

National Park Service
U.S. Department of the Interior



Yellowstone National Park
Idaho, Montana, Wyoming

Conservation and Management of Yellowstone Bison

Environmental Assessment

April 20, 2018

Summary

The National Park Service (NPS) is considering alternate management paradigms to sustain the viable population of wild, wide-ranging bison within and near Yellowstone National Park (YNP). The chosen management approach should (1) maintain the processes of migration and dispersal, (2) maintain existing genetic diversity and historic lineages, (3) contribute to a low risk of brucellosis transmission from bison directly to cattle and, as necessary, (4) regulate bison abundance to lessen adverse impacts to other natural resources and reduce conflicts with humans. A decision regarding whether the NPS should initiate an alternate management paradigm for wild, wide-ranging bison within and near YNP is needed because:

- Bison numbers in the northern portion of YNP have increased in recent years, but there is limited capacity and forage for bison within the park;
- There is limited tolerance for bison migration into surrounding states due to concerns about competition with cattle, brucellosis transmission to cattle, human safety, and property damage.
- There is substantial new information and changed circumstances since the Interagency Bison Management Plan began being implemented in 2001; and
- There are persistent disputes among federal, state, and tribal agencies regarding issues related to authority, priorities, and sovereignty that impede efforts to treat bison more like other wildlife.

The preferred alternative is to maintain a long-term average of (b)5 Draft- Deliberative bison, based on (b)5 Draft- Deliberative. Given the limited tolerance in surrounding states for many bison migrating outside the park during winter, bison numbers should be regulated to (b)5 Draft-Deliberative to reduce adverse impacts to other natural resources and conflicts with cattle and people. Other demographic objectives include maintaining similar proportions of males to females and about 70% adults and 30% juveniles. Management actions and levels of tolerance for bison migrating or dispersing from YNP would continue to be determined by the respective states, private landowners, national forests, and tribes with treaty hunting rights. Tools to regulate bison abundance would include hunting outside the park and capture and shipments to meat processing, quarantine, and research facilities. Culling should not occur when there are (b)5 Draft- Deliberative bison, could be conducted when there were (b)5 Draft- Deliberative bison (depending on harvest levels in Montana), and should increase when there were (b)5 Draft- Deliberative bison. Federal and state managers should maintain a low risk of brucellosis transmission from bison to cattle using culling, hazing, hunting, and other tools to help maintain separation. (b)5 Draft-Deliberative (b)5 Draft-Deliberative

Public Comment

If you wish to comment on the Environmental Assessment, you may post comments online at <http://parkplanning.nps.gov/BisonConservationManagement>, hand-deliver during normal business hours to the mailroom in the Park's Administration Building, or mail comments to: (b)5 Draft-Deliberative (b)5 Draft- Deliberative P.O. Box 168, Yellowstone National Park, Wyoming 82190. This Environmental Assessment will be on public review for 30 days. All comments must be received by DATE. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware your entire comment – including your personal identifying information – may be made publicly available at any time. Although you may request to have your personal identifying information withheld from public review, we cannot guarantee we will be able to do so. Comments will not be accepted by fax, e-mail, or in any other way than those specified above. Bulk comments in any format (hard copy or electronic) submitted on behalf of others will not be accepted.

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Purpose and Need

The National Park Service (NPS) is considering alternate management paradigms to sustain the viable population of wild, wide-ranging bison within and near Yellowstone National Park (YNP). The chosen management approach should (1) maintain the processes of migration and dispersal, (2) maintain existing genetic diversity and historic lineages, (3) contribute to a low risk of brucellosis transmission from bison directly to cattle and, as necessary, (4) regulate bison abundance to lessen adverse impacts to other natural resources and reduce conflicts with humans. A decision regarding whether the NPS should initiate an alternate management paradigm for wild, wide-ranging bison within and near YNP is needed because:

- Bison numbers in the northern portion of YNP have increased in recent years, but there is limited capacity and forage for bison within the park;
- There is limited tolerance for bison migration into surrounding states due to concerns about competition with cattle, brucellosis transmission to cattle, human safety, and property damage.
- There is substantial new information and changed circumstances since the Interagency Bison Management Plan began being implemented in 2001 to reduce brucellosis transmission risk while conserving a viable population of Yellowstone bison; and
- There are persistent disputes among federal, state, and tribal agencies regarding issues related to authority, priorities, and sovereignty that impede efforts by the NPS to recover bison across a larger landscape and treat them more like other wildlife (as wanted by the majority of the public).

Background

The YNP Protection Act of 1872 protected about 2.2 million acres (890,300 hectares) in what would later become the states of Idaho, Montana, and Wyoming as a public park for the benefit and enjoyment of people (16 USC 21 *et seq.*). The NPS Organic Act (54 USC 100101(a, b)) directs the Secretary of the Interior and the NPS to conserve the scenery, natural and historic objects, and wildlife therein unimpaired for the enjoyment of future generations; although the Secretary has broad discretion to transfer “surplus” wildlife or otherwise dispose of them (54 USC 100101 *et seq.*; 54 USC 100752; and 16 USC 36).

The largest conservation population of plains bison lives in and near YNP. These bison have high genetic diversity and are one of only a few bison populations with no evidence of interbreeding with cattle. They move across a vast landscape where they are exposed to natural selection through competition for food and breeding opportunities, predation, and survival under challenging environmental conditions. Yellowstone bison have special significance to many tribes because they are the last living link to the indigenous herds of bison which once roamed across North America and provided sustenance for centuries. When bison are inside YNP, they have unlimited access to all habitat therein. However, when bison migrate outside the park in search of food during winter, the surrounding states and some private landowners do not offer the same access to habitat. Yellowstone bison numbers increase quite rapidly because they have high reproductive and survival rates, but there is only a limited amount of habitat for bison and other ungulates inside YNP, especially during winter when deep snow covers the mountains. If many bison are not allowed to migrate outside the park due to a lack of tolerance by the surrounding states, then their numbers cannot be allowed to increase inside the park indefinitely without eventually exceeding food availability and resulting in substantial starvation. At high densities, bison could cause significant deterioration to other park resources such as vegetation, soils, geothermal features, and other ungulates as the bison population overshoots the park’s capacity to provide adequate forage.

Bison and elk populations in the Greater Yellowstone Area (GYA) are chronically infected with the nonnative disease brucellosis, caused by the bacteria *Brucella abortus*, which can induce abortions and be transmitted back to cattle and elk if they contact infectious birthing tissues. Brucellosis concerns livestock producers because there are economic costs from killing infected cattle, additional testing requirements and, possibly, restrictions on interstate transport and international trade if cattle become infected. The disease was detected in 27 cattle or domestic bison herds in the GYA during 1998 to 2016. All of these outbreaks were traced to wild elk using epidemiology and genetic tests. No cases of brucellosis transmission from Yellowstone bison to cattle have been detected, in part, because management limits bison mingling with cattle. The *Committee on Revisiting Brucellosis in the Greater Yellowstone Area*, which was established by the National Academies of Sciences, Engineering, and Medicine, recommended in 2017 that federal and state agencies prioritize efforts on preventing brucellosis transmission by elk,

while continuing to maintain separation between bison and cattle. Also, the Committee concluded aggressive control measures with bison were unwarranted until tools become available that would allow for an eradication program in elk.

Yellowstone bison are currently managed differently than other wildlife migrating or dispersing outside YNP because the Secretaries of Agriculture and Interior and the Governor of Montana signed a court-mediated agreement in 2000 with guidelines limiting bison abundance and distribution in Montana. This Interagency Bison Management Plan (IBMP) was generated because bison began to migrate during winter towards areas occupied by cattle in Montana as their numbers increased during the 1970s to the mid-1990s. Idaho and Wyoming were not included in the plan because few bison currently migrate from YNP into these states. The NPS, APHIS, Forest Service, Montana Department of Livestock, Montana Fish, Wildlife & Parks, Confederated Salish and Kootenai Tribes of the Flathead Nation, Nez Perce Tribe, and the InterTribal Buffalo Council implement the IBMP. Members of the Blackfoot Nation, Confederated Tribes of the Umatilla Reservation, Confederated Tribes and Bands of the Yakama Nation, and the Shoshone-Bannock Tribes also harvest bison and at times participate in management discussions.

The IBMP was primarily designed to ensure brucellosis was not transmitted from bison to cattle, while conserving about 3,000 bison and attempting to reduce the prevalence of brucellosis in bison through test-and-slaughter and vaccination. The parties involved with the IBMP have conducted an assortment of management and monitoring activities to work towards these objectives. Details regarding the current implementation of the IBMP can be found in the annual operations plan, which is available in the *Document Library* under *Winter Operations and Surveillance/Harvest Plans* at <<http://ibmp.info>>. When bison cross the boundary of YNP their management is determined by the surrounding states, in collaboration with the Forest Service on lands under their jurisdiction. The State of Montana has allowed many hundreds of bison to migrate onto winter ranges adjacent to the park, but mass migrations have, at times, upset state regulatory agencies, local governments, and private landowners and cattle operators. Since 2013, harvests in Montana have ranged between 219 and 486 bison per winter, which was insufficient to regulate (i.e., stabilize) population growth. As a result, the culling of hundreds of bison, primarily by shipments to slaughter, has occurred in about one-half of the winters to limit bison abundance and distribution. The shipment of bison to slaughter is not favored by the NPS and is unpopular with many tribes, non-governmental organizations, and members of the public; some of whom have brought legal challenges to stop this practice. There have been requests to relocate these bison instead of killing them, but livestock regulatory authorities consider exposed or untested Yellowstone bison a factor increasing the overall risk of brucellosis transmission to livestock.

Scoping

The NPS and the State of Montana held a public scoping comment period for a Yellowstone-area Bison Management Plan/EIS from March 16, 2015, to June 15, 2015. The public was encouraged to submit comments through the NPS Planning, Environment, and Public Comment (PEPC) website, by postal mail, and in person at the park. About 3,000 pieces of correspondence were received and 8,830 comments were derived from the correspondence. Three open house meetings were held in Bozeman, Gardiner, and West Yellowstone, Montana, and attended by a total of about 120 people. Each meeting began with a presentation on the history of bison management and the need for a new bison management plan. Preliminary alternative concepts presented in the Notice of Intent (4312-CB) and at the public meetings included (1) continue the 2000 IBMP, as adjusted (i.e., no action), (2) minimize human intervention, (3) limit bison migration into Montana, (4) suppress brucellosis transmission, (5) tolerance in Montana linked to overall bison abundance, and (6) balance bison conservation and brucellosis transmission risk. Following the presentation, staff from the NPS and the State of Montana was available to answer questions and accept written comments.

Impact Topics Retained for Further Analysis

Impact topics represent park resources and values that could be affected by actions under consideration in this Environmental Assessment. Impact topics that were carried forward for detailed analysis include: Yellowstone

Bison; Other Wildlife; Threatened Species; (b)5 Draft-Deliberative
(b)5 Draft-Deliberative

Impact Topics Dismissed from Further Analysis

Council on Environmental Quality regulations (40 Code of Federal Regulations Parts 1500-1508) and Director's Order #12 indicate topics may be dismissed from analyses if there is no potential for significant impacts. The following topics were not analyzed in this Environmental Assessment for the reasons stated below.

(b)5 Draft-Deliberative

(b)5 Draft-Deliberative



(b)5 Draft-Deliberative



Alternatives

This chapter describes alternatives addressing the purpose and need for action. These alternatives were developed to explore the possible effects of a range of reasonable actions and economically and technically feasible strategies. Alternatives were considered if they met the project purpose and need, while conserving the bison population and other natural resources of YNP. This chapter also includes a description of mitigating measures (actions common to all alternatives), alternatives considered but eliminated from further consideration, and a description of the preferred and environmentally preferable alternatives (40 Code of Federal Regulations §1502.14e; Federal Register 73:61292-61323).

Alternative 1: No Action

Abundance: Under the IBMP, bison are managed as described in the Record of Decision (as adjusted) and the annual operations plan (see the <<http://ibmp.info>> website in the *Document Library* section). The demographic objectives for the Yellowstone bison population include an end-of-winter abundance near 3,000 bison (actual counts have ranged between 2,708-5,459 bison since 2000). Each summer, the NPS conducts counts and classifications

(age, sex) of bison, uses this information to assess the status of the population, and conveys this information with recommendations for removals the following winter to the other IBMP members and treaty tribes for their consideration in management, including setting harvest levels. As winter progresses, the NPS uses aerial and ground counts, snow accumulation and condition measurements, and updated weather forecasts to assess bison distribution and predict movements to the park boundary and into areas of Montana which, in turn, supports decision-making for bison management.

Distribution: Bison inside YNP have unlimited access to all habitat therein. Personnel from the NPS and Montana Fish, Wildlife & Parks monitor bison movements within and outside the park. Currently, bison are allowed on national forests and other lands north of YNP and south of Yankee Jim Canyon each winter and spring. Female and young bison are hazed back to YNP by state personnel near May 1, while male bison are allowed to remain in this area year-round. Bison of both sexes are allowed in the Eagle Creek/Bear Creek area and portions of the Absaroka-Beartooth wilderness year-round. In addition, bison of both sexes are allowed to migrate west of YNP into the Hebgen basin, including Horse Butte, and north along Highway 191 to the Cabin Creek Recreation and Wildlife Management Area, Monument Mountain Unit of the Lee Metcalf Wilderness, and the Taylor Fork drainage. Numbers of bison in this area are limited to 250 during July through September, 450 during October through February, and 600 during March through June. During November 15 through April 15, up to 30 female bison (or a mixed group of 30 males and females) are allowed on the Madison Arm. After April 15, up to 30 female/mixed group bison are allowed east of the Madison Arm Resort. After May 15, no females or mixed groups of bison are allowed on the Madison Arm. Females or mixed groups of bison remaining in this area are hazed to nearby habitat, captured, or lethally removed by state personnel.

Hazing: Personnel from federal and state agencies may occasionally haze bison in YNP or nearby areas of Montana to prevent dispersal from areas where bison are tolerated, prevent the shedding of *Brucella* bacteria in areas occupied by cattle, move bison away from private lands where they are not wanted, or move bison away from homes and highways where there are safety or property issues. Personnel from Montana Fish, Wildlife & Parks work with landowners who have safety and property damage concerns, as well as those who favor increased tolerance for bison, to allow bison to use suitable habitat while reducing conflicts. Equipment and methods used for hazing bison include people on foot, horseback, or in a helicopter. Helicopters, cracker shells, and rubber bullets are used in situations when other types of hazing actions are unlikely to be successful in meeting objectives. Bison that do not respond to hazing may be lethally removed by hunters or management staff.

Hunting: Hunting in the park was prohibited by Congress in 1894 (16 USC 26). Bison hunting in Montana occurs outside the northern (Gardiner basin) and western (Hebgen basin) boundaries of YNP, with harvests varying from year-to-year depending on how many bison move outside the park in response to snow depths in the higher mountains. There is a 90-day public bison hunt each year from November 15 to February 15, which is monitored by state game wardens. Also, members of the Salish and Kootenai, Nez Perce, Shoshone-Bannock, Umatilla, Yakama, and Blackfoot tribes harvest bison on open and unclaimed lands in the Custer Gallatin National Forest pursuant to treaties with the federal government. The Crow and other tribes may send members to hunt in the future. Tribal hunting primarily occurs during mid-November through March, with each tribe determining and enforcing regulations and seasons for their members. Harvest managers meet several times during the year to discuss objectives, share data, and address issues such as access, enforcement, and no shooting zones. During 2017, the Salish and Kootenai, Umatilla, Nez Perce, and Yakama tribes agreed to coordinate bison harvests in the Beattie Gulch area adjacent to the north boundary of YNP near Gardiner, Montana, and use common hunt protocols, safety provisions, regulations, and enforcement.

Capture: Bison may be captured in YNP or nearby areas of Montana during winter to augment hunting removals, when safety concerns arise because bison repeatedly resist hazing to keep them within state tolerance areas, because there are already large numbers of bison in the tolerance areas after the hunting seasons are completed, or for brucellosis testing and vaccination. The NPS is the lead agency for captures within YNP, while the Department of

Livestock is the lead agency outside the park in Montana. No bison have been captured outside the park since 2009. The capture and culling of bison in YNP only occurs after bison move outside the park to provide harvest opportunities for public and tribal hunters. If the number of bison decreased to less than 2,100, the NPS and the State of Montana are supposed to cease lethal removals.

Captures in YNP occur before the end of March at a facility in the Stephens Creek Administrative Area, which is located in the northern portion of the park and closed to public access year-round. If managers decide to cull bison to limit abundance, they primarily capture migrating groups of females and young since these groups migrate to the boundary more than adult males. Bison are captured in fenced pens at Stephens Creek either by leaving gates open or by deliberately herding them into the pens. Thereafter, NPS personnel contact tribal and agency partners to schedule transport to meat processing, quarantine, or research facilities. About 24 hours ahead of shipping, NPS personnel move bison into the handling facility. Thereafter, bison are systematically moved through alleyways and restrained in a processing chute where they are marked with a glue-on back tag and blood is drawn to determine if they have antibodies indicating previous exposure to *Brucella* bacteria. The animal's age, sex, and weight is recorded with the back tag number. Each animal is then directed (i.e., sorted) to a holding area with other bison of similar age and sex. Older bulls are not intermixed with other bison for safety reasons.

The NPS communicates with tribal and agency partners during processing regarding how many bison are available, what age and sex categories they represent, and which bison will be transported to various meat processing, quarantine, or research facilities. The NPS has agreements with several tribes to provide them with bison for shipment to meat processing facilities and subsequent distribution of meat, hides, and horns to their members. Based on these discussions, the NPS organizes the processed bison into appropriate-sized groups in various holding areas so they can be loaded onto trailers the next morning without further sorting. On shipping day, the haulers line up their trucks in order of the load-out procedure determined the previous afternoon. The trailers are loaded with bison; local representatives of APHIS certify the numbers, sexes, and age categories of bison loaded and secured in each trailer (APHIS Veterinary Services Form 1-27); the haulers chain and lock the trailer doors closed; APHIS personnel put a documentation tag on the lock and chain; and the hauler is provided with a list of each bison on board the trailer. The trailers leave the Stephens Creek facility with their respective law enforcement escorts and are transported directly to slaughter facilities, where they are killed and processed. A meat inspection agency representative certifies that all bison are delivered to processing facilities.

Brucellosis Suppression: Captured bison not sent to processing facilities may be held for release when winter weather moderates in spring or earlier to provide operational space and shorten confinement. If, for whatever reason, it is necessary to hold pregnant, likely infectious bison in the Stephens Creek capture facility, then NPS staff will attempt to separate them from susceptible bison and keep them in isolation until they have calved and the risk of brucellosis transmission has abated. Calf, yearling, and non-pregnant adult female bison released from the capture facility after the conclusion of the hunting seasons may be vaccinated for brucellosis via syringe with a safe vaccine (currently strain RB-51), regardless of their brucellosis testing status (i.e., seropositive or seronegative). The primary reason for vaccinating bison would be to reduce the shedding of *Brucella* bacteria and, thereby, the potential for further transmission after individuals become infected. The vaccine does not prevent bison from becoming infected after exposure to infectious amounts of *Brucella* bacteria. Animals vaccinated with *Brucella* vaccine should not be consumed within 21 days of vaccination. Bison may be vaccinated and held at the capture facility for the duration of the 21-day withdrawal period, or be vaccinated and released after the end of hunting seasons. No brucellosis suppression actions are taken with elk in YNP or nearby areas of Montana.

By June 15 each year, APHIS and the Montana Department of Livestock determine and document the vaccination status of all at-risk cattle in or coming into the Hebgen and Gardiner basins. These agencies use existing regulations and/or incentives to ensure 100% of adult cattle in the Hebgen and Gardiner basins are calf-hood and/or adult vaccinated with Strain RB-51. If the vaccination status of adult cattle in these areas is not 100%, then vaccination or other to-be-determined actions will be taken to achieve 100% status as determined by the state veterinarian. However, the vaccine does not prevent cattle from becoming infected after exposure to infectious amounts of *Brucella* bacteria.

Quarantine: Quarantine was included in the IBMP as a tool to supplement other methods (hunting, culling) used to manage bison abundance, while reducing the frequency and magnitude of bison shipments to meat processing facilities. During 2005-2010, a quarantine feasibility study conducted by APHIS and Montana Fish, Wildlife & Parks with Yellowstone bison in pastures at Corwin Springs, Montana, demonstrated bison repeatedly testing negative for brucellosis antibodies through pregnancy and calving could be considered brucellosis-free. An Environmental Assessment released by the NPS in 2016 proposed to implement quarantine to identify brucellosis-free bison to establish new conservation and cultural herds, enhance cultural and nutritional opportunities for Indians, and reduce shipments of bison to slaughter. In December 2017, the NPS, APHIS, and the State of Montana developed and signed an agreement in principle which could facilitate the movement and release of Yellowstone bison to tribal lands in the future. Bison would only be placed in quarantine when population size is

(b)5 Draft-Deliberative

(b)5 Draft-Deliberative

Existing quarantine facilities which meet the structural specifications and biosecurity requirements developed by APHIS and the Montana Department of Livestock during June 2017 are located at Stephens Creek, Corwin Springs, and the Fort Peck Reservation. Quarantine would be accomplished in three phases. In Phase I, bison would be captured in or near YNP during winter operations. Bison considered suitable for quarantine based on initial negative serology tests would be isolated in double-fenced quarantine pastures and tested for brucellosis antibodies approximately every 30-45 days until all bison test negative for 2-3 consecutive months. In Phase II, bison in these individual test groups would undergo the brucellosis testing protocol by age and sex described in the Uniform Methods and Rules (APHIS 91-45-013). In Phase III, bison remaining brucellosis-free through the quarantine testing protocol would be vaccinated with strain RB-51 and transferred to one or more other fenced pastures, with additional brucellosis tests conducted at about 6 and 12 months after release (i.e., post-quarantine assurance testing). These bison would be kept separate from other animals until the 6-month test is completed. Thereafter, the brucellosis-free bison would be released on suitable public and tribal lands for conservation and cultural purposes.

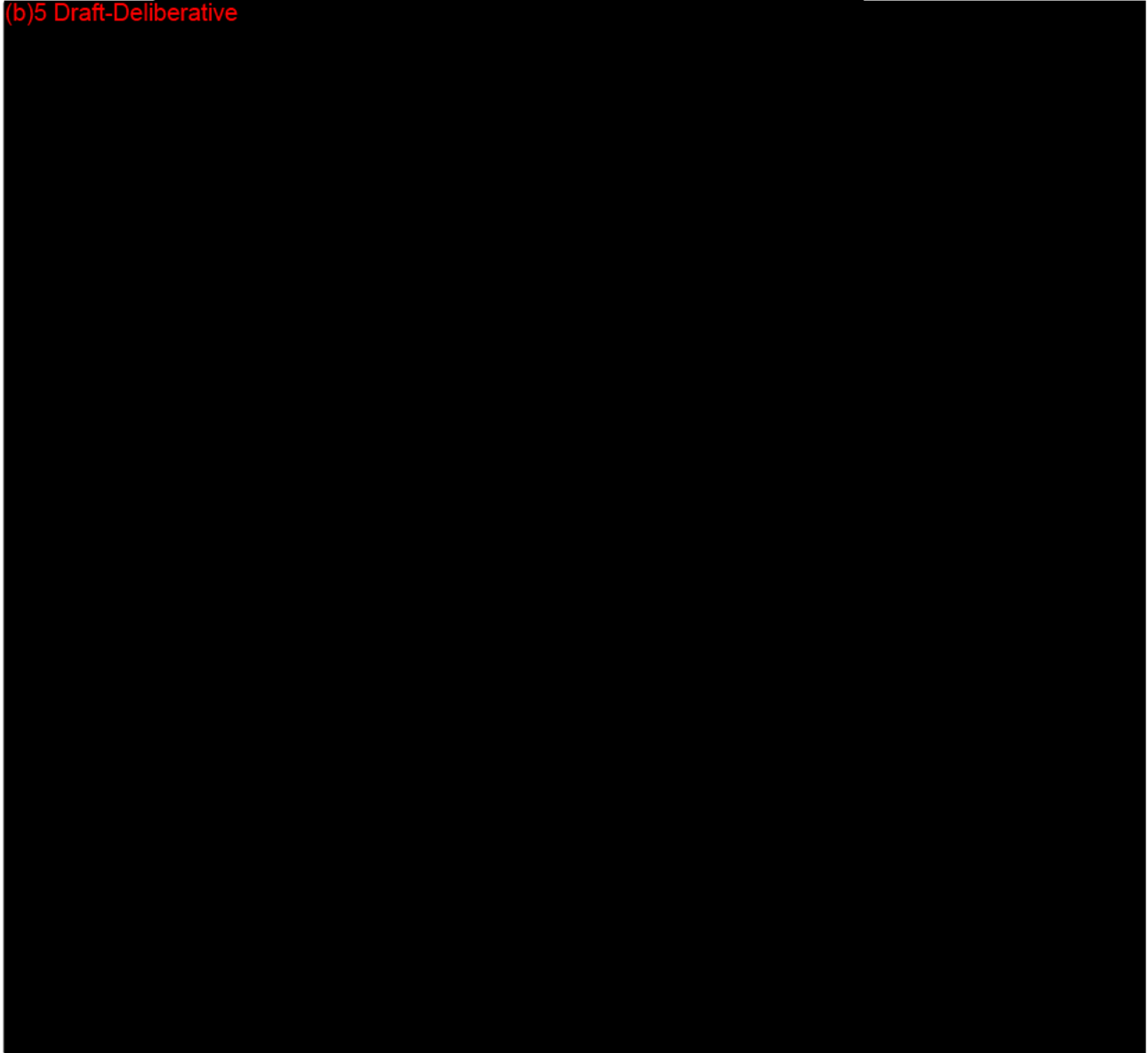
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(b)5 Draft-Deliberative

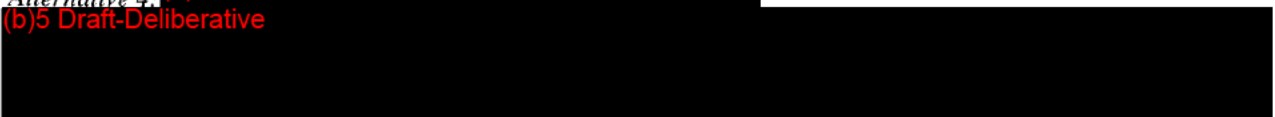
(b)5 Draft-Deliberative



Alternative 3: (b)5 Draft-Deliberative
(b)5 Draft-Deliberative



Alternative 4: (b)5 Draft-Deliberative
(b)5 Draft-Deliberative



(b)5 Draft-Deliberative



Actions Common to All Alternatives

Encourage More Tolerance for Bison in States Surrounding YNP

(b)5 Draft-Deliberative



(b)5 Draft-Deliberative Actions adopted by the Montana Fish, Wildlife & Parks Commission to disperse concentrations of wild elk near cattle include hunting, habitat alterations to promote spatial and temporal separation, and hazing and

fencing to maintain separation. (b)5 Draft-Deliberative
(b)5 Draft-Deliberative

Habitat Enhancement

(b)5 Draft-Deliberative

Bison Health and Welfare

There are several animal welfare considerations when managing wild bison in and near YNP. These considerations include the humane treatment of bison during management activities. (b)5 Draft-Deliberative
(b)5 Draft-Deliberative

Protect People and Property

Broad support exists for migratory bison in YNP and the Gardiner and Hebgen basins of Montana, but many people are concerned about vehicle collisions and concentrations of bison near their homes and other property. (b)5 Draft-Deliberative
(b)5 Draft-Deliberative

Montana Fish, Wildlife & Parks, Natural Resources Defense Council, Greater Yellowstone Coalition, Sierra Club, and Defenders of Wildlife implement the Yellowstone Bison Coexistence Fencing Project in Montana, whereby landowners in the Gardiner and Hebgen basins receive one-half of the cost of fencing to mitigate concerns about property damage from bison, with a \$1,000 limit per landowner.

Adjustments to Management

Adaptive management is a decision-making process whereby (1) the problem and its uncertainties are described, (2) understanding of the system is modeled, (3) responses to management actions are predicted using measurable objectives, (4) management actions are designed and implemented to reach desired outcomes, (5) monitoring of the effects and effectiveness of actions is conducted to evaluate progress, and (6) actions and models are adjusted to further progress towards desired outcomes (Williams et al. 2007). The NPS and other federal and state agencies and tribes involved with the IBMP have used variants of this process, including learning through management experience, monitoring, and research, to inform decision-making and make adjustments to improve bison conservation and management. (b)5 Draft-Deliberative
(b)5 Draft-Deliberative

Annual Operations Plans

Under the IBMP, annual operations plans serve as the primary mechanism for describing, implementing, and adjusting commitments and agreements for cooperative management of Yellowstone bison across jurisdictions. (b)5 Draft-Deliberative
(b)5 Draft-Deliberative

Public Participation

The NPS would continue to participate in public meetings regarding bison management and support the role of the Citizen's Working Group, which was established in 2011 by private citizens and supported, in part, by members of the IBMP to seek responsible management solutions for Yellowstone bison. Also, the NPS will consider

(b)5 Draft-Deliberative



(b)5 Draft-Deliberative

The NPS will continue communicating scientific information to the public, discussing management strategies with local government officials, evaluating human and social factors influencing bison management, and involving people in monitoring and research (citizen science), when appropriate.

Alternatives and Tools Considered and Dismissed From Detailed Analysis

(b)5 Draft-Deliberative



(b)5 Draft-Deliberative



(b)5 Draft-Deliberative



Alternative Summaries

Table 1 summarizes the chief features of each alternative in comparative fashion. Table 2 compares each alternative with the project objectives. Table 3 summarizes the direct and indirect impacts of each alternative on park resources and values.

Table 1. Summary of management alternatives and activities (or tools) being considered and evaluated for Yellowstone bison.

Alternatives	Activities	1: No Action (Management Pursuant to the 2000 IBMP, as Adjusted)	2: (b)5 Draft- (b)5 Draft-Deliberative	3: (b)5 Draft-Deliberative (b)5 Draft-Deliberative	4: (b)5 Draft-Deliberative (b)5 Draft-Deliberative
Abundance (before calving)		Objective = 3,000; hunting and culling used to limit bison abundance	(b)5 Draft-Deliberative	(b)5 Draft-Deliberative	(b)5 Draft-Deliberative
Brucellosis suppression		Prevalence is supposed to be decreased via vaccination and culling test-positive bison			
Public and treaty hunting		Outside the park			
Hazing		Maintain separation of bison and cattle; protect property and human safety; haze female and young bison north of YNP back to the park around May 1			
Capture		Facilities near the park boundary			
Research (brucellosis suppression)		Conduct research to improve suppression techniques			
Vaccination		Conducted at boundary capture facilities; conduct research to improve techniques/technology			
Meat processing facilities (shipments to slaughter)		Used to reduce abundance and remove bison previously exposed to brucellosis			
Quarantine		May be implemented at facilities in YNP, Corwin Springs, and at Fort Peck			
Hunting/terminal pastures		No pastures operational, but could be implemented in future			
Sterilization		No fertility control			

				(b)5 Draft-Deliberative
Alternatives Activities	1: No Action (Management Pursuant to the 2000 IBMP, as Adjusted)	2: (b)5 Draft-Deliberative (b)5 Draft-Deliberative (b)5 Draft-Deliberative	3: (b)5 Draft-Deliberative (b)5 Draft-Deliberative	4: (b)5 Draft-Deliberative (b)5 Draft-Deliberative
Tolerance in Montana	Prerogative of the State and the Forest Service; currently, higher than envisioned in the 2000 IBMP			
Habitat enhancement	Prerogative of the surrounding states, Forest Service, and NPS			

Table 2. Comparison of alternatives with objectives and other needs for the management of Yellowstone bison.

Objectives/Other Needs	Alternatives			
	1: No Action (Management Pursuant to the 2000 IBMP, as Adjusted)	2: (b)5 Draft- (b)5 Draft-Deliberative	3: (b)5 Draft- (b)5 Draft-Deliberative	4: (b)5 Draft- (b)5 Draft-Deliberative
<u>Goal</u> : Sustain a viable population of wild, wide-ranging of bison in and near YNP	Yellowstone bison are the largest migratory population of plains bison, but their distribution is constrained to YNP and nearby areas of Montana	(b)5 Draft-Deliberative		
<u>Objective 1</u> : Maintain the processes of migration and dispersal	Bison are allowed to occupy all lands in YNP and nearby areas of Montana			
<u>Objective 2</u> : Maintain existing genetic diversity and historic lineages	Population has relatively high genetic diversity and indigenous and introduced lineages; concerns about the effects of large culls			
<u>Objective 3</u> : Contribute to a low risk of brucellosis transmission from bison directly to cattle	No transmission of brucellosis because management maintains separation and reduces bison abundance and migration into Montana			

Objective 4: As necessary, regulate bison abundance to lessen adverse impacts from high densities of bison on other natural resources, human safety, and property	Abundance objective is 3,000 before calving; hunting and culling are used to limit abundance; hazing and lethal removals are used to rectify conflicts	(b)5 Draft-Deliberative
Other need: Improve collaboration with other agencies and tribes that implement bison management actions	The agencies and tribes hold three public meetings each year and develop an annual operations plan to coordinate actions	
Other need: Involve the public more in deliberations and decision-making	The jurisdictions and objectives of the agencies and tribes are not clearly understood by the general public	

Table 3. Comparison of environmental impacts by alternative for managing Yellowstone bison.

IMPACT TOPICS	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
Yellowstone Bison	No Action (Management Pursuant to the 2000 IBMP, as Adjusted)	(b)5 Draft-Deliberative		
Population dynamics	Moderate, adverse, local impacts could result in the short-term from removing several hundred bison from the population each year. The population has recovered from removals of more than 1,000 bison during several winters since 1985.			
Distribution	Moderate to major, adverse, regional impacts could result in the long term from bison being constrained to YNP and nearby areas. The IBMP was adjusted to allow more bison in a larger area of Montana, but still a small portion of the GYA.			
Ecological role	Moderate to major, long-term, adverse, local impacts could result if large numbers of bison are forced to remain in and near YNP year-round.			
Genetics and adaptive capabilities	Minor, adverse, local impacts could result in the short- and long-term from removing migratory female-calf groups. However, existing genetic diversity and lineages should be maintained for centuries.			

IMPACT TOPICS	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
Injuries and trauma	Minor, adverse, local impacts could result in the short- and long-term from injuries, infection, and stress during hazing, capture, transport, confinement, physical restraint, and testing.	(b)5 Draft-Deliberative		
Maintain separation between bison and cattle	Minor, adverse, regional impacts could result in the short- and long-term from hazing and lethal removals. Bison have occasionally mingled with cattle for short periods, but there was no transmission of brucellosis.			
Brucellosis suppression	Minor, adverse, local impacts could result in the short- and long-term because about 60% of adult females are exposed to bacteria during their lives. However, abortions appear rare and reproductive and survival rates are high.			
Harvests	Moderate, adverse, regional impacts could result in the short-term from removing several hundred bison from the population each year. Hunting, by itself, has not been effective at regulating population size, and firing lines constrain bison to YNP.			
Culls and shipments to slaughter, quarantine, and research facilities	Moderate, adverse, local impacts could result in the short-term from removing several hundred bison each year. Captures mostly remove migratory female-calf groups.			

IMPACT TOPICS	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
Other Wildlife		(b)5 Draft-Deliberative		
Disturbance and displacement	Minor, adverse, local impacts could result in the short-term from bison management. Most wildlife species have already adjusted to culling, hazing, and hunting activities.			
Bison grazing effects (competition)	Minor to moderate, adverse to beneficial, regional impacts could result in the short- and long-term to other grazers. Modest grazing intensities with seasonal migrations can stimulate above-ground plant production.			
Barriers to movements	Negligible to minor, adverse, regional impacts in the short-term because most animals are familiar with existing fencing patterns and readily move around bison management facilities.			
Effects of bison removals	Negligible to minor, adverse, local impacts in the short- and long-term because the abundance of bison, and the potential for predation or scavenging, has been higher during the IBMP period.			
Brucellosis transmission	Minor, adverse, local impacts in the short- and long-term because current management should not increase the risk of brucellosis being transmitted to wild elk and spreading.			
Threatened Species				

IMPACT TOPICS	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
Disturbance and displacement	The NPS and Fish and Wildlife Service concluded displacement and disturbance from bison management would have negligible impacts on Canada lynx.	(b)5 Draft-Deliberative		
Effects of bison removals	The Fish and Wildlife Service concluded in 2000 and 2012 that slight changes in the availability of bison carrion would have negligible impacts on Canada lynx.			
Brucellosis transmission	Negligible impacts would occur to Canada lynx from consuming <i>Brucella</i> bacteria in an infected bison. Lynx do not transmit brucellosis.			
(b)5 Draft-Deliberative				

IMPACT TOPICS	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
(b)5 Draft-Deliberative				

IMPACT TOPICS	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
(b)5 Draft-Deliberative				

Environmentally Preferable Alternative

The environmentally preferable alternative is the alternative "that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources" (43 Code of Federal Regulations 46.30). Based on this definition, the environmentally preferable alternative is (b)5 Draft-

(b)5 Draft-Deliberative

Preferred Alternative

The preferred alternative is the one the NPS believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors (Question 4a of the Council of Environmental Quality's "Forty Most Asked Questions Concerning Council of Environmental Quality's NEPA [National Environmental Policy Act] Regulations" (1981)). Based on this definition, the preferable alternative is (b)5 Draft-

(b)5 Draft-Deliberative

Affected Environment and Environmental Consequences

This chapter describes the physical, biological, and human environment potentially affected by the implementation of any of the alternatives. The resource descriptions serve as the baseline from which to compare the potential effects of bison management actions within and near YNP. The assumptions, methods, and results of analyses for impacts from current management and the other proposed alternatives are described for each impact topic.

The generalized approach for analyzing each impact topic is to define the issues of concern as discovered through scoping and consultation, identify the area of potential effects to resources, NPS values, and visitor experiences, and disclose those effects likely to occur under the scenarios described by each of the proposed alternatives. Potential impacts are characterized from a variety of perspectives, including type (beneficial or adverse), context (local or regional), duration (short- or long-term, seasonal or continuous), and intensity (negligible, minor, moderate, or major). The following definitions were applied for all impact topics:

- *Beneficial impact*—a positive change in the condition or appearance of the resource or a change moving the resource toward a desired condition.
- *Adverse impact*—a negative change in the condition or appearance of the resource or a change moving the resource away from a desired condition.
- *Site-specific impact*—the action would affect a relatively small area, centered on where the action takes place.
- *Local impact*—the action would affect areas within YNP and Yellowstone bison themselves.
- *Regional impact*—the action would affect resources within YNP and surrounding areas of the GYA.
- *Short-term impact*—consequences of the action would be short in duration and not detectable after a resource returns to the pre-implementation condition.
- *Long-term impact*—consequences of the action would result in a lasting or nearly permanent change in resource conditions.

The magnitude of effect is categorized into four levels of intensity: negligible, minor, moderate, and major. Definitions for these four categories are described in each impact section based on management objectives, consultation with tribal officials and regulatory agencies, the public scoping process, and conversations with subject matter experts.

Yellowstone Bison

Affected Environment

Yellowstone bison are noteworthy because the population faced extinction just over a century ago, but today thousands of individuals roam relatively freely over an expansive landscape. These unfenced bison exhibit wild behaviors reminiscent of prehistoric populations, with large congregations of individuals competing for food and mates, group defensive strategies to protect their young from predators, and migration and pioneering movements to explore new areas. Also, the population has two important genetic lineages of plains bison, indigenous and introduced (Pablo-Allard), with high diversity and no evidence of interbreeding with cattle. However, the population is geographically isolated from other populations and more than 1,000 bison have been sporadically culled and harvested from the population several times during the past two decades to reduce migratory movements to winter ranges outside YNP where there is limited acceptance for wild bison due to disease, property, and human safety issues. These large culls, combined with intervening periods of rapid population growth, resulted in substantial fluctuations in bison population size and generated concerns about possible reductions in genetic variation.

Female bison typically reach sexual maturity and conceive their first calf at 2 or 3 years of age. Males typically do not breed until they are 5 or 6 years old because older, larger males dominate opportunities. Mature female bison generally produce one calf every one or two years for their entire lives. Calves are born during March through June, with 80% of births occurring during late April and May. Bison are long-lived, with some females living 20 or more years. Survival rates for adult females have been high (0.88 to 0.98) during recent decades. Adult males have lower survival and rarely live past 12 years of age, which is probably related to the intense and prolonged competition for mates during the breeding season. Bison calves have surprisingly high survival rates (0.65) given the high densities of predators such as grizzly bears and wolves in YNP.

Yellowstone bison are considered migratory because most animals move back and forth between seasonal ranges to better access grasses, sedges, and other grass-like plants that comprise more than 90% of their diets through the year. Bison move from higher-elevation summer ranges to lower elevations during autumn through winter; returning to summer ranges in June. Bison in northern YNP primarily occupy the Yellowstone River drainage and surrounding mountains between the Lamar Valley and Mirror Plateau in the east and the lower-elevation Gardiner basin in the west. They congregate in the Lamar Valley and on adjacent plateaus during the breeding season. Bison in central YNP occupy the central plateau, extending from the Pelican and Hayden valleys in the east to the lower-elevation and geothermally influenced Madison headwaters area in the west. They congregate in the Hayden Valley for breeding and then move between the Madison, Firehole, Hayden, and Pelican valleys. Also, some bison travel to the northern region of YNP during winter before returning to the Hayden Valley for the subsequent breeding season.

Migration by Yellowstone bison is driven by their density, forage availability, the timing and extent of snow pack, learning, and other factors. While YNP provides a large amount of habitat for bison, it does not include many lower-elevation valleys used by these animals when deep snow limits access to grasses in the mountains. As a result, many hundreds to thousands of bison migrate outside the boundary of YNP during about one-third to one-half of winters. However, large portions of the valleys historically used by these bison are no longer available due to agricultural and residential development. Also, there is little tolerance for bison in these areas due to concerns about human safety and property damage, competition with livestock and elk for grass, and brucellosis transmission to cattle. As a result, substantial numbers of bison may be culled and harvested when abundance is above 3,000 bison. Human removals have been the primary cause of mortality since 1985, with more than 11,700 bison removed from the population.

Under the IBMP, counts of bison in central Yellowstone during summer increased from 2,118 in 2000 to 3,531 in 2005 due to high reproduction, survival, and recruitment. Counts then decreased to 1,284 bison by summer 2015 due to culls of 1,044 bison during 2006 and 1,726 bison during 2008. Conversely, counts of bison in northern Yellowstone increased from 590 in 2000 to 4,008 in 2016. This rapid increase was enhanced by immigration of bison from central Yellowstone and, possibly, reduced competition as counts of northern Yellowstone elk decreased from about 19,000 in 1994 to 4,850 in 2015 following the recovery of grizzly bears, wolves, and other predators.

Methodology and Intensity Level Definitions

The thresholds of change for the intensity of impacts to Yellowstone bison are defined as follows:

- Negligible: Yellowstone bison would not be affected or changes would be either undetectable or, if detected, would have effects considered slight and short term.
- Minor: Temporary displacement of a few localized individuals or groups of bison, but mortality or culling of individuals would not impact population trends. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
- Moderate: Effects to Yellowstone bison would be readily detectable, long term, and regional, with consequences affecting population trends. Mitigation measures needed to offset adverse effects would be extensive, but likely successful.
- Major: Effects to Yellowstone bison would be obvious, long term, and have substantial consequences to the population, with mortality or culling of a number of individuals subsequently jeopardizing the viability of the population. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

The types and levels of impacts for each alternative are described in the following sections and summarized in Table 3.

Impacts of Alternative 1 – No Action

The effects of implementing the IBMP on Yellowstone bison were evaluated in a Final Environmental Impact Statement and Record of Decision (see the <<http://ibmp.info>> website in the *Document Library* section). The analysis for the 2000 IBMP envisioned captures and shipments of bison to processing facilities as the primary method to limit bison abundance and distribution. It was anticipated the implementation of the modified preferred alternative and the selected action would have a moderate adverse impact to the bison population in terms of overall removal of animals. However, modeling predicted these removals would not measurably affect the age and sex distribution or reproductive rates of the population based on removing 246 bison each year to limit the total population size to about 3,000 animals.

Population Dynamics.—Post-calving counts of Yellowstone bison during the IBMP period (2001 to 2018) were between 2,969 and 5,459 (average = 4,195; Table 4). For comparison, similar counts during the pre-IBMP period (1991 to 2000) were between 2,111 and 4,114 (average = 3,085). Recent counts (4,816 in 2017) remain well above the IBMP objective of 3,000, but the age and sex composition is near objectives, with 27% juveniles (calves and yearlings) and a sex ratio of 52% males during summer 2017 (Geremia et al. 2017).

Distribution.—Current management has attained the objectives of maintaining the processes of migration and dispersal within YNP and agreed-upon conservation areas in Montana, with large breeding congregations in the central and northern regions of YNP. Also, adaptive management adjustments during 2006 to 2016 increased tolerance for bison in the Gardiner and Hebgen basins by expanding the areal and numeric limits for bison included in the 2000 IBMP, which was up to 100 bison in small portions of these basins (see documents in the *Adaptive Management* section at <ibmp.info>). Currently, up to 450 bison are allowed north of YNP during winter and spring, while 450 to 600 bison are allowed west of YNP (Bullock 2015). However, bison are often prevented from accessing lands north of YNP due to concentrations of hunters near the park boundary and hazing elsewhere due to concerns about bison mingling with cattle, highway safety, and property damage. The 2000 IBMP allows bison year-round in Eagle Creek/Bear Creek and portions of the Absaroka-Beartooth north of YNP. Migrating bison frequently use the Eagle Creek/Bear Creek area and occasionally use the Absaroka-Beartooth wilderness. Also, the 2000 IBMP allowed bison year-round in the Cabin Creek Recreation and Wildlife Management Area and Monument Mountain Unit of the Lee Metcalf Wilderness west of YNP. However, bison have never migrated to these areas because they are prevented from moving through intervening ranches with cattle or along the Highway 191 corridor.

Ecological Role.—A large population of more than 3,000 wild bison in and near YNP will influence the landscape through nutrient distribution, competing with other ungulates, creating wallows and small wetlands, converting grass to animal matter, and providing sustenance for predators, scavengers, and decomposers. Bison in YNP are selecting areas with high quality food value (i.e., grasses with higher nitrogen content) and enhancing grass quality by re-grazing productive sites and depositing urine and fecal material (Wallen et al. 2015).

Genetics and Adaptive Capabilities.—Geneticists recently identified 10 different mitochondrial DNA haplotypes and an overall haplotype diversity of 0.78, indicating a healthy, diverse population. Mitochondrial haplotypes

indicated no population subdivision, but two independent lineages in approximately equal proportions that correspond to the endemic bison originally in central YNP and the bison introduced into northern YNP from the Pablo-Allard herd in 1902 (Forgacs et al. 2016). The population should retain this genetic diversity for centuries with a fluctuating population size averaging at least 3,000 to 3,500 bison (Pérez-Figueroa et al. 2012). Hundreds of bison congregate in various portions of the central and northern regions of YNP during the breeding season, where mature males compete for breeding opportunities. Parentage analyses indicate a high portion of adults contribute offspring to the population during their lifetimes (Herman et al. 2014). Also, bison are exposed to natural selection through competition, predation, and extreme environmental conditions.

Injuries and Trauma to Bison.—The environmental impacts of capturing, confining, handling, restraining, testing, and transporting bison from the Yellowstone population were previously assessed in the Final Environmental Impact Statement for the IBMP (see the <<http://ibmp.info>> website in the *Document Library* section). Appendix F of that document provides a summary of bison management techniques the NPS developed with veterinarians and members of the Humane Society of the United States, including during hazing, capture, handling, transport, and euthanasia. These techniques have been used since 1997 to lessen injuries and trauma to bison. Bison could be hazed to the Stephens Creek capture facility or other temporary capture facilities in or near YNP. Hazing is a form of harassment that disrupts bison distribution and, in this case, migratory or dispersal movements. Hazing imposes energetic and other physiological costs on bison which, like all ungulates in this temperate mountainous environment, are chronically undernourished during late winter. Hazing also contributes to occasional injuries and temporary behavioral changes such as aggression by some bison, disruption of group cohesion and some mother-calf pairs, flight behavior such as running, and impeding bison from stopping to feed, drink, or rest as they may desire.

Some captured bison congregated in holding paddocks could become injured by running into facility walls or other bison, or by aggressive behavior toward other individuals. Injuries may include breaking horns on hard structures or being gored by other bison. Also, capture operations usually occur during winter months when bison energy reserves are low and snow conditions limit forage availability. Some captured bison may be more susceptible to injury during mid- to late-winter because of decreases in their physical condition. In addition, physically restraining bison for brucellosis testing temporarily elevates their stress levels and makes them more susceptible to injury. There could be stress and injuries to bison during loading or transport in trailers due to crowding, fighting, or panic. Captured bison would be observed daily and individuals showing clinical signs of disease would be segregated while biologists consult with veterinarians and, if necessary, test and treat or cull the affected bison. (b)5 Draft-Deliberative

(b)5 Draft-Deliberative There is some concern about injuries or mortality from fires in a facility because during 2012 a fire burned through the fenced pasture on the Fort Peck Reservation, killing 10 Yellowstone bison relocated from a quarantine feasibility study. (b)5 Draft-Deliberative

Maintain Separation between Bison and Cattle.—The transmission of brucellosis from bison to cattle has not occurred, due in part, to successful efforts by federal and state agencies to maintain separation.

Brucellosis Suppression.—There has not been a reduction in brucellosis prevalence within the Yellowstone bison population under the IBMP. The proportion of adult females that test positive for brucellosis exposure has remained approximately constant at about 60 percent (Hobbs et al. 2015). Several of the key assumptions in the plan were faulty or problematic to implement. Also, expected advances in vaccines, diagnostics, and delivery technologies did not occur, and as a result, the plan overestimated the feasibility and effectiveness of vaccination (White et al. 2015).

Table 4. Numbers of bison removed from YNP or nearby areas of Montana during winters from 1985 to 2018.

Winter	Number of Bison Counted Previous July-August			Sent to Slaughter/ Management Culls		Hunter Harvest ^a		Sent to Quarantine		Total
	North	Central	Total	North	West	North	West	North	West	
1985	695	1,552	2,247	0	0	88	0	0	0	88
1986	742	1,609	2,351	0	0	41	16	0	0	57
1987	998	1,778	2,776	0	0	0	7	0	0	7
1988	940	2,036	2,976	0	0	2	37	0	0	39
1989	NA ^b	NA ^b	NA ^b	0	0	567	2	0	0	569
1990	592	1,885	2,477	0	0	1	3	0	0	4
1991	818	2,203	3,021	0	0	0	14	0	0	14
1992	822	2,290	3,112	249	22	0	0	0	0	271
1993	681	2,676	3,357	0	79	0	0	0	0	79
1994	686	2,635	3,321	0	5	0	0	0	0	5
1995	1,140	2,974	4,114	307	119	0	0	0	0	426
1996	866	3,062	3,928	26	344	0	0	0	0	370 ^c
1997	785	2,593	3,378	725	358	0	0	0	0	1,083 ^d
1998	455	1,715	2,170	0	11	0	0	0	0	11
1999	493	1,399	1,892	0	94	0	0	0	0	94
2000	540	1,904	2,444	0	0	0	0	0	0	0
2001	508	1,924	2,432	0	6	0	0	0	0	6
2002	719	2,564	3,283	0	202	0	0	0	0	202
2003	813	2,902	3,715	231	13	0	0	0	0	244
2004	888	2,923	3,811	267	15	0	0	0	0	282
2005	876	3,339	4,215	1	96	0	0	0	17	114
2006	1,484	3,531	5,015	861	56	32	8	87	0	1,044
2007	1,377	2,512	3,889	0	4	47	12	0	0	63
2008	2,070	2,624	4,694	1,288	160	59	107	112	0	1,726
2009	1,500	1,469	2,969	0	4	1	0	0	0	5
2010	1,837	1,464	3,301	3	0	4	0	0	0	7
2011	2,246	1,652	3,898	6	0	Unknown	Unknown	53	0	
2012	2,314	1,406	3,720	0	0	15	13	0	0	28
2013	2,669	1,561	4,230	0	0	148	81	0	0	229
2014	3,420	1,504	4,924	258	0	258	69	60	0	645
2015	3,424	1,441	4,865	511	0	201	18	7	0	737
2016	3,627	1,282	4,910	101	0	378	24	49	0	552
2017	4,008	1,451	5,459	753	0	389	97	35	0	1,274
2018	3,969	847	4,816	698	0	285	87	98	0	1168

^a - Total bison shot by game wardens and hunters during 1973 through 1991, and state and tribal hunters after 2000.

^b - Aerial survey data not available during summer survey period (July-August).

^c - The Final Environmental Impact Statement reported 433 bison, but YNP records only indicate 370 bison.

^d - Total does not include less than 100 bison captured at the north boundary and consigned to a research facility.

^e - Total harvest from areas north and west of YNP in Montana.

^f - Total does not include 20 to 30 wounded bison that returned to the park and were dispatched by rangers or died.

Harvests.—About 2,330 bison have been harvested by public and tribal hunters during the IBMP (2001-2018). In 2009, managers adaptively adjusted the IBMP to increase the use of public and treaty hunts to manage bison numbers and demographic rates, while decreasing shipments of bison to slaughter facilities. The bison population was allowed to increase to 4,000+ animals to increase migration to the park boundaries during winter and facilitate hunting. However, hunting by itself has not been effective at regulating population size. At current population sizes (4,816 in 2017), about 600 to 700 bison need to be removed from the population each winter to maintain a relatively stable population size. The maximum number of bison harvested during a given winter was about 486 during 2016-2017. However, firing lines of too many hunters concentrated in small area (Beattie Gulch) near the northern park boundary prevented further migration within the conservation area and resulted in bison returning to, and staying within, the park where hunting is prohibited.

Culls and Shipments to Slaughter, Quarantine, and Research Facilities.—The IBMP underestimated bison reproduction and survival rates, which means more bison must be removed to regulate the population towards 3,000. This has contributed to a continued reliance on the capture and shipment of bison to meat processing facilities to reduce abundance. Under the IBMP (2001-2018), about 4,468 bison have been shipped to slaughter or research (5,534) and quarantine (518) facilities. Culls of bison were higher (3,423) during the first 10 years the IBMP was implemented than during the 10 years prior to the IBMP (2,339), in part due to larger overall abundance of bison. The population has shown resiliency to recover from culling and harvesting, with a count of more than 4,800 bison in summer 2015 despite the removal of about 8,385 bison from the population since 2001.

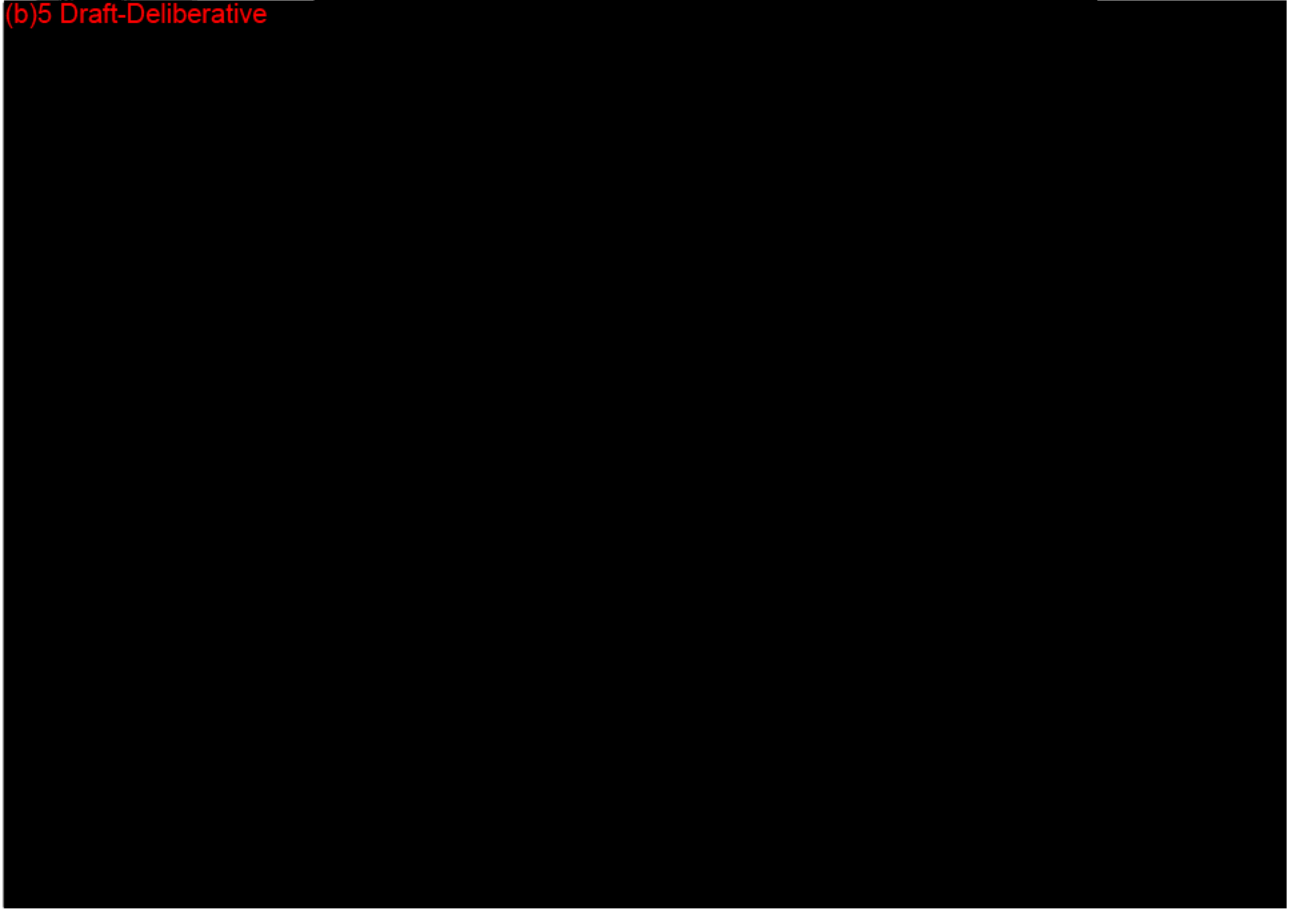
Impacts of Alternative 2 (b)5 Draft-Deliberative

(b)5 Draft-Deliberative

(b)5 Draft-Deliberative



Impacts of Alternative 3 – (b)5 Draft-Deliberative
(b)5 Draft-Deliberative



(b)5 Draft-Deliberative



Impacts of Alternative 4 – (b)5 Draft-Deliberative

(b)5 Draft-Deliberative



(b)5 Draft-Deliberative



Other Wildlife

(b)5 Draft-Deliberative



(b)5 Draft-Deliberative



Impacts of Alternative 1 – No Action

The effects of implementing the IBMP on other wildlife species were evaluated in a 2000 Final Environmental Impact Statement and Record of Decision (see the <<http://ibmp.info>> website in the *Document Library* section). The NPS acknowledged the potential for moderate to major impacts on the pronghorn population which spends winter in the Gardiner basin, minor beneficial impacts to scavengers due to winter-killed carcasses in areas where bison were tolerated in Montana, and negligible impacts associated with bison grazing and changes in behavior.

Disturbance and Displacement.—Counter to predictions, pronghorn abundance increased from about 200 to 505, and their distribution expanded from YNP north to the southern Paradise Valley in Montana, during the IBMP. (b)5

(b)5 Draft-Deliberative



Bison Grazing Effects.—When there were about 2,000 to 4,000 bison and more than 10,000 elk in central and northern YNP during 1998 and 2004, some grassland areas were intensively grazed (55 to 70 percent) during summer. However, the grazed grasses recovered due to the facilitating effects of moderate grazing on the availability of plant resources and animal movements to other patches (Olenicki and Irby 2003, Frank 2008). (b)5

(b)5 Draft-Deliberative



(b)5 Draft-Deliberative

During 1991-2012, the number of bison carcasses detected during spring surveys remained similar in northern Yellowstone and the Firehole River area, but decreased in the Norris geyser basin (USDI, NPS 2012). (b)5 Draft-Deliberative

(b)5 Draft-Deliberative



Brucellosis Transmission.—Brucellosis is transmitted between wild bison and elk in and near YNP. Bison and northern Yellowstone elk have predominantly one lineage of *Brucella abortus*, which is constrained to YNP and the southern Paradise Valley in Montana (Kamath et al. 2016). (b)5 Draft-Deliberative

Impacts of Alternative 2 – (b)5 Draft-Deliberative

(b)5 Draft-Deliberative



(b)5 Draft-Deliberative



Impacts of Alternative 3 –

(b)5 Draft-Deliberative



(b)5 Draft-Deliberative

Impacts of Alternative 4 –

(b)5 Draft-Deliberative



(b)5 Draft-Deliberative

Threatened Species

Affected Environment

Section 7(a)(2) of the Endangered Species Act of 1973 (16 USC 1531 *et seq.*) directs all federal agencies to use their existing authorities to conserve threatened and endangered species and, in consultation with the Secretary of the Interior and/or Secretary of Commerce, ensure their actions do not jeopardize listed species or adversely modify proposed or designated critical habitat. The distinct population segment of Canada lynx in the contiguous United States was listed as threatened under the Endangered Species Act in 2000 because existing regulatory mechanisms in Forest Service land and resource management plans were inadequate to protect lynx or lynx habitat. Critical habitat for lynx was designated in YNP and surrounding lands in southwestern Montana and northwestern Wyoming in 2009. In January 2018, the Fish and Wildlife Service concluded the Canada lynx may no longer warrant protection under the Endangered Species Act and should be considered for delisting due to recovery. The Service has not yet released a proposed rule to delist the species.

Lynx in the contiguous United States are considered part of a larger metapopulation whose core is located in the northern boreal forest of Canada. Historical information suggests lynx were present, but uncommon, in YNP during 1880 to 1980. The presence and distribution of lynx in YNP was documented during 2001 to 2004, when several individuals were detected in the vicinity of Yellowstone Lake and the Central Plateau (Murphy et al. 2006). Another lynx was photographed near the Indian Creek Campground in the northwestern portion of YNP during 2010, and reliable detections of lynx continue to occur in surrounding national forests. Lynx successfully reproduce in the GYA, though production is limited. In accordance with the Canada Lynx Conservation and Assessment Strategy, personnel from YNP mapped suitable lynx habitat—typically late successional or mature forests dominated by mesic subalpine fir, Engelmann spruce, and lodgepole pine—and lynx habitat currently in an unsuitable condition (successional forests one to 20 years after disturbance). Twenty Lynx Analysis Units were identified in the northern and eastern portions of YNP. Managers at YNP use the standards and guidelines provided in the Canada Lynx Conservation and Assessment Strategy to gauge the effects of projects on lynx. Projects occurring outside Lynx Analysis Units have no effects on lynx. Projects inside Lynx Analysis Units may affect lynx, but not adversely, if the location occurs outside of lynx habitat, in habitat currently unsuitable for lynx foraging, or in lynx foraging habitat, but ample suitable habitat is otherwise available.

Methodology and Intensity Level Definitions

The thresholds of change for the intensity of impacts to threatened species are defined as follows:

- Negligible: Threatened species would not be affected or changes would be either undetectable or, if detected, would have effects considered slight and short-term.
- Minor: Temporary displacement of a few localized individuals or groups of threatened species, with mortality of individuals not affecting population trends. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
- Moderate: Effects to threatened species would be readily detectable, long-term, and regional, with consequences affecting the population level(s) of one or more species. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
- Major: Effects to threatened species would be obvious, long-term, and would have substantial consequences to populations in the region, with mortality of a number of individuals that subsequently jeopardizes the viability of the resident population. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

The types and levels of impacts for each alternative are described in the following sections and summarized in Table 3.

Impacts of Alternative 1 – No Action

The effects of implementing the IBMP on threatened species were evaluated in the 2000 Final Environmental Impact Statement and Record of Decision (see the <<http://ibmp.info>> website in the *Document Library* section). The agencies concluded displacement and disturbance from bison management activities and slight changes in the availability of bison carrion would have negligible impacts on Canada lynx. The Fish and Wildlife Service concurred that the IBMP may affect, but was not likely to adversely affect Canada lynx. The IBMP does not modify critical habitat for lynx and negligible impacts from ephemeral disturbances to Canada lynx are expected from bison management operations due to spatial separation from lynx use areas in thick forest. In the unlikely event a lynx encountered bison operations, they would likely move quickly around or through the area. Some bison removed from the population might otherwise have died and become carrion for lynx. However, the abundance of bison, and the potential for predation or scavenging, has been higher during the IBMP period (b)5 Draft-Deliberative (b)5 Draft-Deliberative lynx may rarely consume *Brucella* bacteria from infected bison that are killed or scavenged, but consumption does not appear to result in any clinical effects or mortality, and lynx cannot transmit brucellosis.

Impacts of Alternative 2 – (b)5 Draft-Deliberative (b)5 Draft-Deliberative

Impacts of Alternative 3 – (b)5 Draft-Deliberative (b)5 Draft-Deliberative

Impacts of Alternative 4 – (b)5 Draft-Deliberative (b)5 Draft-Deliberative

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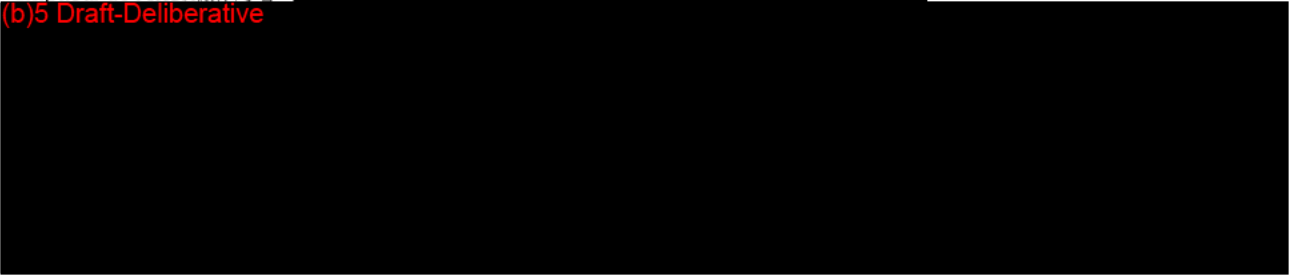


Impacts of Alternative 1 – No Action

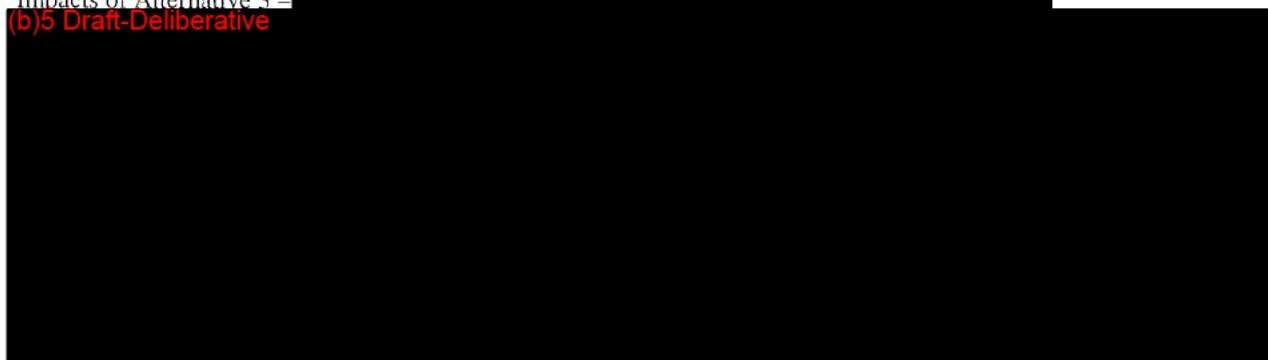
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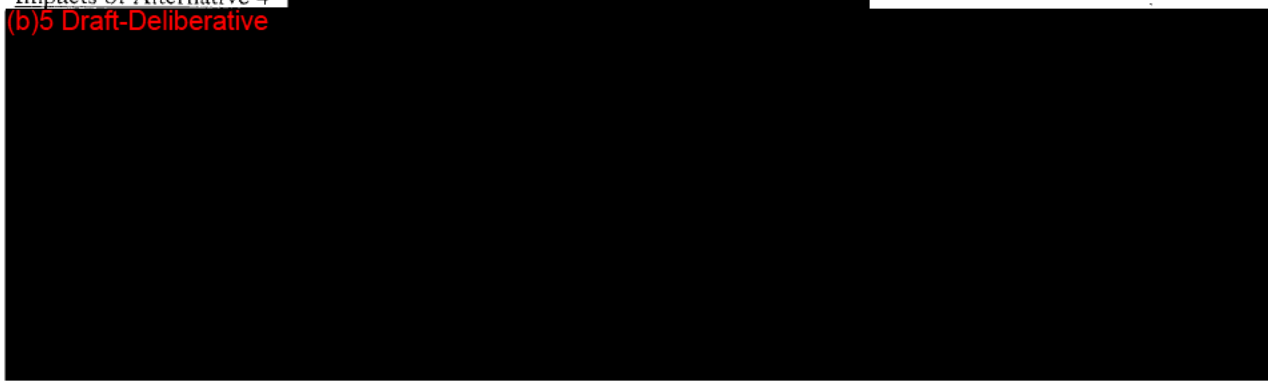
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Impacts of Alternative 3 (b)5 Draft-Deliberative
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Impacts of Alternative 4 (b)5 Draft-Deliberative
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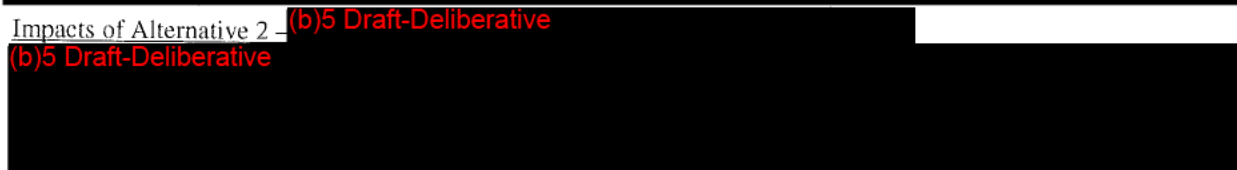
Impacts of Alternative 1 – No Action
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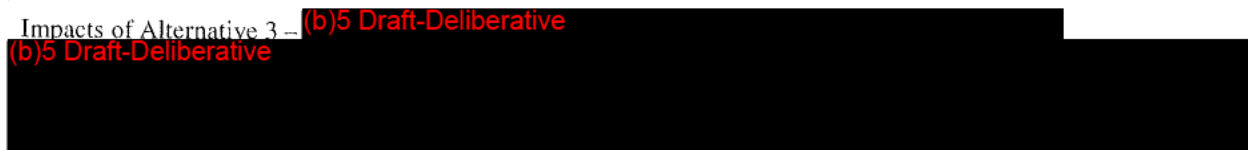
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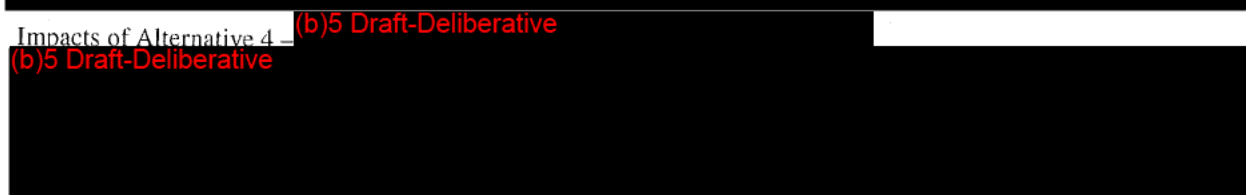
Impacts of Alternative 2 – (b)5 Draft-Deliberative
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Impacts of Alternative 3 – (b)5 Draft-Deliberative
(b)5 Draft-Deliberative



Impacts of Alternative 4 – (b)5 Draft-Deliberative
(b)5 Draft-Deliberative



(b)5 Draft-Deliberative



(b)5 Draft-Deliberative



Impacts of Alternative 1 – No Action

(b)5 Draft-Deliberative



Impacts of Alternative 2 – (b)5 Draft-Deliberative

(b)5 Draft-Deliberative



Impacts of Alternative 3 – (b)5 Draft-Deliberative

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Impacts of Alternative 4 – (b)5 Draft-Deliberative

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Impacts of Alternative 1 – No Action

(b)5 Draft-Deliberative



Impacts of Alternative 2 – (b)5 Draft-Deliberative

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Impacts of Alternative 3 – (b)5 Draft-Deliberative

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Impacts of Alternative 4 – (b)5 Draft-Deliberative



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Impacts of Alternative 4 – (b)5 Draft-Deliberative
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Cumulative Impacts Analysis

Cumulative impacts are the total incremental effects of human activity on an ecosystem, resource, or human community. These impacts may result from singularly minor, but collectively significant, actions taken by humans over time. Cumulative impacts are evaluated by combining the likely effects of a proposed action with other past, present, and reasonably foreseeable future actions within a particular area and timeframe, regardless of whether the actions are implemented by federal, local, private, state, or tribal governments or entities (40 Code of Federal Regulations 1508.7). These combined impacts are compared to an environmental baseline or reference condition that is ecologically sustainable, supports biological processes, maintains productivity and resiliency, and functions with minimal human intervention (Environmental Protection Agency 1999). (b)5 Draft-Deliberative

(b)5 Draft-Deliberative Historians at YNP recently evaluated thousands of first-hand accounts of wildlife in the GYA during 1796-1881, when the area was largely unaltered by Euro-American colonists and in a pre-settlement or early development stage. They concluded wildlife was plentiful and widespread in the ecosystem, with many ungulates observed making seasonal migrations from high-elevation summer ranges to lower-elevation winter ranges (Whittlesey et al. 2018).

Planning or development activities currently being implemented or likely to be implemented in the reasonably foreseeable future that have some relation to a quarantine program for Yellowstone bison and could contribute to cumulative effects include the following:

- The *Parkwide Road Improvement Plan* (1992) which provides direction to preserve and extend the service life of principal roads, enhance human safety, and continue access to YNP.
- The *Wireless Communications Services Plan* (2008) which provides a framework for establishing wireless communication services throughout YNP.
- The *Native Fish Conservation Plan* (2010) which conserves native fish from threats of nonnative species, disease, and other factors using an adaptive framework for managing fisheries and aquatic resources.
- The *Tower-Roosevelt Comprehensive Plan* (2010) which alters or improves visitor services, facilities, and utilities while preserving the rustic western camp character and resources in the Tower-Roosevelt area.
- The *Lake Comprehensive Plan* (2012) which alters or improves visitor services, facilities, buildings, roads, paved parking areas, and utilities in the Lake developed area, while managing growth and development.
- The *Invasive Vegetation Management Plan* (2013) which provides guidance to prevent, eradicate, and control the spread of nonnative plants through the use of manual and herbicide methods.
- The *Wildland Fire Management Plan* (2013) which provides guidance for evaluating, monitoring, and treating forests near developed areas with hazard fuel reduction projects.

- The plan for *Over-snow Vehicle Recreation on Groomed Roads in YNP* (2013) which provides long-term regulations to continue the grooming of roads in the interior of YNP for over-snow vehicles.
- The *Electric Transmission/Distribution System Communication and Automation Plan* (2014) which would improve the reliability, safety, and overall service quality of electrical power distribution to the NPS, concessioners, and visitors.
- The *Commercial Stock Outfitter Concession Contracts* (2014) which provide opportunities for visitors to experience the backcountry of YNP using guided saddle and pack tours, while protecting the natural and cultural resources of YNP.
- The *Stephens Creek Administrative Area Improvements* project (2015) which added holding/quarantine pastures (~36 acres; 15 hectares) to the existing bison capture facility.
- The *Long Range Interpretive Plan* (ongoing) which provides visitor experience goals, primary interpretive themes, and program recommendations.
- Summer Use Planning* (ongoing) is assessing the effects of a 40% increase in visitation since 2008, which has caused overflowing parking lots, a rise in traffic jams, roadside soil erosion and vegetation trampling, and unsanitary conditions around busy bathrooms.
- The *National Ecological Observatory Network* (ongoing) is deploying permanent scientific equipment and conducting monitoring in YNP to gather long-term data on ecological responses of the biosphere to changes in land use and climate, and on feedbacks with the geosphere, hydrosphere, and atmosphere.
- Trail maintenance projects (ongoing) in YNP to rehabilitate or relocate 10 to 15 sections of trail per year.
- Gardiner Basin and Cutler Meadows restoration projects (ongoing) attempting to restore native plants to these areas where bison move in winter months.
- Agricultural landscapes (ongoing) with cattle grazing and supplemental irrigation of valley bottom private lands in Idaho, Montana, and Wyoming would continue.
- Increasing motorized visitor use (ongoing) on National Forest System and private lands for recreation and other amenities.
- Increasing outfitter/guide activities (ongoing) with visitors for wildlife viewing, hunting, and photography.
- Rapid population growth in the GYA (ongoing) for the last 40 years, including more recreation in wildlife habitat and more development in current areas of open habitat.

The following sections contain evaluations of cumulative impacts for each impact topic and alternative analyzed in this Environmental Assessment. Feasible, realistic mitigation measures are proposed to lessen the proposed project's contribution to cumulative impacts and reverse the trend in degradation from impacts caused by other activities.

Yellowstone Bison

Accounts from 1796-1881 suggest bison were plentiful and widespread in the GYA prior to Euro-American colonization (Whittlesey et al. 2018). However, the number of bison that spent time in the mountainous area now encompassed by YNP is unknown. Based on the timing of historical observations and the current behavior of bison and other ungulates such as deer, elk, and pronghorn, it is likely many bison in the area migrated seasonally between productive grasslands in the mountains during summer and lower elevation valleys in outlying areas during winter.

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In this context, wild bison can be characterized as untamed, free-roaming animals living in an environment not dominated by humans and whose behaviors, movements, survival, and reproductive success are primarily affected by their own daily decisions and natural selection.

Plains bison were nearly extirpated during the middle to late 1800s as millions were shot by Euro-Americans colonizing western North America. Only about two dozen bison remained in the Yellowstone area by 1900, all within the newly created (1872) national park. Also, brucellosis was inadvertently introduced into bison and elk in the Yellowstone area during the early 1900s when humans brought domestic cattle for meat and milk. However, the dedicated protection and restoration of this population over the next century gradually increased numbers to about 5,000 bison inside YNP by 2005. These bison are considered the only sustainable, wild population of plains bison due to their large numbers, high genetic diversity, and adaptive capabilities. However, bison were not allowed to migrate or disperse to areas outside YNP due to concerns about brucellosis transmission back to livestock and

adverse economic impacts to the industry. Also, there were concerns about human safety, property damage, and competition with livestock for grass. Thus, the population was not restored regionally throughout the GYA.

Management activities pursuant to the 2000 IBMP, as adjusted, have limited the distribution of bison to YNP and small nearby areas of Montana. However, the mountainous park does not contain substantial low-elevation habitats typically used by ungulates during winter when deep snow pack limits access to forage at higher elevations. As a result, some bison attempt to migrate to valleys outside of the park in search of forage, primarily into the State of Montana at present. However, concentrations of public and tribal hunters along the park boundary, combined with culling and hazing by federal and state employees, essentially confine these bison to the park. As a result, the processes of migration and dispersal have not been restored outside YNP. If migrating bison are forced to remain within the park, numbers will be regulated by food availability and substantial starvation could occur if bison reach high densities. There could also be significant deterioration to other park resources such as vegetation, soils, geothermal features, and other ungulates as the bison population overshoots the park's capacity to provide forage. Given existing conditions and technologies, it is not feasible to cost-effectively and substantially reduce brucellosis in wild bison and elk in the GYA. Region-wide test-and-slaughter and vaccination are unacceptable and infeasible, and these wildlife species are critical to the culture, ecological health, economy, and recreation of the region. However, it is unlikely additional tolerance for bison on public lands in the states surrounding YNP will keep pace with the current prolific growth of this population given the extremely high survival of calves and adults. As a result, it is foreseeable that Yellowstone bison will need to be continually culled and/or harvested from the population to limit abundance and distribution which will, in turn, limit recovery. (b)5 Draft-Deliberative

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For long-term conservation and further recovery in the GYA, Yellowstone bison need mitigation measures such as similar access to habitat that other wildlife species such as elk are given without human intrusion, including year-round access to many National Forest System and other public lands in the ecosystem that are outside the NPS's jurisdiction. Montana has allowed more tolerance for bison adjacent to YNP to facilitate conservation and hunting, including year-round in some areas. Public opinion is shifting toward more tolerance for bison in the GYA and, as a result, a new paradigm is needed to accommodate larger numbers and allow bison to move more freely on suitable public lands. However, state and local governments and many private landowners do not support more tolerance for bison on public lands further from the park. Also, the continuing development of open space on private lands surrounding the park degrades and fragments habitat and migration corridors for wildlife, including bison. Only a few other unfenced, wide-ranging populations of plains bison exist in the United States (e.g., Book Cliffs, Henry Mountains, Grand Teton, Wrangell-St. Elias). All of these populations are relatively small with less than 1,000 bison. Furthermore, most other conservation herds of bison on public lands also have low population sizes, along with limited distributions, protection from natural selection factors like large predators, and skewed sex and age ratios maintained to ease management. Additional wild, wide-ranging populations subject to the forces of natural selection need to be augmented or established at other sites to preserve the species. This would reduce the reliance on Yellowstone and a few other populations to preserve the species in the wild. (b)5 Draft-Deliberative

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As described earlier, under alternative 1 bison would continue to be managed pursuant to the IBMP, as adjusted. Therefore, impacts under this alternative would reflect those described in the 2000 Final Environmental Impact Statement for the IBMP. It was anticipated the implementation of the modified preferred alternative and the selected action would have a moderate adverse impact to the bison population in terms of overall removal of animals. However, modeling predicted this removal would not measurably affect the age and sex distribution or reproductive rates of the population based on removing 246 bison each year to limit the total population size to about 3,000 animals. In addition, since the implementation of the plan, the population has recovered from removals (harvests plus culls) of more than 500 bison during several winters and more than 8,300 bison since 2001. (b)5 Draft-

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Other Wildlife

Narratives from the GYA during 1796-1881 suggest many wildlife species were plentiful and widespread prior to Euro-American colonization (Whittlesey et al. 2018) (b)5 Draft-Deliberative

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In this context, wildlife can be defined as untamed, free-roaming animals that live in an environment not dominated by humans and whose behaviors, movements, survival, and reproductive success are predominantly affected by their own daily decisions and natural selection. Populations of large ungulates, predators, valuable fur-bearing mammals, and plume-bearing birds in the GYA and other areas of Montana were decimated by colonists and settlers during the middle to late 1800s (Whittlesey et al. 2018). Habitat was destroyed and fragmented by continued settlement, agriculture, and resource extraction activities during the 1900s. However, the protection and stewardship of animals within YNP and elsewhere in the GYA gradually increased numbers of many species over the next century. Populations of other animals such as large predator remained low or were suppressed.

The GYA has been experiencing rapid human growth and changes in land use, with a 58% increase in population to over 370,000 residents and a 350% increase in the development of rural land during 1970 to 1999 (Gude et al. 2006, Hansen and DeFries 2007, Hansen 2009). Habitat modification, destruction, and fragmentation have primarily affected valley bottoms and flood plains with higher plant productivity and more moderate winter conditions (Hansen 2009). These areas, which are primarily located outside preserves and wilderness areas, are crucial for migration and seasonal use by many species in this mountainous environment (Hansen and DeFries 2007). More than 75% of migration routes for deer, elk, pronghorn, and other wildlife in the GYA have been lost, and many of those remaining are disrupted or shortened (Berger 2004). Potential uses for most undeveloped private lands are not restricted by regional plans or zoning districts; thus, 30 to 40% of the private lands are forecast to convert to rural residential development (Gude et al. 2006, 2007). These impacts could result in increased disturbance to wildlife and a degradation and loss of habitat (b)5 Draft-Deliberative

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In the Final Environmental Impact Statement and Record of Decision for the IBMP, the NPS acknowledged the potential for moderate to major impacts

on the pronghorn population which spends winter in the Gardiner basin. However those impacts were not realized and pronghorn population abundance increased from about 200 to 505 during 2001 to 2018. (b)5 Draft-

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Threatened Species

Narratives from the GYA during 1796-1881 suggest lynx were rare, though they may have been present in greater abundance and distribution than today (Whittlesey et al. 2018). (b)5 Draft-Deliberative

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In this context, wild lynx can be defined as untamed, free-roaming animals that live in an environment not dominated by humans and whose behaviors, movements, survival, and reproductive success are predominantly affected by their own daily decisions and natural selection. Lynx remain rare, but are reproducing in the GYA and elsewhere in Montana (Murphy et al. 2006). As described in the previous section, the GYA has been experiencing rapid human growth and changes in land use that continue to modify, destroy, and fragment habitat and migration corridors. These impacts could contribute to increased disturbance to lynx. (b)5 Draft-Deliberative

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The NPS and the Fish and Wildlife Service concluded in 2000 and 2012 that the IBMP may affect, but was not likely to adversely affect, this species. The implementation of the IBMP does not modify designated critical habitat for lynx. No lynx have been observed during bison management activities and evidence suggests they are still rare in YNP, primarily in the central portion or transient (Murphy et al. 2006). (b)5 Draft-Deliberative

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Consultation and Coordination

During summer 2015, park staff conducted government-to-government consultation with four tribes regarding a new management plan for Yellowstone bison, including the Confederated Salish and Kootenai Tribes of the Flathead Reservation, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Confederated Tribes of the Umatilla Indian Reservation, and the Nez Perce Tribe. Issues raised during these consultation meetings included allowing

treaty hunting in YNP, allowing hunters to drive and transport bison carcasses through the park, allowing the retrieval of wounded bison from inside YNP, reducing long-distance transport of bison to slaughter facilities, using prescribed burns to enhance habitat for bison, herding bison from northern to central Yellowstone and out of the park to facilitate hunting, avoiding population numbers and instead using management triggers, and the primacy of treaty rights.

During September 2016, the NPS and the State of Montana held a meeting to discuss alternatives for a new bison management plan. The U.S. Institute for Environmental Conflict Resolution, Udall Foundation, conducted a neutral situation assessment and provided facilitation to help work through differences in perspectives. Identified objectives were to maintain a sustainable wild bison population and allow for ecological processes to occur, establish quantitative population targets, contribute to the conservation of bison in North America, support the role of treaty rights in the management of bison, accommodate and manage for the natural migration of bison to and from winter ranges, address property and human safety concerns related to bison, and maintain a high quality visitor experience related to bison. Concepts to include in the range of alternatives were average 4,200 bison (summer count) over 5-year moving windows, use temporary facilities Montana in conjunction with the existing facility at Stephens Creek in YNP, use hunting as a primary management tool outside the park, provide opportunities for hunting outside the park when bison migration allows for safe hunting, make all capture operations a shared responsibility between the NPS and State of Montana, evaluate the use of terminal hunting pastures outside the park as an alternative to slaughter, incorporate quarantine as a population management tool and way to provide brucellosis-free bison for conservation, use 'assisted migration' (i.e., translocation) as a population management tool, use the Montana Governor's plan (Bullock 2015) as a starting point and then incrementally increase tolerance for bison on public lands, and have a shared commitment to advance the science of brucellosis suppression.

References

- Barfield, J. 2015. Preserving Yellowstone bison genetics using assisted reproductive technologies. Colorado State University, Fort Collins, Colorado.
- Becker, M. S., R. A. Garrott, P. J. White, C. N. Gower, E. J. Bergman, and R. Jaffe. 2009. Wolf prey selection in an elk-bison system: Choice or circumstance? Pages 305-337 in R. A. Garrott, P. J. White, and F. G. R. Watson, editors. The ecology of large mammals in central Yellowstone: Sixteen years of integrated field studies. Elsevier, San Diego, California.
- Berger, J. 2004. The last mile: How to sustain long-distance migration in mammals. *Conservation Biology* 18:320-331.
- Bullock, S. 2015. Decision notice. Year-round habitat for Yellowstone bison environmental assessment. Helena, Montana.
- Centers for Disease Control. 2005. Brucellosis. Division of Bacterial and Mycotic Diseases. <http://www.cdc.gov/ncidod/dbmd/diseaseinfo/brucellosis_t.htm>. Accessed September 15, 2008.
- Clarke, P. R., R. K. Frey, J. C. Rhyen, M. P. McCollum, P. Nol, and K. Aune. 2014. Feasibility of quarantine procedures for bison (*Bison bison*) calves from Yellowstone National Park for conservation of brucellosis-free bison. *Journal of the American Veterinary Medical Association* 244:588-591.
- Coughenour, M. B. 2005. Spatial-dynamic modeling of bison carrying capacity in the greater Yellowstone ecosystem: a synthesis of bison movements, population dynamics, and interactions with vegetation. Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, Colorado.
- Cullinane Thomas, C., and L. Koontz. 2017. 2016 National Park Visitor Spending Effects: Economic Contributions to Local Communities, States, and the Nation. Natural Resource Report NPS/NRSS/EQD/NRR—2017/1421. National Park Service, Natural Resource Stewardship and Science, Fort Collins, Colorado.
- Ebinger M. R., P. Cross, R. Wallen, P. J. White, and J. Treanor. 2011. Simulating sterilization, vaccination, and test-and-remove as brucellosis control measures in bison. *Ecological Applications* 21:2944-2959.
- Environmental Protection Agency. 1999. Consideration of cumulative impacts in EPA review of NEPA documents. EPA 315-R-99-002/May 1999, Office of Federal Activities (2252A), Washington, D.C.
- Evermann, B. W. 1892. Report on the establishment of fish-cultural stations in the Rocky Mountain Region and Gulf States. Bulletin of the U.S. Fish Commission for 1891. Government Publishing Office, Washington, D.C.
- Forgacs, D., R. L. Wallen, L. K. Dobson, and J. N. Derr. 2016. Mitochondrial genome analysis reveals historical lineages in Yellowstone bison. *PLOS ONE* doi:10.1371/journal.pone.0166081.
- Frank, D. 2008. Evidence for top predator control of a grazing ecosystem. *Oikos* 117:1718-1724.

- Frank, D. A., R. L. Wallen, and P. J. White. 2013. Assessing the effects of climate change and wolf restoration on grassland processes. Pages 195-205 in P. J. White, R. A. Garrott, and G. E. Plumb. Yellowstone's wildlife in transition. Harvard University Press, Cambridge, Massachusetts.
- Franke, M. A. 1997. A grand experiment. The tide turns in the 1950s: Part II. *Yellowstone Science* 5:8-13.
- Geremia, C., R. L. Wallen, and P. J. White. 2017. Status Report on the Yellowstone bison population, September 2017. Yellowstone National Park, Mammoth, Wyoming. Available at <ibmp.info.>
- Geremia, C., P. J. White, J. A. Hoeting, R. L. Wallen, F. G. R. Watson, D. Blanton, and N. T. Hobbs. 2014. Integrating population- and individual-level information in a movement model of Yellowstone bison. *Ecological Applications* 24:346-362.
- Geremia, C., P. J. White, R. L. Wallen, F. G. R. Watson, J. J. Treanor, J. Borkowski, C. S. Potter, and R. L. Crabtree. 2011. Predicting bison migration out of YNP using Bayesian models. *PLoS ONE* 6:e16848.
- Gude, P. H., A. J. Hansen, and D. A. Jones. 2007. Biodiversity consequences of alternative future land use scenarios in greater Yellowstone. *Ecological Applications* 17:1004-1018.
- Gude, P. H., A. J. Hansen, R. Rasker, and B. Maxwell. 2006. Rates and drivers of rural residential development in the Greater Yellowstone. *Landscape and Urban Planning* 77:131-151.
- Halbert, N. D., P. J. P. Gogan, P. W. Hedrick, J. M. Wahl, and J. N. Derr. 2012. Genetic population substructure in bison at Yellowstone National Park. *Journal of Heredity* 103:360-370.
- Hansen, A. J. 2009. Species and habitats most at risk in greater Yellowstone. *Yellowstone Science* 17:27-36.
- Hansen, A. J., and R. DeFries. 2007. Ecological mechanisms linking protected areas to surrounding lands. *Ecological Applications* 17:974-988.
- Hedrick, P. W. 2009. Conservation genetics and North American bison (*Bison bison*). *Journal of Heredity* 100:411-420.
- Herman, J., A. Piaggio, N. Halbert, J. Rhyen, and M. Salman. 2014. Genetic analysis of a *Bison bison* herd derived from the Yellowstone National Park population. *Wildlife Biology* 20:335-343.
- Hobbs, N. T., C. Geremia, J. Treanor, R. Wallen, P. J. White, M. B. Hooten, and J. C. Rhyen. 2015. State-space modeling to support adaptive management of brucellosis in the Yellowstone bison population. *Ecological Monographs* 85:525-556.
- Kamath, P. L., J. T. Foster, K. P. Drees, G. Luikart, C. Quance, N. J. Anderson, P. R. Clarke, E. K. Cole, M. L. Drew, W. H. Edwards, J. C. Rhyen, J. J. Treanor, R. L. Wallen, P. J. White, S. Robbe-Austerman, and P. C. Cross. 2016. Disease transmission among wildlife and livestock in the Greater Yellowstone Ecosystem revealed by genomics. *Nature Communications* DOI 10.1038/NCOMMS11448.
- Koel, T. M., editor. 2017. Native fish conservation. *Yellowstone Science* 25:1-98.
- Luce, R., J. Snow, D. Gross, T. Murphy, J. Grandpre, W. R. Daley, J. M. Brudvig, M. D. Ari, L. Harris, and T. A. Clark. 2012. Brucellosis seroprevalence among workers in at-risk professions: northwestern Wyoming, 2005 to 2006. *Journal of Occupational & Environmental Medicine* 54:1557-1560.
- Manni, M. F., M. Littlejohn, J. Evans, J. Gramann, and S. J. Hollenhorst. 2007. Yellowstone National Park visitor study, summer 2006. Park Studies Unit, Visitor Services Project, Report 178. USDI, NPS, Washington, D.C.
- Metz, M. C., D. W. Smith, J. A. Vucetich, D. R. Stahler, and R. O. Peterson. 2012. Seasonal patterns of predation for gray wolves in the multi-prey system of YNP. *Journal of Animal Ecology* 81:553-563.
- MFWP [Montana Fish, Wildlife & Parks]. 2013. Elk management guidelines in areas with brucellosis working group. Proposed final recommendations, January 10, 2013. Helena, Montana.
- Murphy, K. M., T. M. Potter, J. C. Halfpenny, K. A. Gunther, M. T. Jones, P. A. Lundberg, and N. D. Berg. 2006. Distribution of Canada lynx in YNP. *Northwest Science* 80:199-206.
- Nabokov, P., and L. Loendorf. 2004. Restoring a presence: American Indians and Yellowstone National Park. University of Oklahoma Press, Norman, Oklahoma.
- National Academies of Sciences, Engineering, and Medicine. 2017. Revisiting brucellosis in the Greater Yellowstone Area. National Academies Press, Washington, D.C.
- NPS [National Park Service]. 2006. Management policies 2006. U.S. Department of the Interior, Washington, D.C.
- National Research Council. 2013. Using science to improve the BLM wild horse and burro program: A way forward. National Academy Press, Washington, D.C.
- Olenicki, T. J., and L. R. Irby. 2003. Determining forage availability and use patterns for bison in the Hayden Valley of Yellowstone National Park. Progress summary report, Montana State University, Bozeman, Montana.
- Pérez-Figueroa, A., R. L. Wallen, T. Antao, J. A. Coombs, M. K. Schwartz, P. J. White, and G. Luikart. 2012. Conserving genomic variability in large mammals: Effect of population fluctuations and variance in male reproductive success on variability in Yellowstone bison. *Biological Conservation* 150:159-166.

- Plumb, G. E., P. J. White, M. B. Coughenour, and R. L. Wallen. 2009. Carrying capacity, migration, and dispersal in Yellowstone bison. *Biological Conservation* 142:2377-2387.
- Rodman, A., S. Haas, K. Bergum, C. Hendrix, J. Jerrett, N. Bowersock, M. Gore, E. Oberg, and L. Smith, editors. 2015. Ecological implications of climate change on the Greater Yellowstone Ecosystem. *Yellowstone Science* 23:1-87.
- Resource Systems Group. 2017. Yellowstone National Park visitor use study: summer, 2016. White River Junction, Vermont.
- Secretary of War. 1871. Senate letter communicating the report of Lieutenant Gustavus C. Doane upon the so-called Yellowstone Expedition of 1870. Executive document number 51 dated March 3 at the 41st Congress, 3rd session, Committee on Territories. Washington, D.C.
- Tercek, M., A. Rodman, and D. Thoma. 2015. Trends in Yellowstone's snowpack. *Yellowstone Science* 23:20-27.
- Treanor, J. J., C. Geremia, P. H. Crowley, J. J. Cox, P. J. White, R. L. Wallen, and D. W. Blanton. 2011. Estimating probabilities of active brucellosis infection in Yellowstone bison through quantitative serology and tissue culture. *Journal of Applied Ecology* 48:1324-1332.
- USDA [U.S. Department of Agriculture], APHIS [Animal and Plant Health Inspection Service]. 2012. Evaluation of GonaConTM, an immunocontraceptive vaccine, as a means of decreasing transmission of *Brucella abortus* in bison in the Greater Yellowstone Area. Environmental assessment, May 2012. Veterinary Services, Fort Collins, Colorado.
- USDI [U.S. Department of the Interior], NPS [National Park Service]. 2006. Stephens creek administrative area environmental assessment/assessment of effect. Yellowstone National Park, Mammoth, Wyoming.
- USDI, NPS. 2010. Native fish conservation plan environmental assessment. Yellowstone National Park, Mammoth, Wyoming.
- USDI, NPS. 2012. Effects of hazing Yellowstone bison on threatened grizzly bears. Biological evaluation. Yellowstone National Park, Mammoth, Wyoming.
- USDI, NPS. 2013. Yellowstone National Park winter use plan / Supplemental Environmental Impact Statement. Mammoth, Wyoming.
- USDI, NPS. 2014. Foundation document; Yellowstone National Park; Wyoming, Montana, Idaho. YELL 101/122938. Mammoth, Wyoming.
- USDI, NPS and USDA, U.S. Forest Service and APHIS. 2000. Bison management for the State of Montana and Yellowstone National Park. Final Environmental Impact Statement. Washington, D.C. Available at <http://ibmp.info/>.
- Varley, J. D., and P. Schullery. 1998. Yellowstone fishes: Ecology, history, and angling in the park. Stackpole Books, Mechanicsburg, Pennsylvania.
- Wallen, R. L., P. J. White, and C. J. Geremia. 2015. Ecological role—bison relations with other animals and effects on grassland processes. Pages 107-117 in P. J. White, R. L. Wallen, D. E. Hallac, and J. A. Jerrett, editors. 2015. Yellowstone bison—Conserving an American icon in modern society. Yellowstone Association, Yellowstone National Park, Mammoth, Wyoming.
- White, P. J., R. L. Wallen, C. Geremia, J. J. Treanor, and D. W. Blanton. 2011. Management of Yellowstone bison and brucellosis transmission risk – implications for conservation and restoration. *Biological Conservation* 144:1322-1334.
- White, P. J., R. Wallen, C. J. Geremia, J. Treanor, and D. E. Hallac. 2015. The future—Recommendations for bison conservation. Pages 159-176 in P. J. White, R. L. Wallen, D. E. Hallac, and J. A. Jerrett, editors. 2015. Yellowstone bison—Conserving an American icon in modern society. The Yellowstone Association, Yellowstone National Park, Mammoth, Wyoming.
- Whittlesey, L. H. 1995. "They're going to build a railroad!": Cinnabar, Stephens Creek, and the Game Ranch addition to Yellowstone National Park. Draft manuscript dated March 9th. Yellowstone National Park, Heritage Research Center, Gardiner, Montana.
- Whittlesey, L. H., P. D. Schullery, S. Bone, A. Klein, P. J. White, A. W. Rodman, and D. E. Hallac. 2018. Using historical accounts (1796-1881) to inform contemporary wildlife management in the Yellowstone area. *Natural Areas Journal* 38:99-106.
- Williams B. K., R. C. Szaro, and C. D. Shapiro. 2007. Adaptive management: The USDI technical guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, D.C.