Yellowstone Bison:
Background and Issues

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A Cooperatively Prepared Narrative

of Bison Management History

and Management Issues

State of Montana
Montana Department of Fish, Wildlife and Parks

U.S. Department of Interior - National Park Service
Yellowstone National Park

U.S. Department of Agriculture - U.S. Forest Service
Gallatin National Forest

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Chapter One

Introduction

PURPOSE AND NEED

In recent years, bison have emigrated during the winter months from within the park to vacant range (for bison) outside the park. This has occurred primarily from the Northern Range herd, and to a lesser extent, the Mary Mountain herd to the west. Acquired knowledge of vacant range, the bison's natural gregariousness, increased herd size, weather conditions, and human activity appear to be factors in their movement.

The need to prepare a cooperative long-range management plan results from this periodic movement of bison from within the park to outside the park where bison come into direct conflict with private property owners and where the possibility exists for the transmission of the brucella organism (brucellosis) to cattle. In addition to controlling these problems, the interim and long-range management plan will ensure opportunities to view free-roaming bison and guarantee a self-perpetuating bison population in Yellowstone National Park.

SCOPE

This is a descriptive document containing interim bison operation goals and management policies for the Montana Department of Fish, Wildlife and Parks; the National Park Service; and the U.S. Forest Service. Areas of concern and deficiencies that require analysis are addressed. Issues raised by the public and other agencies during the public involvement process will be analyzed and culminate in a long-range management plan.

This document will serve as a baseline report of interim bison operations that are being initiated by the Montana Department of Fish, Wildlife and Parks; the National Park Service; and the U.S. Forest Service. It is a compilation of existing operations that are currently providing direction for managing bison emigration.

TIME FRAME AND REVISION

Management direction illustrated in this report is expected to be effective for a period of two years or until the completion of the cooperative, long-range management plan.

COMPLIANCE INFORMATION

This report is a descriptive document and the final bison long-range management plan will follow compliance of the National Environmental Policy Act (NEPA) and the policies and guidelines of the three cooperating agencies.

Chapter Two

Legislation and Policy Guidance

Memorandum of Understanding (November 1989) among Montana Department of Fish, Wildlife and Parks; Yellowstone National Park, the National Park Service; and Gallatin National Forest, the U.S. Forest Service states the purpose is:

> "to provide cooperative and mutual management of wildlife species that are common and shared by the Park, State, and Forest. It is recognized that the Yellowstone ecosystem is an enormous complexity of ecological communities and the diversity of management requirements and procedures is equally complex. It is recognized and understood that each agency operates under different legislative mandates and management objectives. However, when feasible, the Park, State, and Forest shall coordinate research and monitoring activities, and share resulting data, and shall coordinate and share management responsibilities and activities."

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS - STATE OF MONTANA

Legislation

Statement of Intent for House Bill No. 763 (1985) states:

> "It is the intent of the legislature that the regulated hunting of wild buffalo allowed by House Bill No. 763 be considered only one of many solutions available to the Department and the National Park Service for controlling the migration of wild buffalo across the boundaries of Yellowstone National Park. The legislature encourages further negotiations and cooperation between the Department and the National Park Service to seek other methods of controlling, as soon as possible, the migration of wild buffalo into Montana from Yellowstone National Park."
>
> "It is the intent of the legislature that the Department adopt rules flexible enough to address each situation in which wild buffalo travel across the boundaries of Yellowstone National Park into the State of Montana presenting the potential for infecting Montana livestock with brucellosis and for inflicting private property damage to property owned by the residents of the state."

House Bill No. 763 enacted April 19, 1985 to "provide for special wild buffalo licenses and for regulation of special wild buffalo licenses".

House Joint Resolution #32 (1989) states:

> "the Senate and the House of Representatives of the State of Montana urging the National Park Service, U.S. Forest Service and Montana Department of Fish, Wildlife and Parks to take immediate action to seek and implement solutions for the long term management of elk and bison in the Yellowstone Ecosystem."

"Be it further resolved that the long-term solution be directed toward addressing the regulation of elk and bison populations within Yellowstone National Park."

Powers and Duties (87-1-201) states the "Department shall supervise all the wildlife, fish, game and nongame birds, waterfowl and the game and furbearing animals of the state".

Montana Fish and Game Commission Position Statement, March 1989 states: "the solution to elk and bison management in the Yellowstone Ecosystem lies in a combination of the following actions":

"Addressing the regulation of elk and bison populations within the park."

"Initiating a cooperative county, state, federal and private effort to address long-term solutions for the Northern Elk and bison herds both within and outside Yellowstone Park."

NATIONAL PARK SERVICE - DEPARTMENT OF INTERIOR

Acts of Congress

The Act of March 1, 1872 (17 Stat.32, 16 U.S.C. Section 22) established Yellowstone National Park, and states it is "dedicated and set apart as a public park or pleasuring ground for the benefit and enjoyment of the people".

The Act of May 7, 1894 (28 Stat.73, 16 U.S.C. Section 26) established regulations prohibiting "killing, wounding, or capturing at any time of any bird or wild animal, except dangerous animals, when it is necessary to prevent them from destroying human life or inflicting an injury, is prohibited within the limits of said park" and "for the protection of the animals and birds in the park, from capture or destruction, or to prevent their being frightened or driven from the park".

The Act of August 25, 1916 (PL 64-235, 39 Stat.535, 16 U.S.C. Sections 1,2,3, as amended) established the National Park Service, and states its basic mission: "To conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

The Act of January 24, 1923 (42 Stat.1214, 16 U.S.C. Sec. 36) authorized that the Secretary of Interior "may sell or otherwise dispose of the surplus buffalo of the Yellowstone National Park herd".

The National Environmental Policy Act of 1969 [NEPA](PL 91-190 42 U.S.C. 4321-4347 as amended) requires consideration of the environmental effects of proposed federal actions. NEPA procedures insure that environmental information is available to public officials and members of the public before decisions are made and before actions are taken.

The Act of August 18, 1970, as amended in 1978 (PL 95-250, 16 U.S.C. Section 1a-1) states "regulation of the various areas of the National Park System be consistent with and founded in the purpose established ... to the common benefit of all the people of the United States, and that

the authorization of activities be construed and the protection, management, and administration of these areas be conducted in light of the high public value and integrity of the National Park System and not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress."

The Endangered Species Act of 1973, as amended (PL 93-205 87 Stat.884, 16 U.S.C. 1531 et.seq.) requires the park to consult with the U.S. Fish and Wildlife Service on management actions that could affect listed threatened and endangered species. Management actions cannot jeopardize the continued existence of threatened or endangered species.

Department of Interior, Departmental Manual 516 DM 1.2F

Requires the park to "provide, to the fullest extent practicable, timely information to the public to better assist in understanding Departmental plans and programs affecting environmental quality and to facilitate their involvement in the development of such plans and programs".

National Park Service Management Policies (1988)

Park Planning in a Regional Context (2:9)

"Recognizing that parks are integral parts of larger regional environments, the National Park Service will work cooperatively with others to anticipate, avoid, and resolve potential conflicts, to protect park resources, and to address mutual interests in the quality of life for community residents, considering economic development as well as resource and environmental protection."

Biological Resource Management (4:5,6,7)

"The National Park Service will seek to perpetuate the native animal life as part of the natural ecosystems of the park. Management emphasis will be on minimizing human impacts on natural animal population dynamics."

"Natural processes will be relied on to control populations of native species to the greatest extent possible. Unnatural concentrations of native species caused by human activities may be controlled if the activities causing the concentrations cannot be controlled."

"Parks having native migratory species will ensure the preservation of their populations and their habitats inside the park and will cooperate wherever possible with others to ensure the preservation of their populations and habitats outside the park. Management action may include participation in regional land use planning efforts and cooperation with states and native American authorities in the setting of game harvest regulations for lands outside the park."

Yellowstone National Park Master Plan (1974)

"Ongoing and future wildlife management actions will be directed toward reducing or eliminating disruptive human influences, relying, whenever possible, upon natural controls to regulate animal numbers."

Yellowstone National Park Statement for Management (1986)

"Permit natural processes to function within the park ecosystem with minimum disturbance by man's activities."

"Maintain close and harmonious relations with neighboring communities, counties, and States and work closely with other Federal agencies, private groups, organizations, and individuals to provide a full understanding of park operations and purpose."

Yellowstone National Park Resource Management Plans (1982)

Bison management practices designed "to both preserve the unique aesthetic and scientific values of its bison herds and prevent any contacts with domestic cattle."

Man and the Biosphere

Mission Statement (January, 1989) states; "The mission of the United States Man and the Biosphere Program is to foster harmonious relationships between humans and the biosphere through an international program of policy-relevant research which integrates social, physical and biological sciences to address actual problems. These activities - broadly interpreted - include catalytic conferences and meetings, education and training, and the establishment and use of biosphere reserves as research and monitoring sites."

U.S. FOREST SERVICE - DEPARTMENT OF AGRICULTURE

Acts of Congress

The Act of May 26, 1926 (P.L. 295) enables the U.S. Government to acquire certain private or State lands for the purpose of providing the "... winter range and winter feed facilities indispensable for the adequate and proper protection, preservation, and propagation of the elk, antelope, and other game animals of the Yellowstone National Park and adjacent lands..."

Code of Federal Regulations

36 CFR 2.19.19 mandates the USDA Forest Service to manage fish and wildlife habitat "to maintain viable populations of existing native and desired non-native vertebrate species" and the Forest Service will "provide for and maintain diversity of plant and animal communities to meet overall multiple-use objectives."

Forest Service Manual 2611.1 (1978)

Gallatin Forest Land and Resources Management Plan (Forest Plan, II-1, III-3) reiterates Forest Service policy and specifies the Forest will provide for increasing big game populations and will emphasize forage and cover needs on big game winter range.

Chapter Three

Description of the Environment

REGIONAL SETTING

Yellowstone is located in the northwest corner of Wyoming with small sections extending into south-central Montana and east-central Idaho. Yellowstone is the strategic core of a vast, upland wilderness and is surrounded by Federal land including Grand Teton National Park and Bridger-Teton National Forest to the south; Shoshone National Forest to the east; Gallatin, Beaverhead, and Targhee National Forests to the west; and Gallatin and Custer National Forests to the north. Small, privately-owned land portions exist on the north and west boundaries of Yellowstone National Park. These wildlands, encompassing Yellowstone and the adjacent forests, are called the Greater Yellowstone Area and comprise what is the largest and most nearly intact ecosystem in the contiguous United States.

GENERAL

Yellowstone became the world's first national park in 1872. Since its establishment, the idea of preserving natural environments in public trust has spread to many nations of the world. Yellowstone is recognized internationally as a World Heritage Site and Biosphere Reserve for its biological, geological, and cultural significance. Almost all of the park's 2.2 million acres have been recommended for wilderness; only road corridors and existing developed areas are excluded.

Yellowstone is largely a forested volcanic plateau with an average elevation of 8,000 feet. The plateau is surrounded by higher mountains except on the southwest where the Snake River High Plains lie about 1,000 feet lower. The plateau is studded with mountains reaching 11,000 feet and cut by river canyons and valleys to as low as 5,300 feet. The Continental Divide traverses diagonally across the southwest corner of the park. The park is drained by the Snake, Yellowstone, Madison, and Gallatin Rivers.

The Yellowstone River valley north of Yellowstone National Park is open and non-forested except for a three-mile stretch in Yankee Jim Canyon (13-16 miles downstream from Gardiner, Montana). Within the steep, rocky canyon there is a forest of Douglas-fir, limber pine, and Rocky Mountain juniper which reaches the river banks, particularly on the south side. Northward, beyond Yankee Jim Canyon, the river flows into the wide prairie, grassland community of Paradise Valley.

South or southwest facing slopes adjacent to the Yellowstone River are generally too dry to support tree cover but do support grass and sagebrush communities. These lands have historically been used as winter range for a large number of big game mammals, including bison. They are still used by mule deer, bighorn sheep, and migrating elk.

Virtually all of the bottom-land along the Yellowstone River north of Yellowstone National Park to Yankee Jim Canyon, as well as the open bottoms and basins of major tributaries, are in private ownership. The more productive sites are used for livestock grazing or farming. The U.S. Highway 89 corridor has some residential development and a small community at Corwin Springs seven miles north of Gardiner, Montana. These private lands are fenced and cross-fenced throughout the valley.

NATURAL RESOURCES

Flora

Yellowstone National Park can be divided into three major vegetation zones: lodgepole pine, which covers the largest area of the park; spruce/fir zone; and Douglas fir. Two minor zones are the alpine tundra at elevations above 10,000 feet and the cold desert shrub in the northwest portion of the park near Gardiner, Montana. The flora of the Yellowstone area is typical of the central Rocky Mountains and over 1,000 species of plants have been identified. Ross' bentgrass (Agrostis rossiae) is the only plant identified as endemic only to Yellowstone. It occurs in thermal areas along the Firehole River.

Fauna

Yellowstone's highly varied vegetation supports a wide variety of plant-eating animals. Among them are an array of large ungulates; bison, moose, mule deer, pronghorn, elk, and bighorn sheep. The rodent population includes pocket gophers, mice, voles, marmots, squirrels, rabbits, muskrat, and beavers. These plant-eaters support a predatory and scavenger complex such as mountain lion, black bear, coyote, weasel, pine martin, otter and the threatened grizzly bear. Fish, both natural and introduced, are an important component of the fauna. More than 280 species of birds have been recorded within the greater Yellowstone area including endangered species; the bald eagle, peregrine falcon, and whooping crane.

CLIMATE AND WEATHER

The average maximum temperatures during the summer months are in the 70(F) degree range. Readings occasionally reach the 80(F) degree range at lower elevations, but it is rare for the temperature to reach the 90(F) degree range. Summer nights are cool and temperatures may drop to the 30-40(F) degree range. Fall temperatures average 5 to 20 degrees lower than summer temperatures.

Winters are cold with temperatures below freezing most of the time. Mid-afternoon January average temperatures range from zero to the mid-20(F). Winter temperature lows are frequently well below zero (F) and all park locations have recorded -40(F) degree range. Snowfall is normally heavy over the mountains. Annual snowfall averages close to 150 inches in most of the park and less than 100 inches at lower park elevations.

Annual precipitation varies from an average of 14 inches in the northern part of the park to around 38 inches in the southwestern corner.

Chapter Four

Bison Management Practices

HISTORICAL MANAGEMENT

Free-ranging bison have been an integral part of the Yellowstone environment since prehistoric times. Early explorers first observed numerous bison in the area in the early 1800s, but by the time Yellowstone National Park was established in 1872, bison herds outside the park were probably eliminated. Primarily because of poaching, Yellowstone bison numbers declined until just after the turn of this century when less than 50 bison were known to exist in Yellowstone National Park.

From 1902 to about 1915, strong protection from poaching allowed the native bison herd to gradually increase. Augmentation with introduced plains bison (1902) further increased bison numbers. Manipulative management influenced two of the three sub-populations from 1902 to the mid 1960s.

Prior to the 1930s, bison were actively managed at the Lamar Buffalo Ranch to increase herd size. There was no intended focus of re-creating a wild, unmanipulated bison population in the park. During that period, very little attention or management was given to the park's original surviving herd in Pelican Valley. Policy began to shift in the 1930s to the preservation of bison in a more natural state with less artificial manipulation. However, bison were periodically cropped until the late 1960s in certain areas. Culling was based on carrying-capacity studies conducted from a range management perspective which suggested a maximum population on the Northern Range. Bison were rounded up or hay-baited in the Lamar Valley, and numbers were controlled by regular reductions. By 1966, less frequent reductions occurred.

Since the 1930s, bison populations have fluctuated because of the controlled management activities. The Northern Range bison total was over 1,000 in the 1930s and peaked at 1,477 indicated by aerial count in January 1954. Subsequent reductions were conducted on all three herds and an aerial count in March of 1967 indicated 397 bison for the entire park.

In 1966, the management policy changed to one of allowing natural regulation management (no active manipulation) to occur to the maximum extent possible, and the entire park population of bison increased to a peak of about 2,800 in 1988. The 1990 bison population is about 2,400 animals in three areas of the park. There is some intermixing of these subpopulations. Long-term research efforts have been underway for many years to better understand and evaluate natural regulatory mechanisms.

In 1968, in an effort to provide protection from brucella organism transmission to cattle outside the park boundaries, the park proposed a boundary control program as an alternative to controlling bison infected with the organism within the park. This was a program that attempted to prevent wandering bison from leaving the park and was based on a minimal likelihood of large scale bison movements to boundary areas. It relied on shooting bison that approached specified boundary areas. Park personnel shot three bulls in 1974 and one cow and one bull in 1978. Approval to shoot bison was rescinded by the Department of Interior in 1978.

In recent years, bison have emigrated during the winter months from within the park to vacant range (for bison) outside the park. As early as the winter of 1975-76, numerous control measures to discourage

bison from leaving the park, primarily from the Northern Range, were attempted by the National Park Service and the Montana Department of Fish, Wildlife and Parks. Hazing, herding, physical barriers, and scare devices met with only limited success. Once the animals became accustomed to the control measures, they no longer responded.

Increased numbers of bison have attempted to cross park boundaries in recent years. In 1984, Montana Department of Fish, Wildlife and Parks wardens removed 88 bison outside park boundaries. Since 1985, 688 of the bison emigrating across the boundaries into Montana have been removed by the State's program. The number of bison harvested in this manner were:

Winter	Number Removed in Montana
1985/86	57
1986/87	6
1987/88	36
1988/89	569

In 1985, the Montana Legislature addressed the bison issue and passed a law adding wild bison to the list of big game animals.

Considerable debate surrounded the legislation. A Statement of Intent accompanied the law stating "Hunting should be considered only one of the many solutions available to Fish, Wildlife and Parks and the National Park Service to control migrating bison." The Statement further encouraged negotiations and cooperation between the two agencies to seek other methods of controlling, as soon as possible, the emigration of bison into Montana.

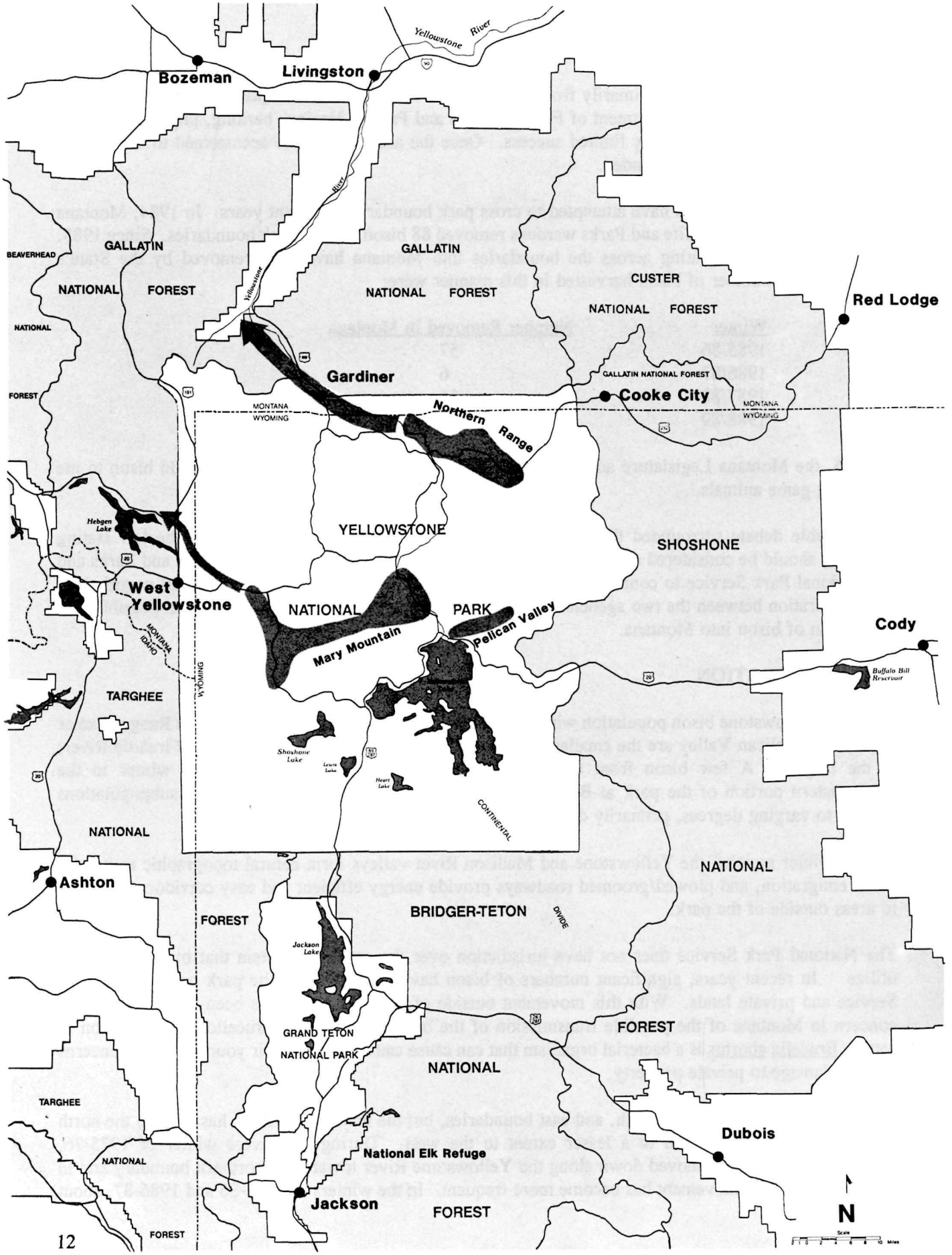
BISON EMIGRATION

The total Yellowstone bison population winters in three major areas of park: the Northern Range (Lamar Valley) and Pelican Valley are the smallest herds, and Mary Mountain (Hayden Valley-Firehole River) is the largest. A few bison from the Mary Mountain subpopulation occasionally winter in the southwestern portion of the park at Bechler Meadows. Intermixing among the three subpopulations occurs, to varying degrees, primarily during the summer season.

During winter months, the Yellowstone and Madison River valleys form natural topographic routes for bison emigration, and plowed/groomed roadways provide energy efficient and easy corridors for travel to areas outside of the park.

The National Park Service does not have jurisdiction over the entire ecosystem that bison attempt to utilize. In recent years, significant numbers of bison have moved out of the park onto U.S. Forest Service and private lands. With this movement outside of the park, there has been an accompanying concern in Montana of the possible transmission of the brucella organism (brucellosis) from bison to cattle. Brucella abortus is a bacterial organism that can cause cattle to abort their young. Other concerns include damage to private property.

Bison have crossed the west, south, and east boundaries, but the major emigration has been to the north on the Northern Range and to a lesser extent to the west. During the severe winter of 1975-76, approximately 80 bison moved down along the Yellowstone River toward the northern boundary and in subsequent winters movement has become more frequent. In the winters of 1985-86 and 1986-87, about



Bison Emigration Routes

250 bison foraged in the boundary area near Gardiner, Montana, at least part of the winter. The movement peaked in the park during the winter of 1988-89 with most of the known 900 bison in the Northern Range herd either coming out of the park or foraging near the boundary at Gardiner.

Late winter migration movements of bison cow and calf herds in small numbers have occurred on the west boundary near West Yellowstone since the winter of 1981-82.

Acquired knowledge of vacant range, bison's natural gregariousness, increased herd size, weather conditions, and human activity all appear to be factors in their emigration movement. The acquired knowledge of travel corridors that most of the remaining northern bison herd now possess, compounds the difficulty of retaining bison within the park. Incidental to the possibility of brucella transmission, bison with acquired knowledge of vacant range and the emigration urge, continue to move out of the park and onto private and public lands where they can cause property damage.

The bison movement to "bison vacant" lands outside the park will probably continue. The acquired knowledge of travel corridors has been entrenched in the remaining bison of the winter movement. As long as the park has bison and the factors triggering emigration, the bison probably will attempt to move outside the park where they are in conflict with other management strategies on both private and public lands.

INTERIM MANAGEMENT

An interim plan has been developed by the Montana Department of Fish, Wildlife & Parks (DFWP), the National Park Service (NPS), and the U.S. Forest Service (USFS) to facilitate cooperative management of the Northern Yellowstone bison herd while a long-term management plan and National Environmental Policy Act (NEPA) compliance documents are being prepared.

The NEPA process will address alternative methods of dealing with the joint management of bison to arrive at a more permanent solution for their management and long term research. Additional information from the Ad Hoc Technical Committee on Brucellosis in the Greater Yellowstone Area will aid in making final decisions.

Interim bison management and then the long-range management plan will direct the three agencies activities toward accomplishing mutually agreed upon objectives. These objectives are:

> Reduce the potential for the transmission of brucellosis from bison to cattle in the area surrounding the park.
>
> Reduce the potential for human conflicts and property damage caused by bison outside the park.
>
> Ensure opportunities to view free-ranging bison in Yellowstone National Park.
>
> Maintain a self-sustaining population of bison in Yellowstone National Park.

Under the interim management of bison, particularly the Northern Range herd, natural bison reproduction and population dynamics will be permitted to occur in the park. Since 1985, Montana Department of Fish, Wildlife and Parks has used warden-supervised individuals to remove bison that enter Montana and are considered a threat to livestock and private property interests. This process will be used, as deemed

necessary, in the interim.

A core number of 200 bison in the northern herd is established to prompt a change in management strategies. Two hundred animals is a number that allows the northern herd to maintain its viability and provide an opportunity for visitors in Yellowstone to see wild bison on the Northern Range in a natural setting.

Prior to reaching the Northern Range core number of 200, and in other areas that bison leave the park and enter Montana, the three agencies have agreed that:

A. Initial monitoring will consist of daily ground patrols to report bison locations and movements.

B. As bison approach the boundary, increased monitoring will be implemented and could include aerial flights.

C. Attempts to prevent bison from leaving the park will be limited to those instances when it is anticipated that that action would be successful in retaining bison in the park.

D. Bison reduction will commence as necessary when bison leave the park and pose a threat to livestock or other private property.

E. The State of Montana will supervise and conduct the reduction outside the park. Park rangers will assist if requested.

If the Northern Range core number is reached, the three agencies have agreed that:

A. The primary concern of the interim management plan will remain the protection of domestic livestock from the potential transmission of the brucella organism from bison. Special efforts, however, will be employed to protect the portion of the northern herd that remain outside the park.

B. Special efforts will include, but not be limited to: aggressively attempting to herd bison back into the park that pose an immediate threat to cattle; selective shooting - only bison that pose an immediate threat to livestock (see Livestock and Property section pp 18-19) will be shot; the establishment of Emergency Management Zones - special adjustments regarding private and public lands; tolerating bison on more remote public lands away from cattle and attempts may be made to herd the bison into these areas.

C. If special efforts are unsuccessful in reducing the risk of contact between cattle and bison, then bison under the jurisdiction of the State of Montana will continue to be removed.

Personnel from the three cooperating agencies will be exclusively responsible for implementation and performance of all interim management actions. Volunteers or the public will not be permitted to participate in any interim bison management activities.

Yellowstone National Park, the U.S. Forest Service, and the Montana Department of Fish, Wildlife and Parks will maintain daily communications until all bison have returned to the park.

Chapter Five

Current Research and Potential Needs

CURRENT RESEARCH

Much of the basic life history of bison is known from studies by Dr. Mary Meagher, 27 years as park research biologist (bison), and others. Such references are listed in the Selected Bibliography and not discussed in detail here. One of Dr. Meagher's major focuses is on population dynamics of the park's free-ranging bison on the three ecologically diverse winter ranges. Emphasis is on understanding the extent to which natural regulatory factors operate on these populations. Indications are that during the last decade park bison on the Northern Range have become increasingly unstable geographically, and bison have exited the park. Although the initial movement was triggered by an exceptionally severe winter, subsequent activity did not necessarily correlate with winter severity. Major factors appear to be: ecological carrying capacity in the context of population increase; an energy efficient travel route via the plowed roads; acquired knowledge of "bison vacant" areas; and the gregariousness of bison. Recent studies suggest that the latter two factors predominate and would frustrate any attempts to change the movements by reducing the numbers appreciably or by attempting to contain the animals. Data collection continues on bison numbers, distribution, population structure, and habitat relationships.

A combination of factors including the drought of 1988, underscored by the 1988 fires, and the 1988-89 winter bison reduction, predominately on the northern herd, resulted in large population changes. These changes will provide greater insight into the bison niche and behavior patterns as the impacts are studied. Long-term population data are being analyzed in relation to environmental influences.

Population modeling may be a valuable tool in attempting to understand the function and impact of the brucella organism on bison numbers. A modeling effort involving brucella in elk and bison of the Yellowstone area is underway but has not been completed. As the impacts of the brucella organism are discovered and better understood, the information will be incorporated into the working model. An additional Yellowstone bison population modeling initiative, relative to environmental influences, is currently being discussed using the facilities and modelers at the University of Wyoming.

To a large degree, the potential for transmission of the brucella organism to livestock outside the park is fueling the need to address the bison movement out of the park. Much has been learned about the organism, and additional inquiries are underway. The Ad Hoc Technical Committee on Brucellosis in the Greater Yellowstone Area is composed of technical experts from the tri-state region (Montana, Idaho, and Wyoming), USDA, and representatives of Yellowstone and Grand Tetons National Parks.

The expressed purpose of the committee is to learn more about the relationship between the brucella organism and bison, elk, and livestock and to evaluate means to eradicate or control the organism to acceptable levels. A major topic of inquiry has been whether the organism has always been a part of the bison ecology (native) or introduced into the United States via domestic stock (exotic) and then transmitted to bison and elk. If the organism is an exotic, the park can attempt to eradicate it as an undesirable component to the native ecosystem; but, only <u>if</u> the method of removal has minimum ecological disruption to bison and other resources of the park.

Additional inquires have included the investigation of a field vaccination delivery system for bison and elk and a successful vaccination agent to inoculate wildlife. Currently, no such agent is available for Yellowstone area bison (Strain 19 has been proven unsuccessful in the laboratory by Texas A&M research work). The Texas group has done considerable documentation of transmission between cattle and bison in controlled conditions. Dr. E.T. Thorne has investigated incidence, transmission, and field vaccination involving elk.

A second group recently met in Washington D.C. to discuss the implications of the brucella organism in bison, elk, and livestock, and possible solutions. The group was composed of staff from the National Park Service (Department of Interior) and Animal, Plant, and Health Inspection Service (APHIS-Department of Agriculture) and experts on the subject. The committee's report is expected in the spring of 1990.

An independent researcher, Dr. Jay F. Kirkpatrick of Eastern Montana College, is investigating pregnancy rate in Yellowstone bison through analysis of urine and fecal chemicals. Fetal loss will be compared in the Mary Mountain and Northern Range herds. Differences in reproductive success may allow for deductions as to the causes of fetal losses. This research is of interest not only because of potential findings but also because it is a non-intrusive research technique with no disturbance to wildlife. Dr. Glen DelGiudice, Veterans Administration Medical Center, Minneapolis, is using winter urine analysis to document changes in bison physiology and body condition.

Other researchers, such as Dr. Linda Wallace of Oklahoma and Dr. Sam McNaughton and his Ph.D. student Doug Frank, are studying ungulate foraging relationships in areas where bison and elk grazing overlap.

Dr. Meagher has collected blood for genetic analysis as well as a representative sampling of bison jawbones for aging studies.

MANAGEMENT NEEDS

The National Park Service through Yellowstone National Park has a requirement to manage wildlife populations by natural regulation to the maximum extent possible, allowing the forces of nature to manifest themselves in shaping and directing the size, structure, and evolution of populations. In large national parks or areas where the land mass is ecologically dedicated, this natural system works, and has done so for thousands of years before the advent of modern human interference and direction. A specific example of the natural components shaping and driving population dynamics is found in Yellowstone's Pelican Valley where bison numbers increase and decrease (they decreased by over 50% during the 1988/1989 winter-kill) and nature plays out her hand without the interference or intervention of technological (modern) man. Yellowstone has a need to comply with this continuing National Park Service policy.

The National Park Service has long recognized that because the park (and the migrating animals that inhabit the park) is not an ecologically complete unit, the policy of natural regulation can not work to the extent it does in Pelican Valley. The National Park Service recognizes that where animal populations are shared, as they are in migratory herds, compatible stewardship needs to be worked out among the park, adjacent land owners, and game managers. Management of the northern bison herd is just such an instance.

A somewhat parallel brucellosis issue occurs in Alberta and Northwest Territories, Canada, in the Wood Buffalo National Park (WBNP). The bison there have not only the brucella organism but also have tuberculosis. These bison are hybrids of two subspecies, the native wood bison and introduced plains bison, and their existence threatens a disease free and seperate wood bison population. Canada is proceeding with a public involvement program to discuss and consider alternatives. The Yellowstone bison management effort may be influenced by decisions that arise from that process. Although there are more differences than similarities between the two situations, something may be learned and applied to bison management here.

A greater Yellowstone area information system should be constructed to better understand the conflicts involved in managing bison. The park's Geographic Information System (GIS) could, as a minimum, incorporate the themes of grazing allotments (location and times), land ownership, and areas of conflict. This schemata would be available for management use to the various agencies in the Greater Yellowstone Area responsible for bison management and public information.

There are counterproductive actions to regional management of the bison that need to be addressed through a more complete public information program. A case in point are the winter backyard feedground situations which encourage not only elk but bison to utilize them, altering natural social patterns, increasing the presence of disease organisms, and increasing land impacts. A well thought out joint public information program can alleviate much of these situations.

RESEARCH NEEDS

Future needed research includes increasing our understanding of bison ecology. Considerable research has been accomplished, but considerable population data remains to be analyzed and published. This is currently underway. Investigations into brucella vaccines suitable for free-ranging bison and acceptable delivery systems need further exploration. A vaccine delivery system compatible with the National Park Service's policy of least disturbance to bison populations and other species is an essential consideration.

Computer modeling holds promise for mathematical insight into bison population dynamics. Models are useful for gaining insights but do not represent absolutes in the natural ecological world. As a tool, they are dependent on our limited level of understanding. Additional information may have to be collected and examined to refine the model as much as possible.

An open mind must be maintained in regard to yet unidentified research needs.

Chapter Six

Future Planning

PURPOSE AND NEED FOR A LONG-RANGE MANAGEMENT PLAN

State and Federal agencies, each having separate and defined mandates, often come into conflict in attempting to resolve mutual problems. For instance, the State of Montana (Legislature and Department of Livestock) want bison eliminated, as necessary, to minimize the brucellosis threat, while the Montana Fish, Wildlife and Parks Department is charged with managing the bison as a big game animal. The Animal, Plant, and Health Inspection Service (APHIS) U.S. Department of Agriculture is charged with the management and possible elimination of disease such as brucellosis, while the National Park Service is mandated to protect native species with little or no interference from modern man. It is recognized that the Yellowstone ecosystem is an enormous complex of ecological communities, and that the diversity of management requirements and procedures presents a difficult challenge. Conflict resolution, alternatives, and compromises must be discussed if the problem is to be addressed and solved.

The Montana Department of Fish, Wildlife and Parks, the National Park Service, and the U.S. Forest Service have agreed to develop plans for coordinated management of individual species such as bison, elk, pronghorn, mountain goats, mule deer, bighorn sheep, etc.

The primary purpose of the bison long-range management plan is to evaluate methods of controlling bison problems and to select the one or combination of alternatives that best meet the conflicting agency mandates. Specific objectives are to reduce the possibility of brucella organism transmission to cattle and reduce the potential for human conflicts and property damage caused by bison outside the park while ensuring opportunities to view free-ranging bison and maintain a self-sustaining population of bison in Yellowstone National Park. Alternative management actions, both inside and outside the park, will be developed that address the social, economic, biological, and environmental impacts of bison emigration.

ISSUES AND CONCERNS

Livestock and Property Protection

Numbers of domestic cattle between the park boundary and Yankee Jim Canyon, a distance of 12-14 miles north of the park, fluctuate according to the time of year. Livestock owners move cattle onto summer grazing leases and buy and sell stock seasonally.

Emigrating bison are not easily deterred by normal wire fences. Damage to fences occurred in the 1988-89 movement. Property owners in Montana are concerned about fence destruction, property damage, and potential transmission of Brucella abortus to cattle. Brucella abortus, the causative organism of a contagious disease called brucellosis, can cause domestic cattle to abort their calves. Increased costs to producers result from the loss of production, loss of markets, and costs of prevention including vaccinations.

Tests indicate some Yellowstone bison are infected with the brucella organism. 54% of the bison killed outside the park in 1989 tested positive (were exposed to the organism in the past) for the brucella

organism. Elk on the Northern Range also carry the brucella organism but at a much lower prevalence (6,158 elk tested in the 1960s indicated 1.7% were positive).

A U.S. Department of Agriculture funded study conducted in 1988 at Texas A&M University showed conclusively that under controlled conditions, the disease transmits as readily from bison to cattle as it does among cattle.

Most cattle in the area are inoculated. The standard procedure is to vaccinate heifers at about four to five months of age. Vaccination effectiveness may vary but is approximately 67 percent. Many Montana cattle producers vaccinate their livestock in order to ship interstate to other producers and/or buyers in states that will not accept non-vaccinated stock. Montana requires all imported cattle to be certified vaccinated.

The areas adjacent to the park have been brucellosis-free for many years and recent testing for the brucella organism in adjacent area cattle have continued to be negative.

The greatest potential for transmission comes if bison cows give birth to their calves outside the park on common range with cattle (studies show brucella organism can remain viable for as little as 5 hours in direct sunlight to as much as 100 days in untreated manure). Not all bison have a high likelihood of transmitting the brucella organism. Usually only cow bison have transmission potential, and transmission is usually by ingestion; if an infected cow gives birth or aborts where domestic cattle graze, transmission may occur directly by contact with the newborn calf or indirectly through contaminated feed, the dead fetus, or birthing tissues. Remote possibilities of transmission may exist if an infected bull bison sheds the brucella organism in urine and semen. The opportunity of bison and domestic cows coming into sexual contact with one another is equally remote, as bison and cattle do not behaviorally seek to mix. Potential for contamination of domestic livestock increases with the increased movement of bison into Montana. Between 1952, when Montana began an accelerated program to eliminate the brucella organism from its cattle, and 1984, when Montana was declared brucellosis-free, the State and its livestock producers spent a reported $30 million on eradicating the disease.

Resource Protection

As is the case with any ungulate population, there is a limit to the number of animals that can be carried in a given area. No resource damage, such as over-grazing or increased sedimentation to streams and resultant problems with water quality, has been documented in Yellowstone National Park. There has been little documented resource deterioration resulting from bison movement outside the park into Montana.

Yellowstone National Park is designated a World Heritage Site and Biological Reserve and is obligated to protect resources and natural processes within the park.

Human Safety

Bison are wild animals and have a quick response to a perceived encroachment from humans. A number of serious injuries have occurred to persons in Yellowstone National Park, especially within the last decade, when bison were approached too closely.

Although no incidents have occurred outside the park, concerns for human safety do exist with the greater numbers of bison leaving the park. The greatest potential for human/bison conflict exists near gateway communities or rural residences located in emigration corridors.

Public Enjoyment and Expectations

The animals and ecology of Yellowstone have long been a special attraction to visitors of Yellowstone National Park. Management objectives will strive to maintain a self-perpetuating population of bison and ensure opportunities to view free-ranging bison in Yellowstone National Park.

The State of Montana has, to this point, made no attempt to provide bison viewing opportunities in the state.

Interpretation and Public Information

Considerable interpretation and public information is provided to visitors of Yellowstone Park. Outside the park, Montana's public information effort has dealt primarily with informing the public why the reduction is taking place and publication of rules and regulations specific to the bison control effort. Additional efforts are underway to inform individuals of the specifics of the control effort and what will be expected of them should they have the opportunity to participate. The intent of this effort is to ensure the taking of bison in the most humane and efficient manner possible.

Agency Financial Impacts

The Department of Fish, Wildlife and Parks has spent approximately 2,000 hours in the field assisting participants and providing the logistics of administering Montana's 1988-89 bison control program. No estimates of administrative time have been made but hundreds of hours were spent.

STATE'S PARTICIPATION

Montana is responsible for controlling wandering bison that are determined to be a problem outside the park in Montana. Because the Montana Department of Fish, Wildlife and Parks has the responsibility for managing the game species of the State, the State will remain involved in managing bison in Montana and cooperating with the two federal agencies in the development of the long-term management plan to control bison.

OTHER FEDERAL AGENCIES' PARTICIPATION

The National Park Service has responsibility for the bison of Yellowstone when inside the park. Any control actions inside the park would be the responsibility of the National Park Service.

Because bison occasionally move onto national forest lands in Montana, the U.S. Forest Service, and more specifically the Gallatin National Forest, are involved in habitat management.

PUBLIC PARTICIPATION

The need to prepare a cooperative long-range management plan for bison is essential. It is the intention of the three agencies to involve the public in decisions that are made specific to management of the bison of Yellowstone. Anyone interested in being involved is encouraged to participate. Scoping meetings will be held to assist in the development of alternative strategies. A preliminary draft plan will be produced that will be published for public review. Comments received on the draft will be incorporated into a final draft plan which will also be provided to the public for their review. A final plan that will guide the management of bison in and outside of Yellowstone in the future will be completed by the winter season of 1991-92.

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