately quantify, the forage consumed by an individual bison would be roughly equivalent to that eaten by a cow. The Montana Supreme Court has ruled that landowners in Montana are expected to tolerate "reasonable" forage use by native herbivores (State vs. Rathbone 1940 and State vs. Sackman 1968 as described in Aderhold 1985), but bison represent a "new" species of wildlife to most landowners in Montana. They would view bison foraging on private lands, where lease payments are currently worth $10 to $20 dollars per female-calf pair per month, as an economic cost to their operations. Bison consumption of hay, currently valued at ~$60-$100 per ton, would be viewed in a similar manner. Fence replacement is difficult to price because the labor involved is usually done by the ranch owner. Losses due to injuries or death of livestock could be estimated by charges for veterinarian services and/or replacement value for livestock.

Bison may also damage vehicles and non-agricultural property and can be dangerous to humans. Of the 143 incidents of bison nuisance/damage recorded in 1991-1993 (National Park Service 2000), ~90 were not directly related to agricultural operations. Between 1991 and 1997, 50 bison – vehicle collisions were reported in YNP and in Montana near the YNP boundary. Monetary damage was estimated for only six of the collisions (5 in YNP and 1 in Montana for a total of $18,800 or $3,100 per collision). The bison management EIS did not mention injuries to humans associated with collisions or with tourist-bison encounters, but over the past 50 years (and maybe longer) bison are responsible for more tourist deaths in YNP than any other animal species.

Positive economic values for bison would primarily accrue from tourist expenditures in YNP and recreationist expenditures in the Gallatin National Forest (GNF) that were associated with bison. There are no completely objective valuation methods to separate income generated by bison from that generated by other characteristics of YNP and GNF,

but a conservative estimate would include a portion of entrance fees to Yellowstone and some percentage of the costs incurred in visiting YNP (fuel, food, lodging, *etc.*). Bison are reported to be one of the "top three" animal species visitors would like to see while in YNP, and 93% of visitors rank wildlife viewing as their primary activity in YNP, but only 5% of visitors surveyed would not have visited YNP if bison were not present (National Park Service 2000).

Hunting would be expected to have minimal impacts on economic issues related to bison population size. Most bison that hunters would be able to legally harvest would be subject to control (capture and slaughter or removal with firearms) by agency personnel carrying out actions mandated under the IBMP (State of Montana and Yellowstone National Park 2000b) if hunting did not occur. Hunting could influence economics by modifying bison behavior or distribution. A public hunt for bison could decrease the economic cost of bison if hunters kill or displace bison from private land. Fewer bison on private land would decrease contact between bison and cattle, reduce damage to fences and haystacks, and reduce the amount of forage on private lands consumed by bison. Hunters could also increase the economic cost of bison if, during the course of a hunt, they push bison onto private lands, through fences, or onto highways.

Recreational hunting, if instituted, would produce fees for licenses ($75 for in-state and $750 for out-of-state hunters, MCA 87-2-113 and 87-2-730), application fees (to be determined), and local economic benefits when hunters purchase food, fuel, lodging, guiding services, and supplies. With the low number of permits likely to be issued, input to the local and state economies from bison hunting would be minor compared to overall economic activity in the region.

Threatened and Endangered Species

Four animal species are generally identified when threatened and endangered species are considered in the Yellowstone ecosystem. Grizzly bears (*Ursus arctos*), Canadian lynx (*Lynx canadensis*), and bald eagles (*Haliaeetus leucocephalus*) are classified as "threatened" (Montana Natural Heritage Program 2004). Wolves (*Canis lupus*) in the Yellowstone ecosystem are classified as an "experimental population" and, therefore, given less protection than wolves in other states in the contiguous United States.

Some bison are killed by grizzly bears and wolves, but bison are difficult to kill and are not a major prey item for wolves (Smith et al. 2000) or grizzly bears (Schwartz and Haroldson 2003) Carrion from winter-killed bison, which can number several hundred following a severe winter, does provide an important protein source for bears (Swartz and Haroldson 2003). Eagles may also feed on bison carcasses. Wolves will utilize bison carrion, but they generally have been able to kill sufficient live prey in the Yellowstone system to avoid carrion as an essential food source (D. Smith, personal communication). Lynx occupy habitats where bison are rare so they are unlikely to benefit from dead bison.

Data from the Final EIS on the Bison Management Plan (National Park Service 2000) indicate that >1 million tourists per year pass through the north and west entrances, and recreationists using the GNF contribute ~ 3 million recreation days per year to human activity in southwest Montana. About 7% of these recreation days are attributable to hunters seeking species other than bison. Under current levels of human activity, grizzly bear numbers outside YNP are evidently increasing (Schwartz and Haroldson 2003)on), and wolf numbers are increasing or stable, depending on drainage (D. Smith, personal communication). Eagle nesting success over the past 10 years is considered good (T. Hoffman, personal communication). Lynx are rare in the system and seldom, if ever, encountered in habitats occupied by bison (K. Alt, personal communication).

Hunters seeking bison may disturb or displace grizzly bears and wolves, but they are prohibited (as all other recreationists are) from approaching nesting eagles, and bison hunters are unlikely to spend time in the heavily forested habitats favored by lynx. Disturbance of bears, wolves, eagles, and lynx by the tens of thousands of non-hunting visitors to YNP and GNF is far more likely than disturbance by a few bison hunters. Bison hunters are unlikely to kill other species by mistake, and the viscera from hunter kills would be available to bears, wolves, and eagles.

Carnivores (including threatened or endangered species) and carrion-eating birds (including eagles and other raptors) could be infected by *Brucella abortus* from winter-killed bison carcasses or viscera from hunter-killed bison, but infections are generally not fatal and are rarely, if ever, passed from one carnivore/scavenger to another.

Impacts on Vegetation

Bison are large herbivores and can have significant impacts on vegetation. The National Academy of Sciences review of the Yellowstone Northern Winter Range (National Research Council 2002) noted that ungulates had significantly changed sagebrush, riparian, aspen, and low elevation conifer communities but had evidently had much less impact on grassland communities. The authors attributed most of the ungulate-induced change in woody vegetation to elk, but they acknowledged that changes in herbaceous vegetation, the plants favored by bison, were not well documented. Bison numbers and distribution in the Yellowstone area were restricted until the 1980s; therefore, vegetation in the system may still be changing to reflect increased herbivory by bison. Data collected by Frank (Frank 1990; Frank and McNaughton 1992, 1993) and Olenicki (unpublished) demonstrated that bison removed significant amounts of forage and may have influenced productivity, and even distribution, of some habitat types in YNP. However, these impacts do not necessarily represent an abnormal ecological state. Ungulates, especially large ungulates such as bison, consume vegetation and trample soils. In systems where ungulates are abundant, these activities are normal ecological processes and are expected to influence plant communities (Hobbs 1996). No data exist that prove bison numbers of ~2,000 – 5,000, the range of population size for the Yellowstone herd over the past 20 years, have had long-term negative impacts on plant communities, but the increase in area occupied by bison over the past 20 years, especially

during winter and spring, suggests that bison are seeking sites with forage to supplement what they can find within YNP.

Over the past 130 years, human activities in the Gardiner and West Yellowstone Basins have had far more impact on vegetation than bison. Mining, ranching, logging, road building and maintenance, residential and commercial development, and recreation have changed, and are still changing, vegetation communities (Houston 1982, Keating 1982, Yellowstone National Park 1997, National Park Service 2000, National Research Council 2002, Rens 2003, Tyers 2003). In some areas, native vegetation has been completely obliterated. In other areas, only species composition and vegetative structure have been modified, but it is doubtful if a single acre of land in either basin has the same vegetation physiognomy and species composition that were present when Euro-Americans began settling the area.

Adding a limited number of additional people and their vehicles, whether these people are bison hunters or non-hunting recreationists, to a system where millions of recreation-days already occur should produce no measurable additional impacts on vegetation and would require no new roads, buildings, or manipulation of vegetation.

Impacts on Physical Environment

Presence of bison trails and wallows in YNP attests to bison impacts on soils and stream banks. As with vegetation, however, large mammals cannot be expected to function in an ecosystem without creating impacts; therefore, "reasonable" soil and stream disturbance is normal when ungulates are an important part of an ecosystem (Hobbs 1996). Soil and stream disturbances attributable to humans in the upper Yellowstone ecosystem far exceed those attributable to bison.

Bison may influence water quality by increasing erosion, but no data have demonstrated any effect of bison on air quality in the Yellowstone ecosystem. Even though the Gardiner Basin and the West Yellowstone Basin have good water and air quality, human activities have had more impacts on quality than bison. Water quality has been degraded sporadically over the past 20 years by sewage leaks in Gardiner and YNP and regularly by construction (roads, buildings, etc.), which increases erosion and particulates in runoff in many drainages. The major human activities that degrade air quality in the Yellowstone ecosystem are use of internal combustion engines and use of fire. Millions of vehicles pass through the system every year releasing hydrocarbons, carbon dioxide, and other pollutants. Fires associated with home heating, trash burning, and logging release substantial amounts of particulates to the air in both the Gardiner and West Yellowstone Basins. As with impacts on vegetation, the addition of a limited number of people and vehicles should produce minimal increases in impacts to soil, water, and air quality.

CHAPTER 3: ALTERNATIVES INCLUDING THE PREFERRED ALTERNATIVE

Introduction

Statute 87-2-113, authorization for management of wild bison for disease control, and Statute 87-2-730, the law that authorized MFWP to determine if a public hunt for wild bison from the Yellowstone population was feasible and desirable, provide guidelines for any hunt that might be authorized. Authors of SB395, the Montana senate bill that led to Statute 87-2-730, noted three objectives that must be met by any public hunt for Yellowstone bison in Montana: 1) it cannot interfere with bison management activities undertaken by YNP, MFWP, and MDOL personnel; 2) it must be compatible with accepted land uses on public and private lands; and 3) it must be conducted under ethical hunting conditions (i.e. fair chase). To avoid interfering with agency efforts to prevent contact between bison and cattle, we only considered public hunting options in which hunter activity was not defined as the primary mechanism for bison control and in which relatively low numbers of hunters would be allowed to participate. To insure that hunting was compatible with accepted land use practices, all alternatives that include hunting were based on hunting structures routinely used in regulation of hunting for other species in Montana. We interpreted "fair chase" as a hunt in which animals have an opportunity to avoid hunters and during which hunters must exercise skill and ethical behavior in stalking and killing animals (Pozewitz 1994, Geist 2001). A number of other public wildlife management agencies have designed successful bison hunts that provide models of what may be possible in Montana (Kountz, unpublished, Appendix A).

Conditions and restrictions common to all alternatives that include public hunting

This Environmental Assessment includes four alternatives (Table 7). Three alternatives include limited hunting by permit. The preferred alternative would allow a few hunters a relatively long season in which to pursue bison with as few restrictions on areas open to hunting as are practical. Given conditions specified in Statute 87-2-730, the interpretation of legislative intent by MFWP personnel mandated to explore the feasibility of a public hunt, limitations imposed by bison ecology, climate, vegetation, and administrative boundaries in the Yellowstone area, and the realities of administering a hunt, MFWP developed a list of conditions and restrictions that would apply to any alternative that included a public hunt:

1. Hunting will be restricted to individuals with permits issued via a drawing process similar to that employed for other special permits issued by MFWP. Hunts will not be administered via a call-up list.

2. Fee structure will follow MCA 87-2-113: $75 for residents, $750 for non-residents.

3. Hunters will not be allowed to harvest bison that have been vaccinated for brucellosis within the mandated withdrawal period (the time interval between vaccine

administration and proven safety for meat consumption by humans. The withdrawal period for the vaccine, RB51, is 21 days).

4. Initially, weapons will be limited to rifles (required by Statute 81-2-120). Rifles will be restricted to those capable of propelling bullets with sufficient force to produce a quick kill.

5. Hunting will be allowed on public land and on private land with landowner permission.

6. No bison hunting will be allowed within 100 yards of major highways in areas open to bison hunting to protect public safety and minimize traffic obstructions. This would initially include segments of Highways 20, 191, and 287 on the western boundary of Yellowstone National Park (YNP) and Highway 89 near the northern boundary of YNP. Hunting on National Forest lands will follow restrictions in USFS order 36 CFR 261.10 (d) (firearm discharges are prohibited within 150 yards of a residence, building, campsite, developed recreation site, or occupied area or across a forest service road or body of water).

7. All hunters will be advised of restrictions and special problems that might be encountered in a bison hunt near YNP in application announcements.

8. Applicants who draw permits will be provided with information on the most effective ways to kill bison and on carcass handling procedures that will minimize meat spoilage and brucellosis infections in humans.

9. If a preference system is created, hunters that apply and do not draw permits will be given preference in the same manner that preference points are awarded in other special permit hunts.

10. Initially, bison hunting will be allowed only between November 15 and February 15.

11. Bison permits will be valid in both areas open to hunting near West Yellowstone (on the western boundary of YNP) and areas near Gardiner (on the northern boundary of YNP).

12. Agencies involved in bison or land management in areas of Montana with wild bison will be informed or, in the case of MDOL (a legislatively mandated partner in bison management in Montana), consulted on changes in hunting regulations.

13. Permit numbers, hunting district boundaries, and season structure can be modified by the MFWP Commission (*i.e.* If bison numbers in the Yellowstone herd drop below 2,500, permit number can be reduced. When bison are tolerated outside YNP in larger areas and in greater portions of the year, more permits can be issued).

In general, a public hunt for bison associated with the Yellowstone herd would be limited to permit holders drawn by lottery, would involve a minimum of supervision by agency

personnel, would mirror administrative procedures used in other permit hunts in Montana, and would rely on educating hunters to avoid problems with brucellosis, public safety, trespass, and damage to public natural resources.

Table 7. Alternatives analyzed in this Environmental Assessment.

1. No action: no public hunt; bison control carried out only by MDOL, MFWP, and YNP personnel.

2. Hunting by permit only in areas where bison are tolerated outside YNP with the permit valid for the entire season: 1-25 permits issued via lottery for a season extending from November 15 to February 15 valid only on public and private (with landowner permission) lands specifically defined as areas where bison are seasonally tolerated outside the northern and western boundaries of Yellowstone National Park in the Interagency Bison Management Plan (State of Montana and Yellowstone National Park, 2000a, 2000b).

3. Hunting by permit in all areas outside YNP where bison from Yellowstone may be found with the permit valid for the entire season (Preferred Alternative): 1-25 permits issued via lottery for a season extending from November 15 to February 15 valid on public and private (with landowner permission) lands in Hunting Districts 310, 313, 314, 361, and 362 where bison from the Yellowstone population may be found outside YNP.

4. Hunting by permit in all areas outside YNP where bison from Yellowstone may be found with permits valid for 10-day periods within a 90-day season: 1-25 permits issued via lottery valid for 10-day periods within a season extending from November 15 to February 15 on public and private (with landowner permission) lands in Hunting Districts 310, 313, 314, 361, and 362 where bison from the Yellowstone population may be found outside YNP).

Alternatives Considered but not Selected for Analysis

Unlimited permits issued via over-the-counter-purchase

This alternative was not pursued because of the limited area available for hunting and the limited number of bison expected to be available in areas open to hunting. Demand for bison permits is expected to be relatively high. Although the number of animals harvested could be regulated by imposing a harvest quota, unlimited permits would create unsafe hunting conditions.

Limited permits available on a first-come first-serve basis

Given the limited number of permits that will be available under any hunting alternative and the high expected demand, we cannot envision a fair way to administer permit issuance.

Preference systems for Native Americans

Preferences for ethnic, racial, or gender groups would be illegal under the equal opportunity laws under which MFWP operates. Without legislative authorization, special consideration of ethnic preferences cannot be considered in this EA.

Permits reserved for primitive weapons

MCA 81-2-120 specifically notes firearms should be used to kill wild bison. Initially, weapons will be limited to modern center-fire rifles of a minimum caliber propelling bullets of a minimum weight (to be determined when rules are finalized after a hunt is authorized). As MFWP gains experience with bison hunts, permit holders may be allowed to take bison with appropriate muzzle-loading rifles or with bows. Use of bows to take bison will require a statutory change.

Early fall hunting

Hunting in early fall was rejected for two reasons: 1) hunting in September and October is more likely to result in meat spoilage and provide additional attractants for grizzly bears; and 2) hunters would have very limited opportunities to harvest bison in areas open to hunting. At present, bison may or may not leave YNP in any month of the year, but they are much more likely to emigrate in winter and spring than summer and autumn.

Late winter/spring hunting

Three factors make bison hunting in late winter - spring less desirable than hunting in mid winter: 1) hunting in late winter and spring could place substantial stress on pregnant females during the last third of pregnancy and has the potential to orphan calves born early in the calving season; 2) the emergence of grizzly bears in spring would increase the potential for viscera from harvested bison becoming grizzly bear attractants; and 3) vaccination programs conducted by YNP and MDOL personnel are expected to be most active during this period. Unless vaccinated bison were conspicuously marked, hunters would not be able to avoid harvesting vaccinated bison within the federally mandated withdrawal period for consumption of meat following vaccination.

Descriptions of Alternatives Selected for Analysis

Alternative 1. No action

This alternative would maintain the *status quo*. Bison in "no tolerance" areas (Zone 3 as defined in the IBMP) would continue to be hazed into traps, chased into areas where they were tolerated, or shot by agency personnel when they cause damage or remain in no-tolerance areas. Environmental, social, and economic costs and benefits would be driven by the factors that currently influence them: 1) the number of bison leaving Zones1 (lands inside YNP where bison are tolerated and cattle prohibited throughout the year) and 2 (specifically designated lands near YNP boundaries where cattle are absent, at least in winter and spring, and limited numbers of bison are tolerated in seasons when contact with cattle is unlikely); 2) the movement patterns of bison before and during control operations; and 3) the activities of people opposed to actions mandated by the Interagency Management Plan. Predictions for both positive and negative impacts outlined in the IBMP Final EIS (National Park Service 2000) provide a reasonable estimate of conditions expected under the "no action" alternative.

Maintaining the *status quo* does not imply that no impacts to the cultural, social, biological environment will occur. As outlined in Chapter 2 of this document and the Final EIS on bison management (National Park Service 2000), the upper Yellowstone environment is significantly influenced by bison presence, bison management activities, activities of other native species, and, most of all, by human activities.

Implementation

No additional actions would be required to implement this alternative. Management of bison leaving YNP would be conducted by MDOL, MFWP, and YNP personnel under agreements outlined in the IBMP of 2000. No hunting regulations would be required because public hunting of bison in Montana would not occur.

How does this alternative address major issues?

Impacts on population size/distribution

Public hunting of bison would not occur so public hunting would have no impact on bison numbers or distribution in the Yellowstone area.

Impacts on population genetics

No bison would be killed by licensed hunters in Montana so hunting would have no impact on bison genetics.

Humaneness/ethics

Questions related to the ethics or humaneness of public hunting would not be raised because no opportunity for public hunting would exist.

Legality

Bison management would continue under the laws, regulations, and interagency agreements currently in existence. The public could not legally harvest wild bison in the Yellowstone area.

Impacts of proposed brucellosis vaccination program on edibility of meat

Hunters would not have access to meat from vaccinated bison in the Yellowstone area so impacts of vaccination on edibility of meat from legally harvested bison would be zero.

Logistics of hunting bison

Because public hunting of bison would not be allowed, no consideration of the logistics of a bison hunting season is necessary.

Public safety

Public hunting for bison would pose no additional risk to public safety because hunting would not be allowed.

Risk of transmitting brucellosis to hunters

Hunters could not legally harvest bison so transmission of brucellosis to hunters would not occur.

Property damage

Hunters would not be able to reduce property damage by bison nor would hunters seeking bison damage property because no bison would be hunted.

Impacts of bison hunting on other animal species

With no public hunting of bison, there would be no positive or negative impacts of bison hunting on other species in the Yellowstone ecosystem.

Impacts of a recreational bison hunt on activities mandated under the Interagency Bison Management Plan

With no public bison hunt, no impacts of the hunt on agency management activities would occur.

Problems specifically associated with hunting bison near the boundary of Yellowstone National Park

With no public bison hunt, no impacts of the hunt on Yellowstone National Park or the Yellowstone ecosystem would occur.

Economics and social issues not associated with YNP

If no public hunt is authorized, no additional economic or social benefits or costs that might be associated with a hunt would accrue.

Alternative 2. Bison hunting by permit in a late fall/early winter hunting season (November 15 – February 15), with permit numbers limited to 1-25, and hunting allowed only in areas outside YNP where bison presence is currently tolerated under the Interagency Bison Management Plan (State of Montana and Yellowstone National Park 2000a, 2000b) .

Under the IBMP (State of Montana and Yellowstone National Park 2000a, 2000b), lands in and surrounding YNP were classified in zones based on tolerance levels management agencies would show for bison. "Zone 1" includes land within the boundaries of YNP where bison are tolerated year-round and cattle are prohibited. Lands designated as "Zone 3" are public and private lands where livestock are given priority and bison from YNP will not be tolerated. The "Zone 2" designation is applied to specific non-wilderness public and private lands outside YNP where bison are officially tolerated in one or more seasons in the West Yellowstone Basin and in two areas along the northern boundary north of Gardiner, Montana (Fig. 1). Bison are allowed to remain outside the Park in Zone 2 lands when contact with cattle and property damage are unlikely.

If this alternative were approved, hunting would be permitted in areas where bison are currently tolerated outside YNP including: 1) lands defined as "Zone 2" in the IBMP - except the Zone 2 area west of the Yellowstone River including the Royal Teton Ranch where cattle are still grazed; 2) portions of the Absaroka Beartooth Wilderness north of YNP (including the upper portions of the Hellroaring and Slough Creek drainages); and 3) public land with no cattle allotments in the Cabin Creek Recreation and Wildlife Management Area, the Monument Mountain Unit of the Lee Metcalf Wilderness, and the upper Gallatin River drainage south of the mouth of Taylor Fork. Only sero-negative and vaccinated bison are tolerated in the Zone 2 areas of the West Yellowstone Basin. In other "tolerance" areas, bison are not subject to hazing, capture, or shooting during specified seasonal periods (generally winter and spring) except when they threaten public safety, cause significant property damage, or exceed numbers agreed to by agencies bound by the IBMP (State of Montana and Yellowstone National Park 2000a, 2000

Implementation

Applicants would apply for permits as they do in other limited entry hunts administered by MFWP, and one to 25 applicants would receive permits. The MFWP Commission would set the number of permits each year prior to the season. Permits would be valid for the entire season (November 15 – February 15), valid for both the northern and western hunting areas, and would be valid for any wild bison (*i.e.* no age or sex restrictions) unless vaccination program are active during the hunting season. If bison are being vaccinated without being conspicuously marked, hunters will be restricted to harvest of adult males (adult males are not scheduled to be vaccinated by MDOL or YNP personnel and can be reliably identified by most hunters). When bison are tolerated in higher numbers and in greater areas outside YNP, areas open to hunting and numbers of permits may be expanded.

How does this alternative address major issues?

Impacts on population size/distribution

Under this alternative, a maximum of 25 bison would be harvested in any year. This represents <0.5% of the current population. Agency management actions, which may remove hundreds of bison from the population in a single year, have a much higher potential for impacting population numbers.

Hunters may influence the distribution of specific bison or bison groups leaving YNP. Hazing records from MDOL and YNP indicate that the same bison are encountered by agency personnel in border areas over long periods of time. Hunters would be likely to harvest some of these individuals, especially mature bulls that are resistant to hazing, and scare others back into YNP. In some years, only a few bison (usually adult males) are responsible for most reports of emigration in fall and early winter.

Impacts on population genetics

Under this alternative, a maximum of 25 bison would be harvested in any year. Based on experiences in other states, hunters will select for adult males when possible, but removal of 25 bison of any age or gender would have minimal impacts on the genetic structure of a population currently numbering in excess of 4,000. Chances of hunters selecting all bison from one of the three genetic sub-populations in YNP or disproportionately harvesting animals that carry unique alleles or alleles that may affect brucellosis susceptibility (Dierschke Halbert 2003) are low. Agency management actions, which may remove hundreds of bison from the population in a single year, largely based on serological tests and from traps at two fixed sites, have a much higher potential for impacting population genetics.

Humaneness/ethics

Restriction of weapons to modern rifles and center-fire cartridges with bullets of an appropriate weight and hunter education (covering ethics, shot placement, carcass care, and hygiene during field dressing.) will minimize wounding loss and time between a bullet hit and death. "Fair chase" hunts will be insured by defining large hunting areas (including areas where bison can move to escape hunting pressure), by limiting numbers of hunters in the field, and by prohibiting hunting from vehicles. Although vehicles (including over-the-snow vehicles) may be used to access hunting areas and, where legal, can be used in retrieving carcasses, hunters will be required to pursue bison on foot and will not be allowed to shoot bison from public roads (the same restrictions that apply to other big game species in Montana). In the first years of the hunt, each hunter will have to make a personal decision on the ethics of shooting an animal that may not flee when approached by a human. Based on experiences with bison hunts in the Northwest Territories, Canada, bison that have been hunted for two or more years become much more wary of humans (C. Gates, personal communication).

Legality

This alternative has been reviewed by MFWP legal staff. Montana Statute 81-2-120 defines bison associated with Yellowstone National Park as "wild bison" and statute 87-2-730 authorizes MFWP to design and implement a hunt in consultation with MDOL. MDOL, YNP, and GNF personnel were consulted during the EA process. Input from all other federal and state agencies involved in bison or land management in areas where hunting will be considered. Appropriate agencies will be informed of or, in the case of MDOL (a legislatively mandated partner in bison management in Montana), consulted on changes in hunting regulations. This alternative meets the criteria for an EA as defined in MFWP Administrative Rule 12.2.431 (as demonstrated in Chapter 4 of this document).

Impacts of proposed brucellosis vaccination program on edibility of meat

If MDOL initiates a brucellosis vaccination program in the West Yellowstone area, bison will most likely be vaccinated only in spring, after the proposed bison season is closed. If bison are vaccinated while the hunting season is open, hunting may be limited to adult bulls (an age/gender class not scheduled for vaccination and identifiable by the average hunter). This restriction should minimize the possibility of hunters taking bison during the withdrawal period in the western hunting area.

Exposure of hunters to bison vaccinated by YNP personnel near the northern boundary of YNP will be low if field vaccinations are limited to spring. YNP personnel will work only in the Park, and spring vaccinations should target bison that are likely to remain in the Park as they move towards summer range. If YNP personnel vaccinate animals in fall or winter, hunter exposure could be higher if recently vaccinated animals move out of YNP. If fall and winter vaccinations occur and YNP personnel elect not to use easily visible markings to identify vaccinated animals, hunters would be restricted to harvesting adult males (which will not be vaccinated and can be identified by the average hunter) in

the northern hunting area. Permit holders can be individually informed of age/gender restrictions associated with vaccination.

Logistics of hunting bison

Hunting permits will be issued to randomly selected applicants as in other limited entry hunts administered by MFWP. Numbers of permits available, conditions under which bison may be taken, safety precautions advised for dressing carcasses, and areas open to hunting will be advertised in printed hunting regulations. Numbers of licenses issued to non-residents will be determined by the MFWP Commission in consultation with MDOL If point preferences are given to unsuccessful applicants, they will be awarded in a manner similar to that used in limited entry hunts for bighorn sheep, moose, and mountain goats. Initial costs for permits will be $75 for residents and $750 for non-residents. Application fees will be determined when final rules are set. Numbers of permits within the authorized range of 1-25 will be determined by the MFWP Commission (in consultation with MDOL) prior to the beginning of the hunting season. Permits will be valid from November 15 through February 15 in areas outside YNP where bison are tolerated under the IBMP of 2002. These areas currently include Zone 2 lands in the West Yellowstone Basin and the Eagle and Bear Creek drainages east of Gardiner, Montana, The South Unit and the Monument Mountain Unit of the Lee Metcalf Wilderness (Madison and Gallatin drainages), The Cabin Creek Recreation and Wildlife Management Area, non-wilderness lands in the Gallatin River drainage south of Taylor Fork, and the Absaroka Beartooth Wilderness Area. Additional areas may be added as adaptive management described in the Interagency Bison Management Plan is implemented.

Public safety

Hunters will be required to adhere to shooting regulations and safety precautions required in all other big game hunts with modern firearms in Montana (no shooting in areas where people or livestock may be endangered, daylight hunting only, hunter orange required, *etc.* – specific requirements are given in published hunting regulations). No bison hunting will be allowed within 100 yards of major highways in areas open to bison hunting to protect public safety and minimize traffic obstructions. This would initially include segments of Highways 20, 191, and 287 on the western boundary of Yellowstone National Park (YNP) and Highway 89 near the northern boundary of YNP. Hunting on National Forest lands will follow restrictions in USFS order 36 CFR 261.10 (d) (firearm discharges are prohibited within 150 yards of a residence, building, campsite, developed recreation site, or occupied area or across a forest service road or body of water).

Risk of transmitting brucellosis to hunters

Precautions that hunters should take when handling carcasses potentially infected with *Brucella* bacteria will be included with hunting regulations for bison and in educational material provided to permit recipients.

Property damage

With no more than 25 hunters per year, bison hunting should not create a measurable risk of property damage. The Gallatin National Forest has over 3 million recreation days per year, including ~200,000 hunter-days in which hunters seek species other than bison (National Park Service 2000). Bison hunters would add no more than a few 100 (more likely <100) recreation days.

Impacts of bison hunting on other animal species

Hunters are unlikely to confuse bison with other species so kills of non-target wildlife should be very low. Disturbances of common, rare, or threatened animal or plant species by bison hunters will be small compared to potential disturbances by the thousands of hunters, anglers, hikers, skiers, and snowmobilers that currently use areas proposed for bison hunting. Entrails from bison killed by hunters will provide a small increase in food for carnivores and scavengers but may also expose carnivores and scavengers to brucellosis. Infections, if they occur, will likely be limited to a few animals that actually feed on *Brucella*-infected tissue, and non-ungulates that contract brucellosis are unlikely to spread the disease (Dobson and Meagher 1996). The potential for producing grizzly bear attractants is minimal because of the timing of the season (most bears have hibernated by mid November and will not become active until March or later). Areas near bald eagle nests will be closed to bison hunters as they are to other human activities when eagles are present.

Impacts of a recreational bison hunt on activities mandated under the Interagency Bison Management Plan

Hazing, trapping, and other activities mandated in the IBMP (State of Montana and Yellowstone National Park 2000a, 2000b) for MDOL, MFWP, and YNP personnel will continue. Hunters will not be used to directly replace management actions by agencies; agency personnel will not have access to a list of bison hunters that can be called to provide lethal management action; and hunters will have to defer to agency personnel if agency activities interfere with their attempts to approach bison. The risk of exposure of cattle to tissue infected with *Brucella* in viscera from harvested bison will be virtually zero because the bison season will end more than three months before cattle are allowed into areas open to bison hunting.

Problems specifically associated with hunting bison near the boundary of Yellowstone National Park

YNP holds a special place in the hearts of Americans. Any activity in YNP is likely to provoke more national attention than the same activity would provoke on most other public or private lands. Bison management is no exception. Organizations and individuals opposed to bison management and/or bison control have protested hazing, capture, and shooting of bison by agency personnel since YNP, MDOL, and MFWP reached interagency management agreements that authorized invasive bison management

techniques. Organizations opposed to hunting were able to use film and videos from public hunts conducted in Montana during the 1980s as effective fund raising tools and can be expected to try to raise money in the same way from hunts held today. If any public hunt is approved, opponents of hunting have threatened boycotts of YNP and businesses in gateway communities that depend on tourism in Yellowstone. Threats have not produced significant boycotts in the past.

Hunters participating in a bison hunt can expect to attract the attention of protestors. Limited numbers of permitees, a long season, large expanses of land open to hunting, and low levels of direct agency involvement with hunters should minimize confrontations between hunters and hunting opponents. Material sent to hunters will include information on how to avoid confrontations and how to handle confrontations if they occur. Agency enforcement personnel (MDOL, county sheriff's departments, MFWP, USFS, and YNP) should be briefed on hunter harassment laws and should adopt a policy of frequent, highly visible patrols in areas open to bison hunting.

Economics and social issues not directly associated with YNP

Bison hunting will generate income for MFWP from license fees and will generate costs associated with administering the hunt and with enforcing game regulations. With 25 hunters active for a few days each over a three-month season and potentially spread over tens of thousands of acres, income and expenses for MFWP should be low. Bison hunters may cause economic damage (stampeding bison through fences, careless shooting, *etc.*) or reduce damage (eliminate marauding bulls, force bison off private property, *etc.*) from bison to private property, but with 25 or fewer hunters, positive and negative impacts should be low. Costs of enforcement of trespass and anti-hunter harassment laws by state and federal agencies is probably the largest potential economic cost associated with a public bison hunt. Limited numbers of hunters and temporal and spatial spread of hunting should reduce opportunities for confrontations that would require enforcement action beyond that already incurred due to protests of agency management actions and should reduce the potential for organizing boycotts of Montana businesses.

Alternative 3. (Preferred Alternative) Bison hunting by permit in a late fall/early winter hunting season (November 15 – February 15), with permit numbers limited to 1-25, and hunting allowed in all areas outside YNP, including Zone 2, Zone 3, and areas not given a zone designation where bison presence is currently tolerated, as defined in the Interagency Bison Management Plan (State of Montana and Yellowstone National Park 2000a, 2000b).

Impacts of this alternative would be very similar to Alternative 2, especially under present management rules where bison are not allowed to remain in Zone 3 lands for long periods. This alternative would allow hunters to harvest bison they happen to see in Zone 3 areas that are open to hunting (public lands and private lands in which owners permit hunting and in situations that do not endanger public safety or private property) as well as on lands outside YNP in which bison are tolerated in specific seasons. Hunting would not

be used to replace efforts by agency personnel to remove bison from Zone 3. On rare occasions, agency personnel hazing bison in Zone 3 could interfere with hunters stalking bison, but given the low number of hunting permits, this problem would likely be small.

Implementation

In this alternative, bison hunters would be able to hunt bison in areas where bison presence is not tolerated under the 2000 IBMP as well as in areas where they are tolerated outside YNP. As with Alternative 2, applicants would apply for permits as they do in other limited entry hunts administered by MFWP, and one to 25 applications would receive permits. The MFWP Commission would set the number of permits each year prior to the season. Permits would be valid for the entire season (November 15 – February 15), valid for both the northern and western hunting areas, and would be valid for any wild bison (i.e. no age or sex restrictions) unless vaccination program are active during the hunting season. If bison are being vaccinated without being conspicuously marked, hunters will be restricted to harvest of adult males (adult males are not scheduled to be vaccinated by MDOL or YNP personnel and can be reliably identified by most hunters). When bison are tolerated in higher numbers and in greater areas outside YNP, areas open to hunting and numbers of permits may be expanded.

How does this alternative address major issues?

Impacts on population size/distribution

As with Alternative 2, a maximum of 25 bison would be harvested in any year under Alternative 3. Harvesting <0.5% of a population each year will have minimal impacts on population size. The influence of hunting on population distribution would also be similar to that described for Alternative 2 (removing some bison that persistently leave YNP and possibly discouraging some bison from using habitat open to hunting), but under Alternative 3, hunters would be able to kill bison in more areas than in Alternative 2.

Impacts on population genetics

As with Alternative 2, a maximum of 25 bison would be harvested in any year. Based on experiences in other states, hunters will select for adult males when possible, but removal of 25 bison of any age or gender would have minimal impacts on the genetic structure of a population currently numbering in excess of 4,000. Chances of hunters selecting all bison from one of the three genetic sub-populations in YNP or disproportionately harvesting animals that carry unique alleles or alleles that may affect brucellosis susceptibility (Dierschke Halbert 2003) are low. Agency management actions, which may remove hundreds of bison from the population in a single year, largely based on serological tests and from traps at two fixed sites, have a much higher potential for impacting population genetics.

Humaneness/ethics

The restrictions on hunters and the potential for "fair chase" hunting would be similar to those described for Alternative 2. Alternative 3 would open more land to hunting and; therefore, could reduce hunter density compared to Alternative 2. At present, however, bison distribution would likely be limited to about the same area as under Alternative 2 so differences in opportunity for "fair chase" hunts would be similar for both alternatives.

Legality

This alternative has been reviewed by MFWP legal staff. Montana Statute 81-2-120 defines bison associated with Yellowstone National Park as "wild bison" and statute 87-2-730 authorizes MFWP to design and implement a hunt in consultation with MDOL. MDOL, YNP, and GNF personnel were consulted during the EA process. Input from all other federal and state agencies involved in bison or land management in areas where hunting will be considered. Appropriate agencies will be informed of or, in the case of MDOL (a legislatively mandated partner in bison management in Montana), consulted on changes in hunting regulations. This alternative meets the criteria for an EA as defined in MFWP Administrative Rule 12.2.431 (as demonstrated in Chapter 4 of this document).

Impacts of proposed brucellosis vaccination program on edibility of meat

As with Alternative 2, problems with edibility of meat due to vaccination programs conducted by MDOL and YNP are unlikely. If MDOL initiates a brucellosis vaccination program in the West Yellowstone area, bison will most likely be vaccinated only in spring, after the proposed bison season is closed. If bison are vaccinated while the hunting season is open, hunting may be limited to adult bulls (an age/gender class not scheduled for vaccination and identifiable by the average hunter). This restriction should minimize the possibility of hunters taking bison during the withdrawal period in the western hunting area. Permit holders can be individually informed of age/gender restrictions associated with vaccination.

Exposure of hunters to bison vaccinated by YNP personnel near the northern boundary of YNP will be low if field vaccinations are limited to spring. YNP personnel will work only in the Park, and spring vaccinations should target bison that are likely to remain in the Park as they move towards summer range. If YNP personnel vaccinate animals in fall or winter, hunter exposure could be higher if recently vaccinated animals move out of YNP. If fall and winter vaccinations occur and YNP personnel elect not to use easily visible markings to identify vaccinated animals, hunters would be restricted to harvesting adult males (which will not be vaccinated and can be identified by the average hunter) in the northern hunting area.

Logistics of hunting bison

As with Alternative 2, hunting permits will be issued to randomly selected applicants as in other limited entry hunts administered by MFWP. Numbers of permits available,

conditions under which bison may be taken, safety precautions advised for dressing carcasses, and areas open to hunting will be advertised in printed hunting regulations. Numbers of licenses issued to non-residents will be determined by the MFWP Commission in consultation with MDOL. If point preferences are given to unsuccessful applicants, they will be awarded in a manner similar to that used in limited entry hunts for bighorn sheep, moose, and mountain goats. Initial costs for permits will be $75 for residents and $750 for non-residents. Application fees will be determined when final rules are set. Numbers of permits within the authorized range of 1-25 will be determined by the MFWP Commission (in consultation with MDOL) prior to the beginning of the hunting season. Permits will be valid from November 15 through February 15.

In contrast to Alternative 2, permits issued under Alternative 3 would be valid not only in areas outside YNP where bison are tolerated under the IBMP of 2002 but also in adjacent areas, where they are not tolerated but may be present until management agencies can remove or move them. Because bison are not tolerated in most areas outside YNP, acres available to hunting would be increased by an order of magnitude. Given the current limited distribution of bison during November – February, however, the difference between acreage in which hunters would be active in Alternative 2 versus 3 would be small. The main advantages of Alternative 3 over Alternative 2 would be: 1) hunters would be allowed to opportunistically harvest bison that have not been hazed from Zone 3 to Zone 2 lands; and 2) it would reduce the need for MFWP enforcement personnel to enforce hunting boundaries that are unnecessarily inflexible.

Public safety

As with Alternative 2, hunters will be required to adhere to shooting regulations and safety precautions required in all other big game hunts with modern firearms in Montana (no shooting in areas where people or livestock may be endangered, daylight hunting only, hunter orange required, *etc.* – specific requirements are given in published hunting regulations). No bison hunting will be allowed within 100 yards of major highways in areas open to bison hunting to protect public safety and minimize traffic obstructions. This would initially include segments of Highways 20, 191, and 287 on the western boundary of Yellowstone National Park (YNP) and Highway 89 near the northern boundary of YNP. Hunting on National Forest lands will follow restrictions in USFS order 36 CFR 261.10 (d) (firearm discharges are prohibited within 150 yards of a residence, building, campsite, developed recreation site, or occupied area or across a forest service road or body of water).

Risk of transmitting brucellosis to hunters

As with Alternative 2, precautions that hunters should take when handling carcasses potentially infected with *Brucella* bacteria will be included with hunting regulations for bison.

Property damage

Because Alternative 3 allows the same range of permit numbers as Alternative 2, property damage from hunters and/or bison being hunted would be very low.

Impacts of bison hunting on other animal species

Alternative 3 would have similar impacts on other species as Alternative 2. Hunters are unlikely to confuse bison with other species so kills of non-target wildlife should be zero. Disturbances of common, rare, or threatened animal or plant species by bison hunters will be small compared to potential disturbances by the thousands of hunters, anglers, hikers, skiers, and snowmobilers that currently use areas proposed for bison hunting. Entrails from bison killed by hunters will provide a small increase in food for carnivores and scavengers. Viscera may also expose carnivores and scavengers to brucellosis, but any infections will likely be limited to a few animals that actually feed on *Brucella*-infected tissue, and non-ungulates that contract brucellosis are unlikely to spread the disease (Dobson and Meagher 1996). The potential for producing grizzly bear attractants is minimal because of the timing of the season (most bears have hibernated by mid November and will not become active until March or later). Areas near bald eagle nests will be closed to bison hunters as they are to other human activities when eagles are present.

Impacts of a recreational bison hunt on activities mandated under the Interagency Bison Management Plan

As with Alternative 2, hazing, trapping, and other activities mandated in the IBMP of 2000 for MDOL, MFWP, and YNP personnel will continue. Hunters will not be used to directly replace actions by agencies; agency personnel will not have access to a list of bison hunters that can be called to provide lethal management action; and hunters will have to defer to agency personnel if agency activities interfere with their attempts to approach bison. The risk of exposure of cattle to tissue infected with *Brucella* in viscera from harvested bison will be virtually zero because the bison season will end more than three months before cattle are allowed into areas open to bison hunting.

Problems specifically associated with hunting bison near the boundary of Yellowstone National Park

Problems would be very similar to those noted for Alternative 2. Organizations opposed to hunting will attempt to film bison kills to raise funds and have threatened boycotts of YNP and businesses in gateway communities that depend on tourism in Yellowstone.

Hunters participating in a bison hunt can expect to attract the attention of people opposed to bison harvest. Limited numbers of permit holders, a long season, the extensive acreage open to hunting, and low levels of direct agency involvement with hunters should minimize confrontations between hunters and hunting opponents. Material sent to hunters will include information on how to avoid confrontations and how to handle

confrontations if they occur. Agency enforcement personnel (MDOL, county sheriff's departments, MFWP, USFS, and YNP) should be briefed on enforcement of hunter harassment laws and should adopt a policy of frequent, highly visible patrols in areas open to bison hunting.

Economics and social issues not directly associated with YNP

Economic and social impacts expected for Alternative 2 would be similar (if not identical) for Alternative 3. Bison hunting will generate income from license fees and services acquired in towns near hunting areas. Costs incurred from a bison hunt would include the expense of administering the hunt and enforcing game regulations, trespass laws, and anti-hunter harassment laws. With 25 hunters active for a few days each over a three-month season and potentially spread over tens of thousands of acres, costs should be low.

Alternative 4. Late fall – early winter season (November 15 – February 15) for a limited entry hunt with permits valid for 10-day intervals, with permits limited to 1-25 per hunting period (225 maximum over 9 hunting periods) and hunting allowed in all areas outside YNP, including Zone 2, Zone 3, and areas not given a zone designation where bison presence is currently tolerated, as defined in the Interagency Bison Management Plan (State of Montana and Yellowstone National Park 2000a, 2000b)

Permits would be valid in areas outside YNP where bison are allowed to remain without triggering management agency action and opportunistically in areas designated as Zone 3 (no bison tolerance). Permits would be limited to one to 25 per 10-day period between November 15 and February 15 (i.e. 9 to 225 permits per year). This alternative would provide more opportunity for hunters to receive permits but would likely reduce hunter success because bison are not usually available outside YNP during all days between mid- November and mid-February. No more than 25 hunters would be in areas open to hunting on any given day so positive and negative impacts would be low.

Implementation

In this alternative, bison hunters would be able to hunt bison in areas where bison presence is not tolerated under the 2000 IBMP as well as in areas where they are tolerated outside YNP. As with Alternatives 2 and 3, applicants would apply for permits via procedures established for other limited entry hunts administered by MFWP, and one to 25 applications would be drawn by lottery to receive permits valid in each of nine 10-day periods between November 15 and February 15. The MFWP Commission would set the number of permits each year prior to the season. Permits would be valid for both the northern and western hunting areas and would be valid for any wild bison (*i.e.* no age or sex restrictions) unless vaccination program are active during the hunting season. If bison

are being vaccinated without being conspicuously marked, hunters will be restricted to harvest of adult males (adult males are not scheduled to be vaccinated by MDOL or YNP personnel and can be reliably identified by most hunters). When bison are tolerated in higher numbers and in greater areas outside YNP, areas open to hunting and numbers of permits may be expanded.

How does this alternative address major issues?

Impacts on population size/distribution

In this alternative, a maximum of 225 bison would be harvested in any year. Given the relatively low number of bison that leave in November through January in most winters, it is highly unlikely that actual harvest would ever exceed 100 per year. Hunter impacts would not equal the impacts of capture operations mandated under the IBMP (State of Montana and Yellowstone National Park 2000a, 2000b) in most years, and hunter harvest would replace some agency-mandated removals (*i.e.* instead of being captured and transported to a slaughter house, bison occupying "non-tolerance" areas would be harvested and removed from the system by hunters). By reducing permit numbers when bison population size falls below the desired range of 2,500 – 3,500 identified in the IBMP, risks of substantial impacts on bison numbers or genetic variability can be avoided.

Impacts of hunters on bison distribution would probably be higher under this alternative than under Alternatives 2 and 3. Most hunters can afford to spend a few days hunting but few have the luxury of spending 90 days searching for a bison. With shorter hunting periods allowing more hunters to spend a few days hunting, bison leaving YNP would be more likely to encounter a hunter, and bison would then be more likely to learn to shift their distribution to avoid hunters under this alternative than under Alternatives 2 and 3.

Impacts on population genetics

Under Alternative 4, a maximum of 225 bison would be harvested in any year. Given the relatively low number of bison that leave in November through January in most winters, it is highly unlikely that actual harvest would ever exceed 100 per year. Even if 225 bison were harvested, the risk to genetic diversity of the Yellowstone population as a whole is low (225 represents ~ 0.4% of the population which, including the 2004 calf crop, probably exceeds 5,000). Probable hunter selection for adult bulls and differential probability of emigration among sub-populations does increase the possibility of concentrating harvest within one or more genotypes, but most harvest will occur from the two largest sub-populations, the Northern and Central herds, because animals from these herds are more likely to leave YNP in winter than animals from the smallest genetic sub-population, the Pelican Valley herd (n ~ 150-200) (National Park Service 2000).

The risk hunters pose to genetic integrity of the Yellowstone population is lower than potential risks associated with capture operations mandated under the IBMP (State of

Montana and Yellowstone National Park 2000a, 2000b). Agency personnel select bison for removal based on which animals enter no tolerance areas and/or which animals are willing to enter traps. This could result in removal of entire matriarchal groups from the population. Hunters will likely harvest only a few bison from individual groups. Not only will hunter harvest likely replace some agency-mandated removals, risk to the genetic structure of the Yellowstone bison herd can be further reduced by varying hunter permit numbers as bison population size changes (i.e. more permits issued when population size exceeds 3,000 and fewer when the population is lower).

Humaneness/ethics

The restrictions on hunter distribution and the potential for "fair chase" hunting would be similar to those described for Alternative 3. Although Alternative 4 would allow more hunters to participate, maximum hunter density on any day during the season would be no different than densities under Alternatives 2 and 3.

Legality

This alternative has been reviewed by MFWP legal staff. Montana Statute 81-2-120 defines bison associated with Yellowstone National Park as "wild bison" and statute 87-2-730 authorizes MFWP to design and implement a hunt in consultation with MDOL. MDOL, YNP, and GNF personnel were consulted during the EA process. Input from all other federal and state agencies involved in bison or land management in areas where hunting will be considered. Appropriate agencies will be informed of or, in the case of MDOL (a legislatively mandated partner in bison management in Montana), consulted on changes in hunting regulations. This alternative meets the criteria for an EA as defined in MFWP Administrative Rule 12.2.431 (as demonstrated in Chapter 4 of this document).

Impacts of proposed brucellosis vaccination program on edibility of meat

As with Alternatives 2 and 3, problems with edibility of meat due to vaccination programs conducted by MDOL and YNP are unlikely. If MDOL initiates a brucellosis vaccination program in the West Yellowstone area, bison will most likely be vaccinated only in spring, after the proposed bison season is closed. If bison are vaccinated while the hunting season is open, hunting may be limited to adult bulls (an age/gender class not scheduled for vaccination and identifiable by the average hunter). Because addresses of permit holders for each hunting period will be available to MFWP, hunters subject to restrictions on age or gender of animals harvested can be notified prior to the beginning of the period in which their permit is valid. This procedure should minimize the possibility of hunters taking bison during the withdrawal period in the western hunting area.

Exposure of hunters to bison vaccinated by YNP personnel near the northern boundary of YNP will be low if field vaccinations are limited to spring. YNP personnel will work only in the Park, and spring vaccinations should target bison that are likely to remain in the Park as they move towards summer range. If YNP personnel vaccinate animals in fall

or winter, hunter exposure could be higher if recently vaccinated animals move out of YNP. If fall and winter vaccinations occur and YNP personnel elect not to use easily visible markings to identify vaccinated animals, hunters would be restricted to harvesting adult males (which will not be vaccinated and can be identified by the average hunter) in the northern hunting area.

Logistics of hunting bison

As with Alternatives 2 and 3, hunting permits will be issued to randomly selected applicants as in other limited entry hunts administered by MFWP. Numbers of permits available, conditions under which bison may be taken, safety precautions advised for dressing carcasses, and areas open to hunting will be advertised in printed hunting regulations. Numbers of licenses issued to non-residents will be determined by the MFWP Commission in consultation with MDOL If point preferences are given to unsuccessful applicants, they will be awarded in a manner similar to that used in limited entry hunts for bighorn sheep, moose, and mountain goats. Initial costs for permits will be $75 for residents and $750 for non-residents. Application fees will be determined when final rules are set. Numbers of permits within the authorized range of 1-25 per hunting period will be determined by the MFWP Commission (in consultation with MDOL) prior to the beginning of the hunting season. Permits will be valid for specific 10-day periods within the November 15 through February 15 hunting season in areas outside YNP where bison are tolerated under the IBMP of 2002 and in adjacent areas. The main advantage of Alternative 4 would be to increase the number of applicants who would receive permits. Hunter success is likely to be reduced under this alternative (compared to Alternatives 2 and 3) because bison may not be present in areas open to hunting in all 10-day permit periods.

Public safety

As with Alternatives 2 and 3, hunters will be required to adhere to shooting regulations and safety precautions mandated in all other big game hunts with modern firearms in Montana (no shooting in areas where people or livestock may be endangered, daylight hunting only, hunter orange required, etc. – specific requirements are given in published hunting regulations). No bison hunting will be allowed within 100 yards of major highways in areas open to bison hunting to protect public safety and minimize traffic obstructions. This would initially include segments of Highways 20, 191, and 287 on the western boundary of YNP and Highway 89 near the northern boundary of YNP. Hunting on National Forest lands will follow restrictions in USFS order 36 CFR 261.10 (d) (firearm discharges are prohibited within 150 yards of a residence, building, campsite, developed recreation site, or occupied area or across a forest service road or body of water).

This alternative could increase risk to public safety, compared to Alternatives 2 and 3, because more hunters could participate. However, with hunter density capped (maximum of 25/day) any increased risk is likely to be low.

Risk of transmitting brucellosis to hunters

As with Alternatives 2 and 3, precautions that hunters should take when handling carcasses potentially infected with *Brucella* bacteria will be included with hunting regulations for bison.

Property damage

The potential for property damage from hunters and/or bison being hunted would be higher than that expected under Alternatives 2 or 3 because more hunters would be in the areas open to hunting over the course of a hunting season, but the maximum hunting pressure under this alternative is the same as under Alternatives 2 and 3 (2,250 hunter-days), and at the maximum hunter-days, bison hunters would contribute <1% of the total hunting pressure (estimated at >200,000 hunter days per year on the Gallatin National Forest) and <0.1% of the recreation days on the Gallatin National Forest.

Impacts of bison hunting on other animal species

Alternative 4 would have slightly more potential for impacting other species than Alternatives 2 and 3 because more hunter days would be expected, but compared to other recreational, residential, and commercial activities occurring on private and public lands in areas open to bison hunting, bison hunters represent a small amount of disturbance. Hunters are unlikely to confuse bison with other species so kills of non-target wildlife should be very low. Entrails from bison killed by hunters will provide a small increase in food for carnivores and scavengers. Viscera may also expose carnivores and scavengers to brucellosis, but any infections will likely be limited to a few animals that actually feed on *Brucella*-infected tissue, and non-ungulates that contract brucellosis are unlikely to spread the disease (Dobson and Meagher 1996). The potential for producing grizzly bear attractants is minimal because of the timing of the season (most bears have hibernated by mid November and will not become active until March or later). Areas near bald eagle nests will be closed to bison hunters as they are to other human activities when eagles are present.

Impacts of a recreational bison hunt on activities mandated under the Interagency Bison Management Plan

As with Alternatives 2 and 3, hazing, trapping, and other activities mandated in the IBMP of 2000 for MDOL, MFWP, and YNP personnel will continue. Hunters will not be used to directly replace actions by agencies; agency personnel will not have access to a list of bison hunters that can be called to provide lethal management action; and hunters will have to defer to agency personnel if agency activities interfere with their attempts to approach bison. The risk of exposure of cattle to tissue infected with *Brucella* in viscera from harvested bison will be virtually zero because the bison season will end more than three months before cattle are allowed into areas open to bison hunting.

Problems specifically associated with hunting bison near the boundary of Yellowstone National Park

Problems would be very similar to those noted for Alternatives 2 and 3. Organizations opposed to hunting will attempt to film bison kills to raise funds and have threatened boycotts of YNP and businesses in gateway communities that depend on tourism in Yellowstone. More hunters and shorter hunting periods with defined beginning dates would make it easier for protesters to target bison hunters.

Hunters participating in a bison hunt can expect to attract the attention of people opposed to bison harvest, and Alternative 4 could expose more hunters to encounters with hunting opponents. The limited number of permit available for each 10-day period, large expanses of land open to hunting, and low levels of direct agency involvement with hunters should reduce the possibility of confrontations between hunters and hunting opponents, but the scale of confrontation is almost certain to be higher than that under Alternatives 2 and 3. Material sent to hunters will include information on how to avoid confrontations and how to handle confrontations if they occur. Agency enforcement personnel (MDOL, county sheriff's departments, MFWP, USFS, and YNP) should be briefed on hunter harassment laws and should adopt a policy of frequent, highly visible patrols in areas open to bison hunting.

Economics and social issues not directly associated with YNP

Economic and social impacts expected for Alternative 4 could be much greater than for Alternatives 2 and 3 because up to nine times more hunters could receive permits. Bison hunting will generate income from license fees and services acquired in towns near hunting areas. Costs incurred from a bison hunt would include the expense of administering the hunt and enforcing game regulations, trespass laws, and hunter harassment laws. Even though no more than 25 hunters active would be active in each 10-day hunting period, individuals and organizations seeking to interfere with hunters would have much greater success targeting hunters under this alternative than under Alternatives 2 and 3; therefore, cost of law enforcement are likely to be much higher than under Alternatives 2 and 3.

CHAPTER 4: CONSEQUENCES OF ALTERNATIVES INCLUDING THE PREFERRED ALTERNATIVE

Introduction

Four alternatives have been analyzed in this Environmental Assessment. The alternatives range from no hunting (Alternative 1 – no action) to a modest hunting season that would allow a maximum of 225 hunters to pursue bison in Montana (Alternative 4: limited permits with permits valid for 10-day hunting periods with minimum restrictions on areas open to hunting). The preferred alternative (Alternative 3: one to 25 permits valid for a 90-day hunting period with minimum restrictions on areas open to hunting) does not provide for large numbers of hunters, but it does offer the best opportunity for permit holders to hunt bison with little interference from other hunters, gives hunters the greatest chance of successfully harvesting a bison, and minimizes impacts of hunters on bison population size, distribution, and genetic makeup. None of the three "action" alternatives will result in major changes in human impacts from the current situation in the Gardiner and West Yellowstone Basins, none will generate large benefits or costs, and none will replace bison management activities authorized under the IBMP (State of Montana and Yellowstone National Park 2000a, 2000b).

Methods

The impacts of each alternative are examined in relationship to ongoing activities mandated by the IBMP with cost/benefit valuation comparable to that used in the final impact statement for the management plan (National Park Service 2000). Changes in the *status quo* that adoption of Alternatives 2 – 4 would entail are so small relative to the magnitude of recreational, residential, commercial, and agricultural activities ongoing in areas potentially open to bison hunting that quantitative analysis methods conventionally used to measure impacts would be unlikely to detect any differences between Alternative 1 (no action) and Alternatives 2-4 (hunting alternatives) or among Alternatives 2-4. Therefore, most assessment of consequences will be limited to descriptive analysis.

Alternative 1: No Action

Biological and Physical Environment

If bison hunting is not approved, bison hunters will not create any impacts on the biological and physical environment, but this does not mean that environmental impacts to the Yellowstone ecosystem are not incurred if the "no action" alternative is selected. Bison management activities by agency personnel will continue with or without bison hunting. Attempts to enforce the restrictions on bison distribution outlined in the interagency agreement involve hazing using horses, ATVs, snowmachines, and

helicopters. Some trampling of vegetation by bison and disturbance of other species by herders or bison is an inevitable consequence of these activities. Efforts of opponents of bison management to disrupt agency actions create additional disturbance to wildlife outside YNP.

The amount of disturbance associated with bison management, however, is minor compared to disturbance by other recreationists. Thousands of archers and rifle hunters are active along the western boundary from September through November and from September through mid February along the northern boundary. Over 100,000 snowmachine days and about 20,000 cross country ski days are recorded each winter in the GNF near West Yellowstone (Greater Yellowstone Winter Visitor Use Management Working Group 1999). Thousands of spring recreationists (anglers, antler seekers, mushroom hunters, photographers, hikers, etc.) move freely over public land adjacent to YNP during March through June. These activities take place every year without provoking public concern for the safety of indigenous animals or plants, and they have not driven any native species into threatened or endangered status or seriously impacted soils or water courses. Grizzly bears, and wolves, charismatic species, which receive protection because of perceived susceptibility to human actions, have increased numbers and range within the Yellowstone ecosystem since the beginning of active bison management under interagency agreements in 1996. Bald eagle productivity and numbers have remained stable.

Cultural/Social Environment

If the "no action" alternative (Alternative 1) is selected, bison hunting will have no impacts on the cultural or social status in the Yellowstone ecosystem, but bison management will impact the social and cultural life of people in the Montana-YNP boundary area with or without hunting. Agency personnel will continue to attempt to prevent contact between bison and cattle. Individuals opposed to control of bison will continue to protest. Bison management activities and protest of management will take place concurrently with recreational activities (tourism directed towards YNP, fishing, hunting, snowmobiling, skiing, hiking, *etc.*) and the normal commercial and residential activities of people living near YNP boundaries. People living and recreating in the YNP boundary areas of Montana are accustomed to this mix of activities. The "no action" alternative has not provoked severe social dislocation nor has it resulted in threatened boycotts by tourists. The uncertainty in snowmachine use in YNP and the introduction of wolves have caused far more controversy locally than bison management.

Economic Impacts

Under Alternative 1 (no action), bison hunting would produce neither positive nor negative economic impacts. Bison management, however, would continue to generate both costs and benefits. Ongoing costs of managing bison (including capture, shipping, hazing, slaughter, and vaccination costs but excluding building and maintaining quarantine facilities) are expected to exceed $1 million per year indefinitely (National Park Service 2000), with or without hunting. This expenditure is projected to save $4.7 to

$22.5 million (based on the value of the dollar in 2000) per year for cattle producers in Montana by maintaining brucellosis-free status for Montana (State of Montana and Yellowstone National Park 2000a). These costs and benefits, however, are small compared to the estimated $12.7 billion economy (estimate for 2000) of 17 counties in Montana, Idaho, and Wyoming included in the Greater Yellowstone Area (National Park Service 2000)

Legal and Economic Impacts for MFWP

Alternative 1 (no action) would require no change in current legal and economic commitments by MFWP. State law (see statutes 81-2-120 and 87-2-730) requires joint management of "wild bison" by MFWP and MDOL. The IBMP (State of Montana and Yellowstone National Park 2000a, 2000b) spells out the responsibilities of MFWP, MDOL, and YNP in management of bison from the Yellowstone herd. MFWP provides assistance to MDOL under this plan, but MDOL is the lead state agency in Yellowstone bison management outside YNP. YNP personnel are responsible for management activities inside YNP.

MFWP would incur no costs and receive no revenue from bison hunting under Alternative 1. Costs incurred for bison management without hunting include personnel and vehicles involved in controlling bison (hazing, capture, shooting) and dealing with bison management protesters. Currently, MFWP allocates 0.8 Fulltime Equivalent (FTE) in personnel to bison management near West Yellowstone and expends ~$40,000, provided by MDOL through USDA, to support management operations.

Overall impacts (short, medium, long term, and cumulative effects)

Hunting would not be authorized under Alternative 1; therefore, no short, medium, or long-term impacts could be attributed to hunting. This does not mean that selection of Alternative 1 would not have consequences for the Yellowstone ecosystem. The primary positive short-term (<10 years) impact expected under Alternative 1 (no action) is minimization of risk of infecting cattle herds in southwest Montana with brucellosis. In achieving this goal, state and federal agencies have committed themselves to: 1) spend > $1 million per year in public funds to maintain separation between bison and cattle; 2) to test the feasibility of tolerating bison outside YNP (at least in limited numbers and time periods); and 3) to carry out research to determine if brucellosis can be eliminated from bison in the Yellowstone herd. This policy also has stimulated an ongoing protest movement and has resulted in removal of several hundred bison from the YNP herd in some winters.

Medium-term impacts (10-50 years) will likely involve increased expenditure of public funds on bison management due to increases in bison numbers and/or distribution and inflation. Brucellosis incidence may or may not decrease, depending on the efficacy of the RB51 vaccine and vaccine delivery techniques. Agencies may gain sufficient experience with managing bison to allow wild animals to exist outside the Park throughout the year, but agency action will be necessary to maintain appropriate numbers

and distribution of bison. Chemical contraception to limit population growth is feasible but is unlikely to be economically or logistically realistic. Limiting bison productivity through contraception or removal of bison from the YNP herd via capture and shooting has the potential to decrease frequency of genes that infer natural resistance to brucellosis and to change the frequency of unique genotypes within the YNP population.

Long-term and cumulative impacts will be similar to medium-term impacts. As long as agencies are required to actively manage bison numbers and/or distribution (whether inside or outside YNP), public funds will be necessary for management. Bison may or may not be tolerated on more public land outside YNP, but there will be limits to the area in which they are tolerated – Yellowstone bison will not be allowed to repopulate the Great Plains through natural expansion. Brucellosis may or may not be eliminated, and the relative proportions of different bison genotypes may or may not change. It is doubtful if recreational hunters will demand additional habitat for bison if hunting is not allowed.

Overall impacts: As outlined in MFWP statute 12.2.431, an EA is adequate for decision-making if the impacts of a proposed alternative, judged on the following conditions, are not significant:

(a) the severity, duration, geographic extent, and frequency of occurrence of the impact:

"No action" would create no new impacts on bison or other resources.

(b) the probability that the impact will occur if the proposed action occurs; or conversely, reasonable assurance in keeping with the potential severity of an impact that the impact will not occur:

"No action" would create no new impacts on bison or other resources.

(c) growth-inducing or growth-inhibiting aspects of the impact, including the relationship or contribution of the impact to cumulative impacts:

"No action" would create no new impacts on bison or other resources.

(d) the quantity and quality of each environmental resource or value that would be affected, including the uniqueness and fragility of those resources or values:

"No action" would add no new effects to environmental resources.

(e) the importance to the state and to society of each environmental resource or value that would be affected:

"No action" would add no new impacts to natural resources.

(f) any precedent that would be set as a result of an impact of the proposed action that would commit the department to future actions with significant impacts or a decision in principle about such future actions:

"No action" would set no new precedents.

(g) potential conflict with local, state, or federal laws, requirements, or formal plans:

"No action" would create no conflicts with laws or formal agreements.

Mitigation needed

No mitigation related to hunting would be required under Alternative 1 (no action).

Irretrievable commitments

No irretrievable commitments of resources associated with hunting are required under Alternative 1.

Alternative 2. Bison hunting by permit in a late fall/early winter hunting season (November 15 – February 15), with permit numbers limited to 1-25, and hunting allowed only in areas outside YNP where bison presence is currently tolerated under the Interagency Bison Management Plan (State of Montana and Yellowstone National Park 2000a, 2000b) .

Biological and Physical Environment

Currently, areas where bison outside YNP are seasonally tolerated include: 1) lands defined as "Zone 2" in the IBMP (non-wilderness public and private lands outside YNP where bison are officially tolerated in one or more seasons in the West Yellowstone Basin and in the Eagle and Bear Creek drainages east of Gardiner). Another block of land north of Gardiner, west of the Yellowstone River and south of Yankee Jim Canyon is classified as Zone 2 and will be available for hunting **if** cattle grazing on private lands in the area is ended; 2) portions of the Absaroka Beartooth Wilderness north of YNP (including the upper portions of the Hellroaring and Slough Creek drainages); and 3) public land with no cattle allotments in the Cabin Creek Recreation and Wildlife Management Area , the Monument Mountain Unit of the Lee Metcalf Wilderness, and the upper Gallatin River drainage above (south of) the mouth of Taylor Fork.

Under Alternative 2, permits to hunt bison will be limited to one to 25 per year, permits would be valid for ~90 days, and hunting would be legal only in areas where bison are seasonally tolerated under the interagency management plan (Fig. 1). Environmental, impacts associated with this alternative will be minor. One to 25 hunters, each probably accompanied by a companion, with a wheeled vehicle for each hunter and probably a snowmachine for each hunter who hunts in the West Yellowstone Basin, would be added

for 3 to 4 days per permit issued per year to current recreational use in the Gardiner and West Yellowstone Basins.

Adding one to 25 additional hunters to the thousands of recreationists active in the Yellowstone, Gallatin, and Madison drainages during November – February will cause negligible increases in traffic, impacts on threatened or endangered animals, and disturbances to non-game species and native vegetation. With instructional material provided to hunters, the potential for spreading brucellosis to humans handling carcasses will be low and, because no cattle will be pastured near any hunting areas until June following the hunting season, the probability of spreading brucellosis to cattle from entrails left in the field is essentially zero. Spreading *Brucella* from entrails to scavengers is possible, but self-limiting. Mammals and birds likely to scavenge viscera may contract brucellosis but are very unlikely to spread brucellosis to other animals. Few, if any, grizzly bears will be active during the hunting season, and hunters will be prohibited, as are all other GNF visitors, from entering bald eagle closure areas in January and February.

Cultural/Social Environment

Social benefits will include a small increase in recreational opportunities for resident and non-resident hunters (one to 25 per year). Social costs include the possibility that hunters will offend non-hunting recreationists (perhaps escalating to abusive confrontations if hunting opponents stalk hunters) and a minor increase in risks to public safety associated with one to 25 additional people bearing firearms on public and/or private property. Hunters in the West Yellowstone Basin will need to use snowmachines to access hunting areas and to retrieve bison carcasses during most of the season. This will place bison hunters and non-hunting snowmobilers in the same areas, but this interaction has caused few problems when hundreds of elk, deer, and moose hunters have shared public land near West Yellowstone with people on snowmachines in past years with heavy November snows. The few bison hunters present are unlikely to be noticed by most snowmobilers. Confrontations between anti-hunting activists and hunters in the West Yellowstone areas are possible, but the low number of hunters, difficulty in movement in the hunting areas by hunters and activists, unpredictability of hunter presence, and vigilance by enforcement personnel from state and federal agencies should reduce potential for violence and property damage. Hunters in the Eagle Creek area near Gardiner would likely be able to pursue bison without using snowmachines and with minimal attention from hunt opponents.

Economic Impacts

Economic benefits and costs would accrue to bison hunts under Alternative 2, but amounts would likely be low because permit numbers are low (1 to 25 permits issued per year). Economic benefits include permit purchases ($75 - $3,900 for 1 to 25 permits, assuming ~10% are reserved for non-resident applicants plus $10,000 if 2,000 people apply for a permit, the approximate annual number of applicants for bison permits in Wyoming over the past 3 years, and MFWP charges a $5 application fee), hunter

expenditures ($522 - $13,050 for food, fuel, and lodging for an average 3-day hunt based on a daily expenditure rate of $174.50 which was calculated by adjusting a daily estimate of $146.58 in 1996 dollars presented in the bison management EIS [National Park Service 2000, Table 54, p487] to 2004 dollars). A bison hunt could decrease (if hunters remove offending animals and force other animals to change their distribution and/or behavior) or increase (if hunters behave carelessly or drive bison through fences or onto highways) property damage, but any change from the "no hunt" state would be small.

Costs of a bison hunt would include administration of the drawing and enforcement activities required to control anti-hunters and hunters. The costs of administration would be low (~$15,000) because drawing procedures are well established and advertising, printing, and other costs associated with 25 or fewer permits would add little to existing hunting permit administration. Monitoring hunter compliance with laws and regulations would also require little if any extra money. Wardens, park rangers, state and county law enforcement personnel, and Forest Service enforcement personnel patrol all the potential bison hunting areas to control violations by hunters seeking other big game species and non-hunters (including non-hunting recreationists and residents). The only substantial increase in costs would be associated with monitoring/controlling opponents of bison hunting, if they decide to interfere with hunters, and lost business that would occur if organizations opposed to bison hunting mount a successful campaign to boycott Montana. It is impossible to accurately estimate the intensity or frequency of protests (which will determine costs of policing protesters), but low numbers of hunters widely dispersed in time and space, as proposed in Alternative 2, should minimize costs associated with protests. The probability of a boycott of cities within hunting areas or of Montana in general is low under this alternative. A boycott threatened when Montana conducted public bison hunts in the 1980s, when hundreds of bison were killed in a single year, did not produce detectable changes in tourist expenditure in the Yellowstone area (National Park Service 2000).

Legal and Economic Impacts for MFWP

Statutes are already in place that will allow the MFWP Commission to authorize a hunt. Montana Statute 81-2-120 defines bison associated with Yellowstone National Park as "wild bison" and Statute 87-2-730 authorizes MFWP to design and implement a hunt in consultation with MDOL. Eventual use of hunting as a management tool was discussed in the Final EIS on bison management (National Park Service 2000); therefore, YNP does not have to formally approve a public hunt in Montana. The public hunt would not replace the Interagency Plan as the primary regulatory mechanism for bison numbers and distribution in the Yellowstone population in the immediate future so hunting regulations would have to be configured so that agreed upon regulatory actions could take place in a timely manner.

The cost of administering the hunt should be covered by application and permit fees. Permit prices were set by the Montana legislature ($75 for residents, $750 for non-residents) and would produce <$4,000 in revenue. However, if Montana charged a modest application fee of $5 (Wyoming charges $12 for residents and $17 for non-

residents) and applicant interest is similar to that in Wyoming (over 2,000 applicants for bison hunts in the Yellowstone ecosystem per year), the hunt would bring in >$10,000 in application fees alone. This amount would easily cover administration of the permit process and could be used to fund bison management. MFWP already has substantial enforcement responsibility activities under the current interagency bison plan (Alternative 1). The amount of extra enforcement activity under Alternative 2 is impossible to accurately predict, but it should be low (given a small number of hunters) and, because of hunter harassment laws, enforcement would be shared with the Sheriff's Departments of Gallatin and Park Counties.

Overall impacts (short, medium, long term, and cumulative effects)

The primary short-term (<10 years) benefit expected under Alternative 2 would be providing a limited number of hunters an opportunity to shoot bison in public hunts in Montana. The small scale hunt proposed under Alternative 2 would presumably have a small impact on minimizing the risk of infecting cattle herds in southwest Montana with brucellosis, but measurement of the decrease (if hunters kill bison that might come in contact with cattle) or increase (if hunters inadvertently herd bison into closer proximity to cattle) in risk would be impossible to predict and likely too small to measure. Actions by YNP, MDOL, and MFWP personnel will continue to play a dominant role in separating bison and cattle (through hazing, capture, and shooting) and in reducing prevalence of brucellosis (slaughter of sero-positive animals and vaccination of sero-negative animals). A public bison hunt may also provide bison protesters with an additional incentive for protesting and aid in raising funds from sympathizers who support the protest.

Medium-term impacts (10-50 years) of Alternative 2 could include increased opportunity for hunters to harvest wild bison. If hunting builds a constituency for bison among sportsmen, numbers of bison and areas where bison are tolerated outside YNP will likely increase (This assumes hunters will become more interested in bison hunting and will support regulations and land purchases that increase opportunities for bison hunting when they have a stake in bison management). Under Alternative 2, management of brucellosis in bison would still remain largely under MDOL and YNP authority – at least until brucellosis is eliminated. Actions taken by agencies under the current bison management plan may or may not eliminate *Brucella* from the Yellowstone ecosystem within 50 years, but more than likely agency action will be necessary to maintain appropriate numbers and distribution of bison in the mid term. Hunting will have minor impacts on population size, distribution, and genetic makeup under this alternative.

Long-term and cumulative impacts under Alternative 2 are difficult to predict. Elimination of brucellosis under the risk management strategy approved in the IBMP (State of Montana and Yellowstone National Park 2000a, 2000b) is problematic. Agency personnel will likely require large sums of public funds to actively manage bison numbers and/or distribution (whether inside or outside YNP) as long as *Brucella* presents a threat to the livestock industry in Montana, and hunting may not be the primary mechanism for controlling bison in the Yellowstone ecosystem even if brucellosis is

eliminated. If brucellosis is eliminated, bison may be tolerated on more public land outside YNP, and hunters may play a greater role in management, but there will still be limits to the areas in which bison are tolerated, and agency personnel will likely play a direct role in enforcing limits.

Overall impacts: As outlined in MFWP statute 12.2.431, an EA is adequate for decision-making if the impacts of a proposed alternative, judged on the following conditions, are not significant:

(a) the severity, duration, geographic extent, and frequency of occurrence of the impact:

"Alternative 2" would have a minor impact on bison numbers every year, but part of the impact would be compensatory (i.e. bison harvested by hunters would not have to be captured or killed in IBMP management actions). The presence of bison hunters, their companions, and their vehicles would add a small amount each year to current recreational pressure in the West Yellowstone and Gardiner Basins, and would lead to a small increase in disturbance to vegetation, soil, water, and threatened/endangered species. The disturbances generated by hunters would be similar to disturbances created by non-hunting recreationists.

(b) the probability that the impact will occur if the proposed action occurs; or conversely, reasonable assurance in keeping with the potential severity of an impact that the impact will not occur:

"Alternative 2" would very likely create minor new impacts on natural resources.

(c) growth-inducing or growth-inhibiting aspects of the impact, including the relationship or contribution of the impact to cumulative impacts:

"Alternative 2" would create minor new economic impacts

(d) the quantity and quality of each environmental resource or value that would be affected, including the uniqueness and fragility of those resources or values:

"Alternative 2" would create minor new impacts on resources, but the extent of increases would be too small to measure using conventional resource measurement techniques. The maximum harvest allowed (25 bison) represents <1% of the 3,500 bison defined as the upper population tolerated under the IBMP and only 9% of the average population increase expected each year. Hunter activity would contribute <0.1% to annual recreation days in the West Yellowstone and Gardiner Basins. The impacts of 25 or fewer hunters on vegetation, soil, water, and endangered and threatened species would be minor.

The extent of positive or negative economic impacts would generally be small. The impacts with the greatest potential for negative economic effects, agency costs to regulate

protests and the economic boycott threatened by some respondents, are also the ones with the highest degree of uncertainty.

(e) the importance to the state and to society of each environmental resource or value that would be affected:

Bison in the Yellowstone herd are an important cultural resource for Native Americans, residents of Montana, and U.S. citizens in general. "Alternative 2" would not significantly reduce the value, numbers, or visibility of bison in YNP but might, over time, increase the wariness of bison outside YNP.

(f) any precedent that would be set as a result of an impact of the proposed action that would commit the department to future actions with significant impacts or a decision in principle about such future actions:

"Alternative 2" would reopen bison hunting by the public in Montana, but it would not commit MFWP to continue the hunt indefinitely. Bison hunting has been initiated and closed two other times within the last six decades.

(g) potential conflict with local, state, or federal laws, requirements, or formal plans:

"Alternative 2" is consistent with state and federal statutes.

Mitigation needed

No mitigation would be required under Alternative 2.

Irretrievable commitments

Other than funds necessary to continue management of bison under the interagency agreement, no irretrievable commitments of resources are required under Alternative 2.

Alternative 3. (Preferred Alternative) Bison hunting by permit in a late fall/early winter hunting season (November 15 – February 15), with permit numbers limited to 1-25, and hunting allowed in all areas outside YNP, including Zone 2, Zone 3, and areas not given a zone designation where bison presence is currently tolerated, as defined in the Interagency Bison Management Plan (State of Montana and Yellowstone National Park 2000a, 2000b).

Biological and Physical Environment

Under Alternative 3, permits to hunt bison will be limited to one to 25 per year, permits would be valid for ~90 days, and hunting would be legal in areas where bison are seasonally tolerated under the interagency management plan (Fig. 1) and in adjacent

areas if hunters locate bison before agency personnel haze or capture them. Environmental impacts associated with this alternative will be minor. One to 25 hunters, each probably accompanied by a companion, with a wheeled vehicle for each hunter and probably a snowmachine for each hunter who hunts in the West Yellowstone Basin, would be added for 3 to 4 days per permit issued per year to current recreational use in the Gardiner and West Yellowstone Basins.

Adding one to 25 additional hunters to the thousands of recreationists active in the Yellowstone, Gallatin, and Madison drainages during November – February will cause negligible increases in traffic, impacts on threatened or endangered animals, and disturbances to non-game species and native vegetation. With instructional material provided to hunters, the potential for spreading brucellosis to humans handling carcasses will be low and, because no cattle will be pastured near any hunting areas until the following June, the probability of spreading brucellosis to cattle from entrails left in the field is essentially zero. Spreading *Brucella* from entrails to scavengers is possible, but self-limiting. Mammals and birds likely to scavenge gut piles may contract brucellosis but are very unlikely to spread brucellosis to other animals. Few, if any, grizzly bears will be active during the hunting season, and hunters will be prohibited, as are all other GNF visitors, from entering bald eagle closure areas in January and February.

Cultural/Social Environment

The primary difference between Alternative 3 and Alternative 2 is the increased hunting area open with Alternative 3. Hunters would benefit from having more space in which to seek bison and would not be restricted by specific boundaries defined in the bison management plan.

Other cost and benefits for Alternative 3 are similar to those for Alternative 2. Social benefits will include a small increase in recreational opportunities for resident and non-resident hunters (1-25 hunters per year). Social costs include a low probability of hunters offending non-hunting recreationists (perhaps escalating to abusive confrontations if hunting opponents stalk hunters) and a minor increase in risks to public safety associated with one to 25 additional people bearing firearms on public and/or private property. Hunters in the West Yellowstone Basin will need to use snowmachines to access hunting areas and to retrieve bison carcasses during most of the season. This will place bison hunters and non-hunting snowmobilers in the same areas, but this interaction has caused few problems when hundreds of elk, deer, and moose hunters have shared public land near West Yellowstone with people on snowmachines in past years with heavy November snows. The few bison hunters present are unlikely to be noticed by most snowmobilers. Confrontations between anti-hunting activists and hunters in the West Yellowstone areas are possible, but the low number of hunters, difficulty in movement in the hunting areas by hunters and activists, unpredictability of hunter presence, and vigilance by enforcement personnel from state and federal agencies should reduce potential for violence and property damage. Hunters in the Eagle Creek area near Gardiner would likely be able to pursue bison without using snowmachines and with minimal attention from animal rights activists.

Economic Impacts

Economic benefits and costs in Alternative 3 are similar to those in Alternative 2. Economic benefits include permit purchases ($75 - $3,900 for 1 to 25 permits, assuming ~10% are reserved for non-resident applicants plus $10,000 if 2,000 people apply for a permit, the approximate annual number of applicants for bison permits in Wyoming over the past 3 years, and MFWP charges a $5 application fee), hunter expenditures ($522 - $13,050 for food, fuel, and lodging for an average 3-day hunt based on a daily expenditure rate of $174.50 which was calculated by adjusting a daily estimate of $146.58 in 1996 dollars presented in the bison management EIS [National Park Service 2000, Table 54, p487] to 2004 dollars). A bison hunt could decrease (if hunters remove offending animals and force other animals to change their distribution and/or behavior) or increase (if hunters behave carelessly or drive bison through fences or onto highways) property damage, but any change from the "no hunt" state would be small.

Costs of a bison hunt under Alternative 3 would be similar to those under Alternative 2. Costs would include administration of the drawing and enforcement activities required to control anti-hunters and hunters. The costs of administration would be low (~$15,000) because drawing procedures are well established and advertising, printing, and other costs associated with 25 or fewer permits would add little to existing hunting permit administration. Monitoring hunter compliance with laws and regulations would also require little if any extra money. Wardens, park rangers, state and county law enforcement personnel, and Forest Service enforcement personnel patrol all the potential bison hunting areas to control violations by hunters seeking other big game species and non-hunters (including non-hunting recreationists and residents). The only substantial increase in costs would be associated with monitoring/controlling opponents of bison hunting, if they decide to interfere with hunters, and lost business that would occur if organizations opposed to bison hunting mount a successful campaign to boycott Montana. It is impossible to accurately estimate the intensity or frequency of protests (which will determine costs of policing protesters), but low numbers of hunters highly dispersed in time and space, as proposed in Alternatives 2 and 3, should minimize costs associated with protests. The probability of a boycott of cities within hunting areas or of Montana in general is low under this alternative. A boycott threatened when Montana conducted public bison hunts in the 1980s, when hundreds of bison were killed in a single year, did not produce detectable changes in tourist expenditure in the Yellowstone area (National Park Service 2000).

Legal and Economic Impacts for MFWP

Statutes are already in place that will allow the MFWP Commission to authorize a hunt. Montana Statute 81-2-120 defines bison associated with Yellowstone National Park as "wild bison" and Statute 87-2-730 authorizes MFWP to design and implement a hunt in consultation with MDOL. Eventual use of hunting as a management tool was discussed in the Final EIS on bison management (National Park Service 2000); therefore, YNP does

not have to formally approve a public hunt in Montana. The public hunt would not replace the Interagency Plan as the primary regulatory mechanism for bison numbers and distribution in the Yellowstone population in the immediate future so hunting regulations would have to be configured so that agreed upon regulatory actions could take place in a timely manner.

The cost of administering the hunt proposed under Alternative 3 should be covered by application and permit fees. Permit prices were set by the Montana legislature ($75 for residents, $750 for non-residents) and would produce <$4,000 in revenue. However, if Montana charged a modest application fee of $5 (Wyoming charges $12 for residents and $17 for non-residents) and applicant interest is similar to that in Wyoming (over 2,000 applicants for bison hunts in the Yellowstone ecosystem per year), the hunt would produce over $10,000 in application fees alone. This amount would easily cover administration of the permit process. MFWP already has substantial enforcement responsibility activities under the current interagency bison plan (Alternative 1). The amount of extra enforcement activity under Alternative 3 is impossible to accurately predict, but it should be low (given a small number of hunters) and, because of hunter harassment laws, enforcement would be shared with the Sheriff's Departments of Gallatin and Park Counties.

Overall impacts (short, medium, long term, and cumulative effects)

The primary short term (<10 years) benefit expected under Alternative 3, as with Alternative 2, would be providing a limited number of hunters with an opportunity to shoot bison in public hunts in Montana. The small scale hunt proposed under Alternative 3 would presumably have a small impact on minimizing the risk of infecting cattle herds in southwest Montana with brucellosis, but measurement of the decrease (if hunters kill bison that might come in contact with cattle) or increase (if hunters inadvertently herd bison into closer proximity to cattle) in risk would be impossible to predict and likely too small to measure. Actions by YNP, MDOL, and MFWP personnel will continue to play a dominant role in separating bison and cattle (through hazing, capture, and shooting) and in reducing prevalence of brucellosis (slaughter of sero-positive animals and vaccination of sero-negative animals). Over the next 10 years, hunting may also provide bison protesters with additional incentives for protesting and aid in raising funds from sympathizers who support the protest.

Medium-term impacts (10-50 years) of Alternative 3 could include increased opportunity for hunters to harvest wild bison. If hunting builds a constituency for bison among sportsmen, numbers of bison and areas where bison are tolerated outside YNP will likely increase (This assumes hunters will become more interested in bison hunting and will support regulations and land purchases that increase opportunities for bison hunting when they have a stake in bison management). Under Alternative 3, as with Alternative 2, management of brucellosis in bison would still remain largely under MDOL and YNP authority – at least until brucellosis is eliminated. Actions taken by agencies under the current bison management plan may or may not eliminate *Brucella* from the Yellowstone ecosystem within 50 years, but more than likely agency action will be necessary to

maintain appropriate numbers and distribution of bison in the mid-term. Hunting will have minor impacts on population size, distribution, and genetic makeup under this alternative.

Long-term and cumulative impacts under Alternative 3 are difficult to predict. Elimination of brucellosis under the risk management strategy approved in the IBMP (State of Montana and Yellowstone National Park 2000a, 2000b) is problematic. Agency personnel will likely require large sums of public funds to actively manage bison numbers and/or distribution (whether inside or outside YNP) as long as *Brucella* presents a threat to the livestock industry in Montana, and hunting may not be the primary mechanism for controlling bison in the Yellowstone ecosystem even if brucellosis is eliminated. If brucellosis is eliminated, bison may be tolerated on more public land outside YNP, and hunters may play a greater role in management, but there will still be limits to the areas in which bison are tolerated, and agency personnel will likely play a direct role in enforcing limits.

Overall impacts: As outlined in MFWP statute 12.2.431, an EA is adequate for decision-making if the impacts of a proposed alternative, judged on the following conditions, are not significant:

(a) the severity, duration, geographic extent, and frequency of occurrence of the impact:

"Alternative 3" would have a minor impact on bison numbers every year, but part of the impact would be compensatory (i.e. bison harvested by hunters would not have to be captured or killed in IBMP management actions). The presence of bison hunters, their companions, and their vehicles would add a small amount each year to current recreational pressure in the West Yellowstone and Gardiner Basins, and would lead to a small increase in disturbance to vegetation, soil, water, and threatened/endangered species. The disturbances generated by hunters would be similar to disturbances created by non-hunting recreationists.

(b) the probability that the impact will occur if the proposed action occurs; or conversely, reasonable assurance in keeping with the potential severity of an impact that the impact will not occur:

"Alternative 3" would very likely create minor new impacts on natural resources.

(c) growth-inducing or growth-inhibiting aspects of the impact, including the relationship or contribution of the impact to cumulative impacts:

"Alternative 3" would create minor new economic impacts.

(d) the quantity and quality of each environmental resource or value that would be affected, including the uniqueness and fragility of those resources or values:

"Alternative 3" would create minor new impacts on resources, but the extent of increases would be too small to measure using conventional resource measurement techniques. The

maximum harvest allowed (25 bison) represents <1% of the 3,500 bison defined as the upper population tolerated under the IBMP and only 9% of the average population increase expected each year. Hunter activity would contribute <0.1% to annual recreation days in the West Yellowstone and Gardiner Basins. The impacts of 25 or fewer hunters on vegetation, soil, water, and endangered and threatened species would be minor.

The extent of positive or negative economic impacts would generally be small. The impacts with the greatest potential for negative economic effects, agency costs to regulate protests and the economic boycott threatened by some respondents, are also the ones with the highest degree of uncertainty.

(e) the importance to the state and to society of each environmental resource or value that would be affected:

Bison in the Yellowstone herd are an important cultural resource for Native Americans, residents of Montana, and U.S. citizens in general. "Alternative 3" would not significantly reduce the value, numbers, or visibility of bison in YNP but might, over time, increase the wariness of bison outside YNP.

(f) any precedent that would be set as a result of an impact of the proposed action that would commit the department to future actions with significant impacts or a decision in principle about such future actions:

"Alternative 3" would reopen bison hunting by the public in Montana, but it would not commit MFWP to continue the hunt indefinitely. Bison hunting has been initiated and closed two other times within the last six decades.

(g) potential conflict with local, state, or federal laws, requirements, or formal plans:

"Alternative 3" is consistent with state and federal statutes.

Mitigation needed

No mitigation would be required under Alternative 3.

Irretrievable commitments

Other than funds necessary to continue management of bison under the interagency agreement, no irretrievable commitments of resources are required under Alternative 3.

Alternative 4. Late fall – early winter season (November 15 – February 15) for a limited entry hunt with permits valid for 10-day intervals, with permits limited to 1-25 per hunting period (225 maximum over 9 hunting periods) and hunting allowed in all areas outside YNP, including Zone 2, Zone 3, and areas not given a zone designation where bison presence is currently tolerated, as defined in the Interagency Bison Management Plan (State of Montana and Yellowstone National Park 2000a, 2000b).

Biological and Physical Environment

Under Alternative 4, the 15 November to 15 February hunting season would be divided into nine 10-day hunting periods, permits would be limited to one to 25 per hunting period (nine to 225 per year), permits would be valid for 10 days, and hunting would be legal in areas where bison are seasonally tolerated under the interagency management plan (Fig. 1) and in adjacent areas if hunters locate bison before agency personnel haze or capture them. This is similar to Alternative 3 except for shorter hunting periods for individual hunters and the potential for nine times more permits to be issued. Environmental impacts associated with this alternative could thus be greater than those for Alternatives 2 and 3 but would still result in very small increases in impacts on the biological and physical environment of the upper Yellowstone area. Movement patterns of bison over the past 6 years (see Chapter 2) suggest that hunters in November and December would have few, if any, bison available in legal hunting areas in many years, so issuing 225 permits will very likely result in harvest of <100 bison in most years. **If** the maximum number of permits were issued and **if** 225 bison were harvested, this would represent only 6-9% of the population if it were maintained at levels identified as optimal in the IBMP (2,500 – 3,500). A harvest of 225 would be less than the annual population increase in most years, and harvested animals would reduce the number of animals captured and transported to slaughter in some years. If population levels dropped below 2,500 (a "floor" identified in the IBMP), permit numbers would be decreased.

Adding a maximum of 225 additional hunters with no more than 25 hunters (plus companions and vehicles) present on any single day to the thousands of recreationists active in the Yellowstone, Gallatin, and Madison drainages during November – February will cause only small increases in traffic, impacts on threatened or endangered animals, and disturbances to non-game species and native vegetation. If appropriate instructional material is provided to hunters, the potential for spreading brucellosis to humans handling carcasses will be low and, because no cattle will be pastured near any hunting areas until the following June, the probability of spreading brucellosis to cattle from entrails left in the field is essentially zero. Spreading *Brucella* from entrails to scavengers is possible but self-limiting. Mammals and birds likely to scavenge viscera may contract brucellosis but are very unlikely to spread brucellosis to other animals. Few, if any, grizzly bears will be active during the hunting season, and hunters will be prohibited, as are all other GNF visitors, from entering bald eagle closure areas in January and February.

Cultural/Social Environment

The primary difference between Alternative 4 and Alternative 3 is the increased opportunity for applicants to draw permits and the limited time period in which permits would be valid. Compared to Alternative 2, hunters would benefit from having more space in which to seek bison and would not be restricted by specific boundaries defined in the bison management plan. Maximum number of hunters in the field on each day of the season would be the same as under Alternatives 2 and 3, but under Alternative 4, hunters would have a lower probability of harvesting a bison because the time available for hunting would be shorter, and bison might not be available in areas where hunting is legal in some months in some years (Fig. 2 and 3).

If social costs and benefits accrue in a linear fashion, Alternative 4 would produce nine times the costs and benefits outlined for Alternatives 2 and 3 simply because nine times more hunters could participate. This linear relationship is probably valid on the social benefit side. Alternative 4 would produce an increase in recreational opportunities for resident and non-resident hunters because more hunters could participate. Negative impacts of Alternative 4 would include some linear relationships (for example, aggregate risks to public safety would likely be directly proportionate to the number of hunters involved) and some non-linear relationships. Because the shorter hunting periods would have specific start dates, protesters would be able to plan their efforts more efficiently and would have nine groups of hunters to protest rather than one group spread over a 90-day season. This could increase intensity and frequency of protest far more than nine-fold (compare to Alternatives 2 and 3).

Economic Impacts

Economic benefits of Alternative 4 should be approximately nine times higher than for Alternatives 2 and 3. Economic benefits include permit purchases ($1,350 - $33,750 for 9 to 225 permits, assuming ~10% are reserved for non-resident applicants plus $10,000 if 2,000 people apply for a permit, the approximate annual number of applicants for bison permits in Wyoming over the past 3 years, and MFWP charges a $5 application fee), hunter expenditures ($4,712 - $117,788 for food, fuel, and lodging for an average 3-day hunt based on a daily expenditure rate of $174.50 which was calculated by adjusting a daily estimate of $146.58 in 1996 dollars presented in the bison management EIS [National Park Service 2000, Table 54, p487] to 2004 dollars). A bison hunt could decrease (if hunters remove offending animals and force other animals to change their distribution and/or behavior) or increase (if hunters behave carelessly or drive bison through fences or onto highways) property damage, but any change from the "no hunt" state would be small.

If protests did not occur, costs of administering a drawing for a bison hunt under Alternative 4 would be similar to those under Alternative 2 and 3 (~ $15,000). Monitoring hunter compliance with laws and regulations would require more funding because more hunters would participate. How much extra is difficult to predict because even 225 bison hunters would represent a small number compared to other recreationists

active during November – February (elk hunters, deer hunters, water fowl hunters, anglers, snowmachiners, skiers, etc.). MFWP wardens, YNP rangers, state and county law enforcement personnel, and Forest Service enforcement personnel already patrol all the potential bison hunting areas to control activities of hunters seeking other big game species, bison management protesters, and non-hunters (including non-hunting recreationists and residents). The only substantial cost increases associated with Alternative 4 would be those related to monitoring and controlling opponents of bison hunting. These costs are unknown but are likely to be much higher than for Alternatives 2 and 3. Protesters would have nine groups of hunters to confront and nine predictable "opening days" around which they could organize confrontations. The probability that people opposed to bison hunting could organize a successful local or state boycott would be similar to that for Alternatives 2 and 3, low based on past history.

Legal and Economic Impacts for MFWP

Legal and economic impacts to MFWP under Alternative 4 are similar to those under Alternative 2 and 3. Statutes are already in place that will allow the MFWP Commission to authorize a hunt. Montana Statute 81-2-120 defines bison associated with Yellowstone National Park as "wild bison" and Statute 87-2-730 authorizes MFWP to design and implement a hunt in consultation with MDOL. Eventual use of hunting as a management tool was discussed in the Final EIS on bison management (National Park Service 2000); therefore, YNP does not have to formally approve a public hunt in Montana. The public hunt would not replace the Interagency Plan as the primary regulatory mechanism for bison numbers and distribution in the Yellowstone population in the immediate future so hunting regulations would have to be configured so that agreed upon regulatory actions could take place in a timely manner.

The cost of administering the hunt proposed under Alternative 4 should be covered by application and permit fees. Alternative 4 could produce more revenue that could be returned to bison management from permit sales than Alternatives 2 and 3 (a maximum of $33,750 versus <$4,000). It is unlikely, however, that the number of applicants would be much greater under Alternative 4 than under Alternatives 2 and 3 so application fee income should be similar (~$10,000 for a $5 fee paid by 2,000 applicants) and sufficient to cover administration of the permit process. Given the increased ease with which people opposed to bison hunting could organize protests under Alternative 4 compared to Alternatives 2 and 3, MFWP would face substantial increases in enforcement costs, even though other agencies could be called on to help with enforcement.

Overall impacts (short, medium, long term, and cumulative effects)

The primary short-term (<10 years) benefit expected under Alternative 4 would be greater opportunity for hunters to participate in a bison hunt than under Alternatives 2 and 3 and greater opportunities for opponents of the hunt to generate funding and publicity. Even though as many as 225 permits per year could be offered, Alternative 4 would have a small impact on minimizing the risk of infecting cattle herds in southwest Montana with brucellosis. Hunters could decrease (if hunters kill bison that might come

in contact with cattle) or increase (if hunters inadvertently herd bison into closer proximity to cattle) risk of transmission, but the overall impact on incidence of sero-positive bison in the YNP herd would be much smaller than that attributable to actions by YNP, MDOL, and MFWP personnel over the next 10 years. Agency personnel will continue to play a dominant role in separating bison and cattle (hazing, capture, and shooting) and in reducing prevalence of brucellosis (slaughter of sero-positive animals and vaccination of sero-negative animals). If hunting encourages anti-hunting protesters, Alternative 4 could produce stronger protests than Alternatives 2 and 3 because more hunters would be present.

Medium-term impacts (10-50 years) of Alternative 4 could include increased opportunity for hunters to harvest wild bison. If hunting builds a constituency for bison among sportsmen, Alternative 4 would build the constituency faster than Alternatives 2 and 3, unless poor success of hunters who drew permits for periods when no bison were available for hunting reduced overall enthusiasm for bison hunting. Under Alternative 4 numbers of bison and areas where bison are tolerated outside YNP will likely increase (This assumes hunters will become more interested in bison hunting and will support regulations and land purchases that increase opportunities for bison hunting when they have a stake in bison management) and could increase more than under Alternatives 2 and 3. Under Alternative 4, as with Alternatives 2 and 3, management of brucellosis in bison would still remain largely under MDOL and YNP authority – at least until brucellosis is eliminated. Actions taken by agencies under the current bison management plan may or may not eliminate *Brucella* from the Yellowstone ecosystem within 50 years, but agency action will likely be necessary to maintain appropriate numbers and distribution of bison in the mid-term. Hunting under Alternative 4 potentially could have more impact over the next 50 years than under Alternatives 2 and 3 but would have minor impacts on population size, distribution, and genetic makeup compared to agency activities.

Long-term and cumulative impacts under Alternative 4 are difficult to predict. The highest probability is that impacts of Alternative 4 would be similar to Alternatives 2 and 3 but would force impacts, positive and negative, attributable to hunting to occur sooner. Elimination of brucellosis under the risk management strategy approved in the IBMP (State of Montana and Yellowstone National Park 2000a, 2000b) is problematic. Agency personnel will likely require large sums of public funds to actively manage bison numbers and/or distribution (whether inside or outside YNP) as long as *Brucella* presents a threat to the livestock industry in Montana, and hunting may not be the primary mechanism for controlling bison in the Yellowstone ecosystem even if brucellosis is eliminated. If brucellosis is eliminated, bison may be tolerated on more public land outside YNP, and hunters may play a greater role in management, but there will still be limits to the areas in which bison are tolerated, and agency personnel will likely play a direct role in enforcing limits.

Overall impacts: In compliance with MFWP statute 12.2.431, an EA is adequate for decision-making if the impacts of a proposed alternative, judged on the following conditions, are not significant:

(a) *the severity, duration, geographic extent, and frequency of occurrence of the impact:*

"Alternative 4" would have more impacts on bison numbers than Alternatives 2 and 3. If the maximum number of permits were issued and the maximum allowable number of bison were harvested every year, hunters would take 6-9% of the winter bison population when the herd was managed within bounds agreed upon in the IBMP (2,500 – 3,500). This would represent a significant part of the expected annual increase (although in many years, bison mortality from hunters would only replace bison mortality that would have occurred under management actions required under the IBMP. The presence of bison hunters, their companions, and their vehicles would create more disturbances than under Alternatives 2 and 3 but would still add only a small amount each year to current recreational pressure in the West Yellowstone and Gardiner Basins, and would lead to a small increase in disturbance to vegetation, soil, water, and threatened/endangered species. The disturbances generated by hunters would be similar to disturbances created by non-hunting recreationists.

(b) the probability that the impact will occur if the proposed action occurs; or conversely, reasonable assurance in keeping with the potential severity of an impact that the impact will not occur:

"Alternative 4" would likely create impacts on bison and other natural resources.

(c) growth-inducing or growth-inhibiting aspects of the impact, including the relationship or contribution of the impact to cumulative impacts:

"Alternative 4" would create economic impacts.

(d) the quantity and quality of each environmental resource or value that would be affected, including the uniqueness and fragility of those resources or values:

"Alternative 4" was not selected as the preferred alternative partially because it would impact bison numbers more than Alternatives 2 and 3. Had Alternative 4 been selected as the preferred alternative, it would be unlikely to prevent the Yellowstone bison population from increasing. In most years, harvest would be much lower than the maximum of 225 because bison would not be available to hunters in some hunting periods. At population levels >3,000, more than 225 bison are added to the population in most years. If no hunting were to occur, a large portion of this annual increase would have to be removed by agency personnel under the terms of the IBMP. With hunting, part of the harvest would be compensatory (i.e. bison harvested by hunters would not have to be captured or killed in IBMP management actions). Although disturbances to vegetation, soils, water, and threatened/endangered species would be greater under Alternative 4 than under Alternatives 2 and 3, the maximum recreation days possible (225 hunters x 10 days per hunting period = 2250 recreation days) would contribute <1% to annual recreation days in the West Yellowstone and Gardiner Basins and the impacts of hunters would be similar to disturbances by non-hunting recreationists.

Positive economic impacts (license dollars, spending on gas, motels, etc.) will likely increase linearly with numbers of hunters so Alternative 4 could generate nine times more revenue than Alternatives 2 and 3. Negative economic impacts could increase non-linearly. People protesting hunting would have 9 defined hunting periods in which to organize protests and new groups of hunters would be available for confrontations every 10 days. This might allow more than nine times more publicity and require more than nine times more agency enforcement effort than Alternatives 2 and 3. Whether linear or non-linear, these economic benefits and costs will be miniscule compared to the multi-million dollar economies of the West Yellowstone and Gardiner Basins. The impact of a boycott threatened by some respondents is impossible to predict, but the boycott threatened as a protest to bison hunts in the 1980s produced no detectable impact on the Greater Yellowstone economy (National Park Service 2000).

(e) the importance to the state and to society of each environmental resource or value that would be affected:

Bison in the Yellowstone herd are an important cultural resource for Native Americans, residents of Montana, and U.S. citizens in general. "Alternative 4" would not significantly reduce the value, numbers, or visibility of bison in YNP but might, over time, increase the wariness of bison outside YNP.

(f) any precedent that would be set as a result of an impact of the proposed action that would commit the department to future actions with significant impacts or a decision in principle about such future actions:

"Alternative 4" would reopen bison hunting by the public in Montana, but it would not commit MFWP to continue the hunt indefinitely. Bison hunting has been initiated and closed two other times within the last six decades.

(g) potential conflict with local, state, or federal laws, requirements, or formal plans:

"Alternative 4" is consistent with state and federal statutes.

Mitigation needed

No mitigation would be required under Alternative 4.

Irretrievable commitments

Other than funds necessary to continue management of bison under the interagency agreement, no irretrievable commitments of resources are required under Alternative 4.

PREPARATION OF ENVIRONMENTAL ASSESSMENT

This report was prepared by Lynn R. Irby, Retired Director of the Fish, and Wildlife Management Program at Montana State University, Bozeman and Kurt L. Alt, Regional Wildlife Manager, Montana Fish, Wildlife, and Parks, Region 3, Bozeman.

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APPENDIX A

Public Bison Hunts in North America

Prepared by Bernie Kuntz, MFWP, Bozeman, 2004.

Alaska Hunts: Areas are located south of McGrath, and near Delta, and in the Copper River Valley near Chitna. The latter hunt involves crossing Native-owned lands, which currently are charging a $2,000 access fee, which has essentially shut down this hunt. In 2003, 184 permits were issued. Non-residents pay a $10 application fee, $85 for a general hunting license, and $450 for the tag if successful in the drawing. Residents get tags for free but must participate in the drawing. There is no cap on non-resident tags.

Arizona Hunts: Hunts are held on two state-owned Wildlife Management Areas In the Raymond Ranch WMA, hunting is conducted in fall (20 cow permits for 2004) and spring (16 yearling and 4 bull permits for 2004) with additional "call-up" permits available if more population or distribution management is required. In the larger House Rock WMA (and adjacent USFS land) permits available in 2004 included: 20 cow/yearling fall permits, 4 "any bison" spring permits, and up to 10 "any bison" permits authorized for additional population management if needed. Adult bull permits are $755 for residents and $3,755 for non- residents. A permit for a yearling bison is $245 for residents and $1,205 for non-residents. A cow bison permit is $455 for residents and $2,255 for non-residents.

South Dakota Hunts: The only public hunt in South Dakota is held at Custer State Park, some 30 miles south of Rapid City. The park is 71,000 acres in size and is fenced. Ten permits are issued for a fall hunt. Non-residents are charged the same price as residents. A trophy bull permit is $4,000; a non-trophy bull permit (two-year olds) is $1,500; and a cow bison permit is $1,000.

Utah Hunts: Four hunting districts provide hunts for bison: three in the Henry Mountains in the southeast part of the state, and one at Antelope Island, located on Great Salt Lake. Five resident permits and one non-resident permit are issued for the Antelope Island hunt; 17 resident and two non-resident permits are issued for the early Henry Mountains hunt; the same number issued for a late hunt, and the same number are issued for a cow-only hunt. Permits costs $408 for residents and $1,008 for non-residents for the Henry Mountain hunts. For the Antelope Island hunt, the cost is $1,100 for residents and $2,600 for non-residents. Sixty-three permits are issued for all units combined.

Wyoming Hunts: Two areas are open to public bison hunting in Wyoming. A hunt for bison that move out of Grand Teton National Park and the National Elk Refuge is held on the Bridger-Teton Forest. This season is open from July 1 to January 31, but most hunting is done after October 1. Applicants (application fee: $12 for residents and $17 for non-residents) have their name placed on a list and are issued a number. When bison are on the hunting area, hunters are phoned and issued a license ($300 for residents and $2,100 for non-residents). Hunters take 40-50 bison each year from a population of several hundred animals. A second hunting unit is located on the North Fork of the

Shoshone River west of Cody. Bison that move out of YNP, are hunted from a call-up list similar to that in the Bridger-Teton hunt. Numbers of bison harvested are low because bison generally only emigrate from Yellowstone along the Shosone during severe winters.

British Columbia Hunts: There is one hunting unit in this province. It is located near Fort St. John in the northern part of the province, includes several hundred square miles in size, and is divided into two zones. Three two-week seasons are offered in each zone in November and December. Twenty either-sex permits are issued for each two-week period in each zone. Residents pay a $6 application fee plus $70 for the tag if drawn; non-residents pay the application fee and $700 for the tag if drawn. Five more permits are issued for a bulls-only hunt in October. B.C. has a cartridge restriction on bison hunting that requires a minimum of a 175-grain bullet generating at least 2,000 foot-pounds of energy at 100 yards.

Northwest Territories Hunts: Wood bison are hunted in the MacKenzie Wood Bison Sanctuary east of Fort Simpson near Fort Providence. Nine bison tags are issued. The NWT resident fee is $15 plus GST; the Canadian resident fee is $50 plus GST; and the alien fee is $150 plus GST. Residents are required to hunt in December; Non-residents hunt in February and March.

Yukon Territory Hunts: Two zones in the Yukon offer wood bison hunting. They are located in the southwest Yukon around Aishihik Lake between Whitehorse and Haines Junction. Hunting area are hundreds of square kilometers in size. The total herd size for herds available for hunting is approximately 400 animals, and 70 permits are issued each season. The resident fee is $20. Non-residents must pay a $50 hunting fee with an additional $500 trophy fee due upon kill.