EXHIBIT 13
DATE 2/17/09
HB 482

HISTORY OF BISON AND BISON MANAGEMENT IN YELLOWSTONE NATIONAL PARK

EARLY BISON POPULATION

Bison are native to the Yellowstone National Park area. Archaeological evidence indicates that people hunted bison there in the 1800s. One population estimate based on fossil evidence stated that there were 600 bison in 1880 (Schullery and Whittlesey 1992). However, many early expedition parties such as Langford, 1870; Captains Barlow and Heap, 1871; Hayden 1871; William A. Jones, 1873; Dunraven 1874; and Captain Robert Ludlow, 1875, reported very few animals in the Park area.

In 1856, for example, Scout Jim Bridger warned explorer Captain William F. Raynolds not to try to traverse the Yellowstone Plateau because he would find nothing to eat. "A bird can't fly over that", he warned, "without taking a supply of grub along." By 1891, Park authorities reported, "the elk have increased enormously." In 1903, Teddy Roosevelt remarked that the elk "were certainly more than when I was through the Park twelve years ago."

Earliest visual population estimates of bison indicated that there were 300 bison in 1892. In 1902, Congress appropriated funds to save Yellowstone National Park bison from diminishing numbers as by that time, fewer than 50 wild bison remained in the Park. This herd was augmented with 21 untested bison from semi-domesticated herds in Montana and Texas, resulting in the establishment of the Buffalo Ranch in the Lamar Valley in 1907. Initial management was intense with herding, weaning of calves, winter feeding, and regular removals. Active management gradually tapered to the last winter feeding in 1952 and last use of the slaughter facilities in 1957.

MANAGEMENT POLICIES AND BRUCELLOSIS

As far back as 1917, the bison in Yellowstone National Park were tested, and brucellosis was found in the herd. Control measures were used to maintain bison numbers below the level of estimated forage based carrying capacity. Activities were limited to testing bison until the 1940's when the program was expanded to include calfhood vaccination and slaughter of reactors in the Lamar bison herd. By 1963, culling was based on a comprehensive range site and condition inventory of Yellowstone Park commissioned by the Department of Interior and conducted by the USDA Soil Conservation Service. USDA developed a bison herd optimum size of 350, along with an optimum elk herd size of 5,000, based on available forage. (USDA, NRCS, 1963.) Nevertheless, brucellosis testing and herd reductions were not conducted in Yellowstone National Park after the winter of 1965-66. (Barmore, 1968).

By the early 1970's, the management policy changed to one of allowing natural regulation management (no active manipulation) to occur to the maximum extent possible. When bison population controls within Yellowstone National Park ceased, 397 bison were counted. Except for an occasional animal, few bison attempted to leave Yellowstone National Park until 1984. At that time, 2,114 bison were counted in the Park in three areas. Bison in Yellowstone Park tend to group in three different geographic locations. There is intermixing of the three geographic subpopulations of bison. (Yellowstone Bison: Background and Issues, May 1990).

In 1967, State veterinarians from Montana, Idaho, and Wyoming expressed concern to the Department of Interior about the potential for Yellowstone National Park bison to increase in the absence of reductions in the park, leading to greater numbers moving to surrounding areas where cattle grazed. (Montana Department of Livestock). Yellowstone National Park instituted a boundary control program the next year. In 1971, concerns about risks from migrating bison resulted in the first Park-State Federal joint meeting. Park personnel shot three bulls in 1974, and they shot one cow and one bull in 1978. (Yellowstone Bison: Background and Issues, May 1990.)

During a severe winter of 1975-1976, approximately 80 bison moved downstream along the Yellowstone River toward the northern boundary of the Park . A decision was made by the National Park Service to attempt to restrict the animals to the Park using hazing tactics as an alternative to shooting. (Meagher, 1989.) In 1977-78 and 1979-1980, baiting with hay was not effective in bringing the bison back to the Park. According to Dr. Meagher, "Most of the northern range wintering population of bison have found the new foraging areas and connecting travel routes. Removal of all bison that move to the boundary area at a given time would eliminate what appears to be acquired knowledge, but is probably unrealistic politically." (Meagher 1989).

Annual use of the Mammoth-Gardiner area by bison continued to increase after 1976. Mixed herds began to cross the boundary at Reese Creek in the winter 1982-83. Unable to use lethal methods to prevent bison from exiting the Park, YNP personnel decided to use non-lethal techniques including foot and horseback hazing, aerial hazing, noise makers, tape-recorded wolf howls, barrier fences, cattle guards on roads, aversive conditioning (bird shot and rubber bullets), baiting with hay, and scattering charcoal to increase snow melt. (Meagher, 1989). Although some methods temporarily deterred bison, no method or combination proved effective in deterring bison from moving to boundary areas with which they had recently become familiar. During the winter of 1984-85, state of Montana personnel removed 88 bison that wandered beyond the northern boundary into Montana.

Interagency planning to address bison management in Yellowstone National Park and adjacent Montana areas began in 1985.

BISON BEHAVIOR

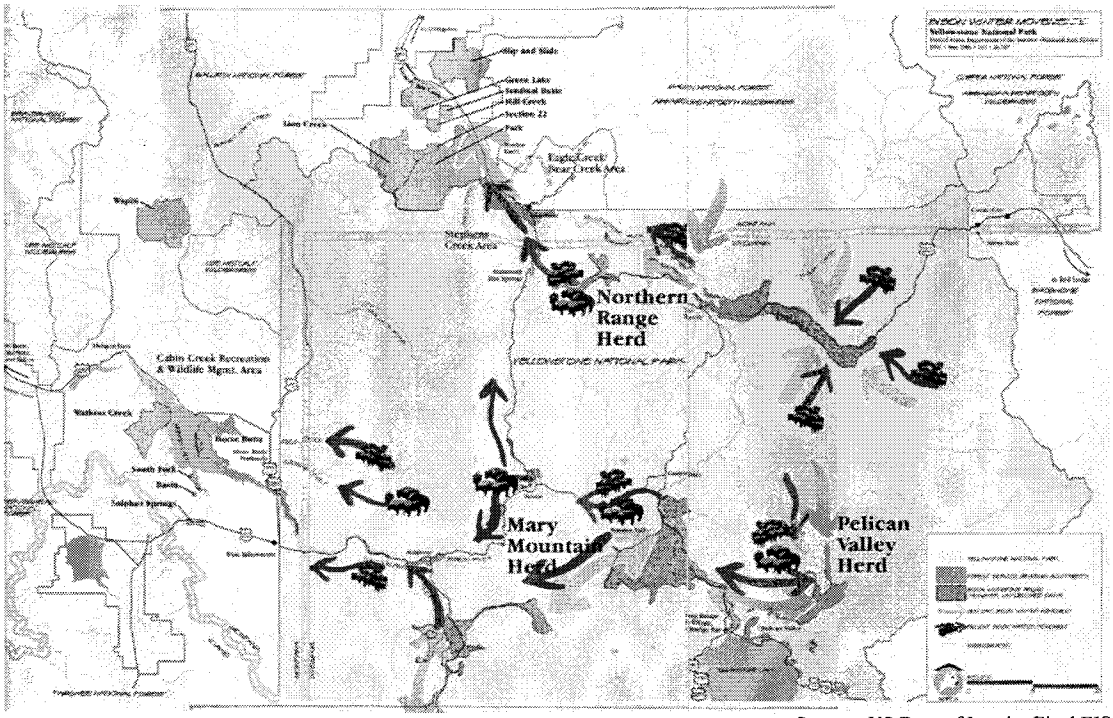
Much of the basic life and history of bison is known from studies by Mary Meagher who worked for 27 years as a research biologist for Yellowstone National Park. Meagher has stated that "bison are gregarious animals." A base unit of perhaps 11-20 animals is common (Fuller 1960). Mature cows which provide the herd group leadership have strong affinities for returning to acquired knowledge winter ranges. In 1986, it was observed that the lead cows continued to return to new foraging areas. Bison groups are not stable in composition, and so other and more bison continue to learn new foraging areas. Sedges provide the major source of forage for bison. They appear to have a greater digestive ability for low-protein, poor quality forage, and may eat more of this kind of forage than cattle do (Peden et. al 1974).

Although predominantly an inhabitant of historic grasslands, the bison is able to survive in places where no other large ungulate can, including open valleys covered with several feet of snow. (Meagher 1976). During the winter of 1985-1986, as many as two-thirds of the Lamar bison, including nearly all of the cow-calf groups, moved westward and down country to the Park boundary near Gardiner, Montana. Meagher has stated that "there seems to be no question, that if left to their own devises, they would gradually recolonize the Yellowstone river valley. Eventually, small units of bison would separate to become resident subpopulation farther down the valley." (Meagher 1985).

To better understand the relationship of bison movements and the use of the winter groomed road system, researchers have studied bison behavior. While groomed roads may have contributed to the redistribution of bison within Park boundaries (Meagher, 1997), some research has suggested that bison tend to use waterways and off-road trails for much of their travel on the Western boundary of the Park (Bjornlie and Garrott 1998). However, groomed roads may have allowed larger numbers of bison to exist in the Park than in the absence of groomed roads by allowing access to otherwise unavailable foraging areas, and westward redistribution early in the winter may predispose some bison to exit the Park. According to Meagher, "Use of the plowed road for relatively easy and energy efficient travel probably facilitated learning and a rapid increase in numbers." (Meagher, 1989). Evidence presented for the Northern Range indicate that the bison population size above a threshold of about 550 drives the animals to move to lower elevation range in the Gardiner basin and is positively correlated to snowpack. (University of Calgary, 2005).

Bison are highly social and appear to retain and pass along knowledge through generations (Meagher, 1985), so it is possible that closing groomed roads may not impact bison movements and distribution. A study completed by the University of Calgary in April 2005 concluded that bison movement between winter ranges was projected to range from 100 to 4,000 animals, influenced most by per capita forage availability. An average movement of approximately 1,000 bison occurred in non-road grooming scenarios, and

1,200 in road grooming scenarios. (University of Calgary, Faculty of Environmental Design, 2005).



Source: US Dept of Interior Final EIS

Bison Winter Movements

Blue arrows represent historic winter movements
Brown arrows represent recent migrations to forage as a result of overpopulation

COOPERATIVE BISON MANAGEMENT AMONG AGENCIES

Since the early 1980's, a series of federal, state, and joint federal/state management plans have been in place. In 1984, Montana Department of Fish, Wildlife, and Parks wardens removed 88 bison outside Park boundaries. In 1985, the Montana Legislature addressed the bison issue and passed legislation to add wild bison to the list of big game animals. Considerable debate and subsequent attacks against hunting bison resulted. Hunting has continued as a method of culling bison, with the Montana state legislature changing its position periodically. In spite of removals, the herd has a tendency for population increase and has quickly recovered following every major herd reduction. During the 1996-1997 winter, 1,084 bison were removed through federal and state management actions.

In 1995, the Montana State Legislature statutorily named the Department of Livestock the lead agency to manage the bison/brucellosis disease issue. As long as the bison remain in Yellowstone National Park, there are under the management of the National Park Service. If the bison leave the Park, the Montana Department of Livestock is mandated to take action to ensure the health and safety of Montana's livestock and citizens and to ensure that Montana's brucellosis free status is maintained.

CURRENT MANAGEMENT PRACTICES

A Notice of Intent to prepare a cooperative bison management plan and environmental impact statement was published in the July 1990 Federal Register. The process continued with a public review of a draft environmental impact statement (EIS) that began on June 12, 1998 and ended on November 3, 1998. The draft EIS was jointly prepared by Yellowstone National Park, Gallatin National Forest, APHIS Veterinary Services and the State of Montana. A final record of decision was released on December 22, 2000. The final resulting cooperative agreement, that includes specific operating procedures, is not a plan for eradicating brucellosis from bison in Yellowstone National Park, but rather a plan to prevent the transmission of brucellosis from bison to cattle. It details a set of actions, or "Adaptive Management Steps" to take place in both the Western boundary area and the northern boundary area of the Park. Those actions include hazing bison back into the Park, testing captured bison, and sending seropositives to slaughter or for use in jointly approved research. Seronegative pregnant bison are allowed to enter Montana under certain conditions. Operating procedures for all agencies are periodically updated, with the latest directive issued in October 2005. The current Interagency Bison Management Plan (IBMP) states that "to date, management strategies directed and implemented by the IBMP have successfully prevented brucellosis transmission to cattle that graze in proximity of the IBMP management areas." The current interagency management plan includes:

1. The plan provides for actions in Yellowstone National Park, the Gallatin National Forest, and private lands on the north and west boundaries of Yellowstone National Park.

2. The primary tool is the spatial and temporal separation of cattle and bison.

3. The number of bison will be limited in the boundary areas in the Gardiner basin and near West Yellowstone.

4. The intensity of management will increase as bison move toward the edges of Management Zone 2 (zone nearest the park in Montana in each boundary area.)

5. In the spring the agencies will haze bison back into the Park when snow and weather typically allow bison to move back into the interior of the Park.

6. If hazing is unsuccessful, bison that do not return to the park will be captured or shot.

7. Capture, test, and slaughter of seropositive bison in the Reese Creek and West Yellowstone areas in steps one and two;

8. Hazing, capture, test and slaughter operations, or quarantine of bison that remain outside the Park in these areas after specified haze-back dates.

9. Vaccination of bison and cattle (including remote delivery) will be used to reduce risk and to work toward the eventual elimination of brucellosis in bison. The delivery system and development of a safe and effective vaccine require further research.

10. Untested bison will be allowed to occupy the Eagle Creek/Bear Creek area, Cabin Creek Recreation and Wildlife Management Area, and the Monument Mountain Unit of the Lee Metcalf Wilderness year-round without agency interference because these areas do not have cattle grazing within them or nearby.

RECORD OF BISON POPULATION AND REMOVALS

The following table has been drawn from data prepared by the Dept. of Interior and other agencies and details how many bison have historically been estimated to be in the Yellowstone herd, along with removal data. When this table is correlated with management policies, winter snow conditions, condition of range forage resources in Yellowstone Park, and other factors, trends can be seen that indicate increasing numbers of bison within the Yellowstone Park herd. According to the Interagency Bison Management Plan status review of September 2005, "The abundance of bison has grown steadily since the implementation of the IBMP (plan)." This growth has been attributed by researchers as related to mild to average winters since the plan has been in place. At current population levels, movements from the Park to surrounding areas are normal occurrences, according to Park researchers.

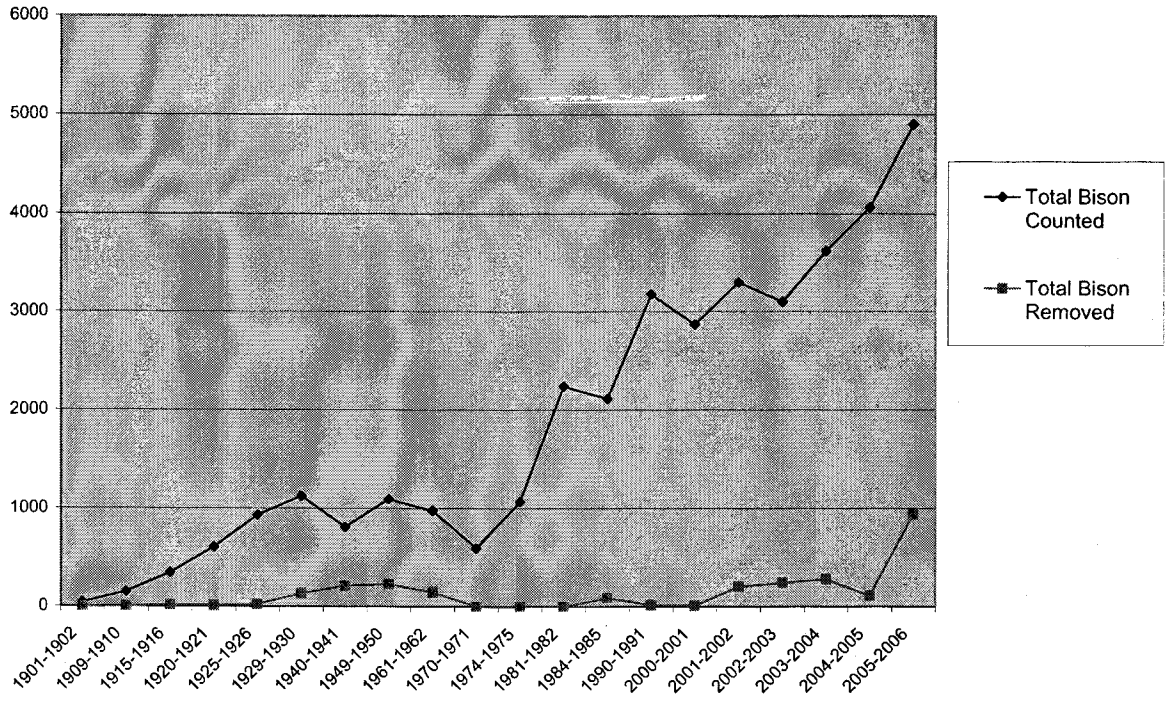
HISTORIC BISON POPULATION COUNTS AND REMOVALS FROM 1901-02 TO 2005-06

Winter of Year	Total Bison Counted	Total Bison Removed	Winter of Year	Total Bison Counted	Total Bison Removed	Winter of Year	Total Bison Counted	Total Bison Removed
1901-02	44	0	1938-39	811	67	1973-74	873	0
1902-03	47	1	1939-40	868	3	1974-75	1,068	0
1903-04	51	7	1940-41	809	213	1975-76	1,125	8
1904-05	74	0	1941-42	869	202	1976-77	1,252	nc**
1905-06	nc	nc	1942-43	964	11	1977-78	1,626	nc**
1906-07	84	2	1943-44	747	407	1978-79	1,727	nc**
1907-08	95	1	1944-45	932	Nc	1979-80	1,803	nc**
1908-09	118	5	1945-46	791	238	1980-81	2,396	nc**
1909-10	149	3	1946-47	nc	Nc	1981-82	2,239	0
1910-11	168	2	1947-48	960	237	1982-83	2,160	0
1911-12	192	28	1948-49	1,126	Nc	1983-84	2,229	0
1912-13	215	8	1949-50	1,094	228	1984-85	2,114	88
1913-14	nc	nc	1950-51	nc	Nc	1985-86	2,291	57
1914-15	270	4	1951-52	976	250	1986-87	2,433	6
1915-16	348	18	1952-53	nc	Nc	1987-88	2,644	35
1916-17	397	11	1953-54	1,477	139	1988-89	3,159	569
1917-18	nc	nc	1954-55	1,350*	288	1989-90	2,606	4
1918-19	504	46	1955-56	1,258	373	1990-91	3,178	14
1919-20	501	17	1956-57	543	273	1991-92	3,426	271
1920-21	602	7	1957-58	nc	12	1992-93	3,304	79
1921-22	647	56	1958-59	800*	44	1993-94	3,551	5
1922-23	748	14	1959-60	800*	Nc	1994-95	3,956	427
1923-24	nc	nc	1960-61	869	Nc	1995-96	3,398	433
1924-25	830	109	1961-62	975*	148	1996-97	3,436	1,084
1925-26	931	23	1962-63	819*	370	1997-98	2,105	11
1926-27	1,008	41	1963-64	821*	6	1998-99	2,239	94
1927-28	1,057	58	1964-65	388	392***	1999-00	2,444	nc
1928-29	1,109	106	1965-66	226	54	2000-01	2,870	6
1929-30	1,124	132	1966-67	397	3	2001-02	3,300	202
1931-32	nc	nc	1967-68	418	4	2002-03	3,100	244
1932-33	nc	nc	1968-69	556	0	2003-04	3,620	280
1934-35	nc	nc	1969-70	592	0	2004-05	4,063	112
1935 -36	847	109	1970-71	565	0	2005-06	4,900	939
1936-37	674	17	1971-72	713	0			
1937-38	755	25	1972-73	837	0			

SOURCE: NPS, Meagher 1973; Meagher, unpub. data; Montana Department of Fish, Wildlife and Parks, Montana Department of Livestock, and National Park Service, unpub. data).
NOTE: Sources of removals include culling from the semidomestic Lamar Ranch, hunting and agency shooting, and capture and slaughter. It does not include natural mortality. Winter counts in later years use aerial spotting and better estimating techniques.

nc = not counted or information unavailable
* Estimates, rather than actual counts.
** During 1974 and 1976-81, a few bulls were removed.
*** Includes 38 from natural mortality (1964-65 numbers are suspect)

Historic Bison Population Counts and Removals



The chart above is a decade by decade review of bison counts and removals.

Significant dates:

1970-1971: National Park Service "Natural Regulation Policy" adopted.
1975: Bison first move towards northern boundary during severe winter.
1984-1985: Park personnel remove 88 bison that wander beyond the Park.
Interagency planning to address bison management underway.

BISON NUMBERS TODAY

Through the process of state and federal interagency negotiations and federal court mediation throughout the 1990's, the minimum number of Yellowstone bison was established at 3,000. A study completed on winter snow conditions by the National Research Council in 1998 (Cheville, McCullough, Paulson, and others, 1998.) determined that bison will move out of the park in all but the mildest winters when numbers exceed 3,000 head. The study also predicted that under average conditions, about 332 bison will move out of Yellowstone National Park each winter.

BRUCELLOSIS IN BISON AND CATTLE

BRUCELLOSIS

Brucellosis is a disease caused by Brucella abortus, a bacterial organism transmitted primarily by contact with byproducts of birth or abortion, or with milk from infected animals. Typically, transmission occurs when susceptible animals come into direct contact with contaminated aborted fetuses, newborn calves, birth membranes or uterine fluids. When present, brucella abortus usually is found in the organs and tissues of the reproductive system and mammary gland, associated lymph nodes, and lymph nodes of the head and neck.

Animals are tested for brucellosis using serologic tests (blood tests to detect that antibodies are present as a result of an infection) and bacterial cultures. Four vaccines are used against brucellosis: Brucella abortus strain 19 (S19) and Brucella abortus strain RB51, Rev 1 against Brucella melintesis, and strain 2 against Brucella suis. S19 and RB 51 were developed to prevent brucellosis in cattle and have also been used in bison and elk. The vaccine RB 51 appears to meet the criteria for a safe vaccine as described by the Greater Yellowstone Interagency Brucellosis Committee.

There is no feasible treatment or cure for animals infected with Brucella. Animal species response to brucellosis varies, but most bovines do not suffer marked fever, anorexia, or other outward signs. Pregnant female cattle and bison typically develop placental infection that results in spontaneous abortion or premature labor. Infected cows usually abort once, but a percentage will abort during additional pregnancies, and calves born from later pregnancies may be weak and unhealthy.

In humans, it is manifested as a febrile, systemic disease, known as "undulant fever" (characterized by an undulating body temperature, hence its name). A simple, uncomplicated case initially resembles influenza with headache, fever, chills, profuse sweating, abdominal, and joint pain. Less frequent but more serious indications include emotional and neuropsychiatric problems, problems with internal infection, bones, and joints. Ninety eight cases of human brucellosis were reported in 1997. In 1998, 62 cases of brucellosis in humans were reported to the Centers for Disease Control. Today, brucellosis in humans is a potential bioterrorism agent, and the Centers for Disease Control lists brucellosis as a Category B threat among Bioterrorism Agents and Diseases. This means that it is a significant health threat.

BRUCELLOSIS TRANSMISSION FROM WILD ANIMALS TO CATTLE

Some critics have debated whether or not brucellosis can be transmitted from wild animals to cattle herds. An analysis of this was completed by Texas A&M University in

1990 and found that in a researched, controlled setting, brucellosis can be transmitted from infected bison to cattle. In 2004, Wyoming lost its 20 year brucellosis free status after cattle were found to carry the disease. DNA tests confirmed that the cattle were infected from wild elk, according to the Wyoming State Veterinarian. In January 2006, Idaho lost its brucellosis free status after a small herd of cattle near the Wyoming border was found to be infected. The only brucellosis affected animals with which the herd had come into contact were wild elk, according to the Idaho Department of Agriculture.

Brucellosis was first detected in Yellowstone bison in 1917 and has been present since. Currently, approximately 50% of Yellowstone bison that are tested carry brucellosis; however that number has fluctuated. In 1989, 54% of the bison killed outside the park tested positive. The Montana Department of Livestock reported in 1999 that 68% of Yellowstone bison have tested positive for the disease brucellosis.

Among elk populations, approximately 1-2% of elk in the Northern range herd are believed to be infected with brucellosis. Approximately 3%-9.5% of elk in the Madison-Firehole herd test positive for exposure to brucellosis. Recent studies completed by Montana Fish, Wildlife, and Parks in April 2006 have shown that serological surveillance indicated an increase in brucellosis seroprevalence in elk from the Madison Elk Management Unit from an average of 1.2% in prior surveys (1990-2003) to 6.9% in 2004-2005. Elk associated with the National Elk Refuge and the feedgrounds managed by the state of Wyoming south of YNP have seroprevalence rates ranging from 3% to 65% (NAS 1998). The National Academy of Sciences in 1998 assessed elk transmission risk relative to that of bison. Unlike bison, elk tend to exhibit a cover strategy during the calving period, separating themselves from the herd to calve. Elk are also much less likely than bison to calve in lowland areas near rivers or streams where farm and ranch headquarters and calving areas are generally located. They also are much more meticulous than bison in cleaning up afterbirth and soil and vegetation from calving sites.

According to wildlife biologists, under natural conditions, elk prefer to calve in seclusion, meticulously cleaning up the area by consuming placental tissues and fluids to avoid attracting predators. They prefer to keep the calf separate from the other animals for the first few days before returning to the herd, a behavior pattern that reduces the risk for disease transmission. For these reasons, elk seroprevalence is less of a threat. Artificial elk feeding grounds, through which cases of brucellosis transmission from elk to cattle have been documented, are a detriment to brucellosis clean elk herds because they do not provide the spatial conditions that nature affords.

In a typical blood test, a blood agglutination test is performed. A blood sample is taken from each animal in a herd and tested in the field or in a laboratory. The blood serum is mixed with a test fluid or antigen containing dead Brucella organisms. When the organisms in the test fluid clump together in a reaction known as agglutination, the test is positive. The incubation period between exposure to the infectious dose of organism and the first appearance of disease is quite variable, ranging from about two

weeks to one year, and even longer in certain instances. When abortion is the first sign observed, the minimum incubation period is about 30 days (APHIS, 2006).

Brucella organisms on vegetation and soil have been reported to persist from a few days to over 100 days. The bacteria has remained viable on fetal issues 20-30 days for those placed out in mid-May. That period lengthens, depending upon the season of year. Results indicate that sunlight and temperature directly affect bacterial survival on fetal tissues.

In addition to blood tests, tissue cultures are performed to detect the presence of brucellosis. Although tissue cultures are a much more reliable method of identifying active infection, they also will not identify all infected animals. The rate of current infection as determined by blood cultures is usually lower than the rate of positive blood tests because Brucella abortus cannot always be cultured from infected animals. For example, an ongoing analysis of samples of 41 bison killed during the winter of 1996-1997 showed that the blood tests for 30 females were positive. For 18 of those 30, tissue cultures have been completed. The results of those cultures show that 7 tested positive for brucellosis. According to Wyoming officials, research with elk have suggested a higher correlation between positive blood tests and positive tissue cultures.

BRUCELLOSIS PREVENTION

There is no cure for brucellosis. Occasionally, animals may recover after a period of time. Such animals are carriers and continue to remain a dangerous source of infection for other animals with which they associate.

Numbers of domestic cattle between the Yellowstone Park boundary and Yankee Jim Canyon, a distance of 12-14 miles north of the park, fluctuate according to the time of year. Estimates given by the Montana Department of Livestock show that as many as 3,000 head of cattle have been in the Yellowstone Park area at one time, including both the northern boundary area and western boundary area. Most cattle in the area are inoculated against brucellosis. The standard procedure is to vaccinate heifers that are to be kept for breeding stock at about six to nine months of age. However, vaccination is not 100 percent effective in preventing brucellosis. It typically protects about 65 to 70 % of the vaccinated cattle from becoming infected by an average exposure to Brucella abortus under current vaccination strains.

ELIMINATION OF BRUCELLOSIS INFECTION FROM MONTANA CATTLE

The following table, developed by Dr. Ferlika, former Montana State Veterinarian, details historical data on Montana's brucellosis free status.

MONTANA'S PATH TO BRUCELLOSIS FREE STATUS

Year	Number of Quarantined Infected Herds
1953-1956 (First Area Test Statewide)	2,434
1957	666
1958	357
1959	283
1960	135
1961	93
1962	49
1963	44
1964	36
1965	37
1966	30
1967	26
1968	14
1969	9
1970	10
1971	6
1972	6
1973	10
1974	17
1975	62
1976	45
1977	47
1978	28
1979	33
1980	9
1981	9
1982	1
1983	4
1984	1
June 1, 1985	Montana declared brucellosis free

THE LIVESTOCK INDUSTRY AND BRUCELLOSIS IN MONTANA

AGRICULTURE IN MONTANA

Agriculture has been and continues to be Montana's number one basic industry. When comparing Montana industries, agriculture exceeds other industry contributions by $801 million. Receipts for Montana agriculture in 2004 were over 2.2 billion dollars. Tourism and travel receipts were $1,958,000 during that same period, with oil and gas receipts ranking third at $1,268,200. Livestock products directly account for over 1.2 billion dollars, or approximately 57% of Montana's average cash receipts from agriculture in 2004. Montana ranks second in the nation in acres of land in farms and ranches, with over 60,100,000 acres in agricultural status. Approximately 64% of the state's 93 million acres is used for farming and ranching. (Montana Agricultural Statistics, 2005.)

According to the Bureau of Economic Analysis, U.S. Department of Commerce, every dollar of meat animal (beef cattle, sheep, hogs, and poultry) product sold to entities outside Montana results in approximately $1.25 of additional sales by Montana economic sectors tied to the meat sector. Also, for every additional job in the meat animal sector, approximately 1.3 jobs are generated in the Montana economy. (U.S. Dept. of Commerce, 2003).

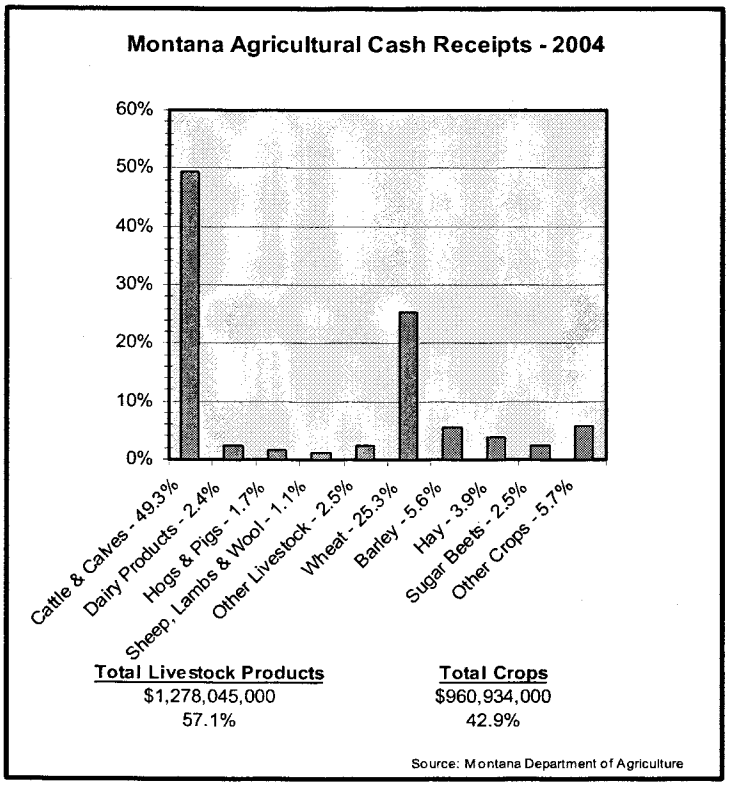


Chart 1

Left unchecked, the migration of brucellosis infected bison from Yellowstone National Park into Montana could not only have direct impacts on local livestock operators, but on the cattle industry statewide. Chart I shows the importance of the livestock industry to statewide cash receipts for agriculture. Production in infected herds could decline due to a number of consequences of the disease, including:

1. **Abortions.** Abortion losses constitute the largest single cost of brucellosis in beef cattle. A cow that aborts or has a calf that does not survive because of the debilitating effects of brucellosis has, in effect, been maintained for a year without financial return.
2. **Decreased weight gain by calves.** Calves from infected cows may have less than normal weight gains since milk production from infected cows may be inadequate. Affected calves at the time of sale may weigh 100 pounds less than calves from healthy cows.
3. **Delays in calf production.** Brucellosis would result in some infected cows being difficult to breed.
4. **Increased rates of culling and replacement.** Brucellosis-affected cows are usually culled at a faster than normal rate because of reproductive deficiencies. Another cost for affected herds would be the expenses related to additional testing and vaccinating. Testing for brucellosis is done every 30 days, as long as reactors are found. The herd is then retested after 90 days, and again after another 90 days. After the quarantine is lifted, the herd is tested again after six months.

NATIONWIDE IMPACTS

Sales at all levels—intrastate, interstate, and international—would be affected by loss of Montana's brucellosis free status. There would be the direct impacts on sales of herd depopulations and quarantines, but far more detrimental to the state's livestock industry would be the requirement of a negative brucellosis test within 30 days before interstate movement. Since Montana producers export a majority of their commodity to other states and to international markets, the perception of diseased animals could impede producers from around Montana from marketing livestock. For instance, during the 1996-97 winter, the state of Oregon imposed restrictions on the movement of untested livestock from Montana into Oregon (U.S. Dept. of Interior, Final EIS, 2000). Table I details Montana's rank in national agricultural production. This table clearly demonstrates the importance of Montana's livestock industry to the nation as a whole. A brucellosis outbreak in Montana would sharply impact the nation's agricultural and consumer supply.

MONTANA'S RANK IN THE NATION'S AGRICULTURE

ITEM	TOTAL	PERIOD OR DATE	U.S. RANK	% of U.S. Total
FARMS AND RANCHES				
Land in farms and ranches	60,100,000 acres	2005	2	6.4
Number farms and ranches	28,000 farms/ranches	2005	30	1.3
Average farm or ranch size	2,146 acres	2005	4	N/A
INCOME FROM CASH RECEIPTS, EXCLUDING GOVERNMENT PAYMENTS				
Total	$2,238,980,000	2004	33	0.9
Livestock	$1,278,045,000	2004	31	1.0
Crops	$960,935,000	2004	31	0.8
LIVESTOCK INVENTORY				
All cattle and calves	2,400,000 head	Jan. 1, 2006	12	2.5
All cows	1,470,000 head	Jan. 1, 2006	9	3.5
Beef cows	1,451,000 head	Jan. 1, 2006	7	4.4
Milk cows	19,000 head	Jan. 1, 2006	39	0.2
Cattle on feed	55,000 head	Jan. 1, 2006	24	0.4
All sheep and lambs	295,000 head	Jan. 1, 2006	6	4.7
Breeding sheep	270,000 head	Jan. 1, 2006	5	5.8
Meat goats	9,000 head	Jan. 1, 2006	35	0.4
Milk goats	2,780 head	Jan. 1, 2006	29	1.0
Hogs and pigs	175,000 head	Dec. 1, 2005	25	0.3
Chickens	480,000 head	Dec. 1, 2005	38	0.1
LIVESTOCK PRODUCTION				
Calf crop	1,480,000 head	2005	8	3.9
Lamb crop	275,000 head	2005	4	6.7
Pig crop	319,000 head	2005	27	0.3
Wool production	2,490,000 pounds	2005	6	6.7
Egg production	106,000,000 eggs	2005	38	0.1
Honey production	8,710,000 pounds	2005	6	5.0

Source: USDA National Agricultural Statistics Service

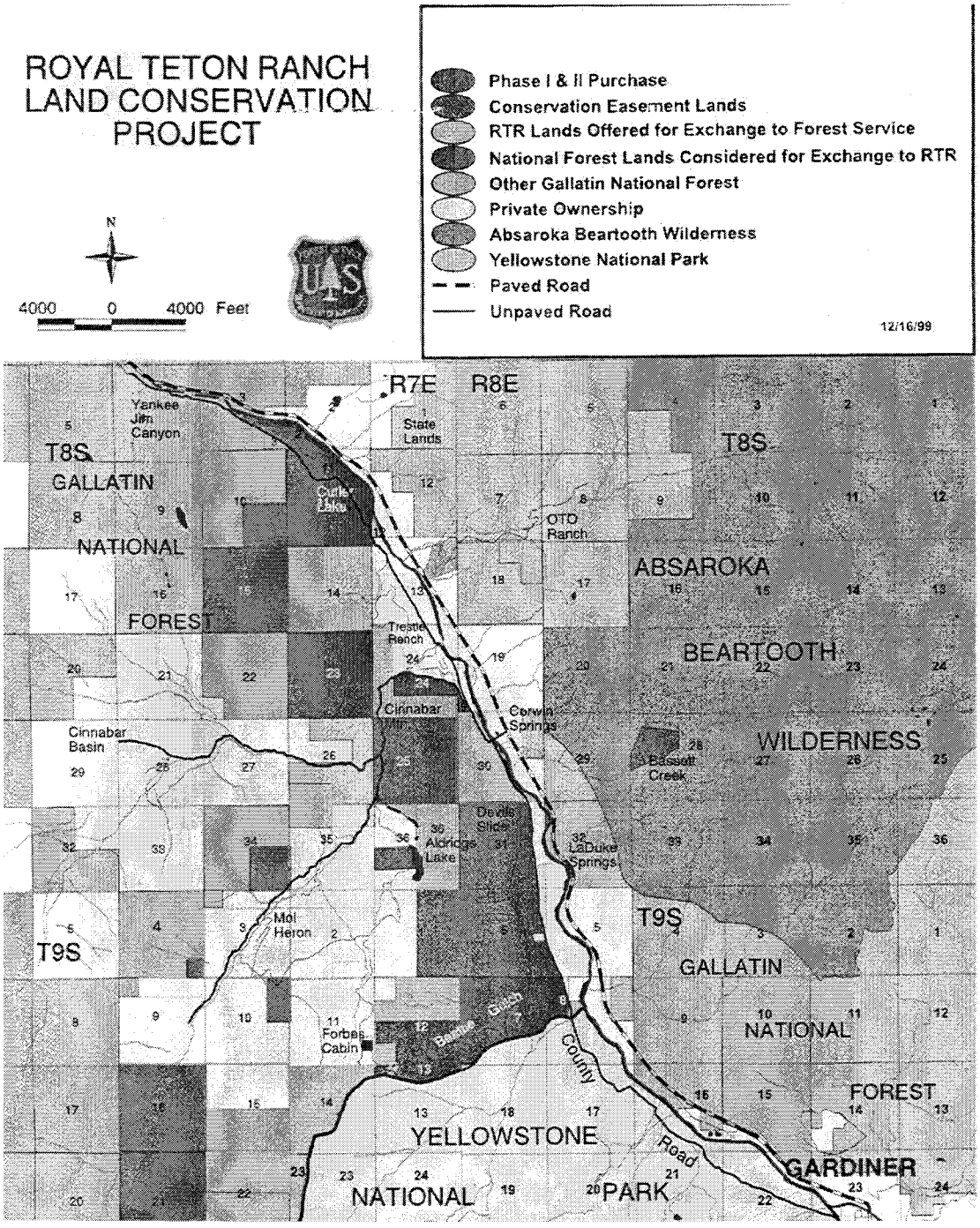
Table 1

In 1994, APHIS informed the Montana State veterinarian that states surrounding Yellowstone National Park would be downgraded from class-free status if the states failed to take action against bison within the state's borders when bison leave the Park. Also, in 1994 and 1995, the states of Idaho, Nebraska, North Dakota, Oregon, South Dakota, and Washington informed the Montana State veterinarian that testing requirements would be imposed on Montana cattle due to the migration of bison into Montana from Yellowstone National Park.

REGIONAL LIVESTOCK ECONOMY NEAR YELLOWSTONE NATIONAL PARK

In the private lands surrounding Yellowstone National Park, the livestock industry is composed mainly of cow-calf operations. Gallatin County to the west of Yellowstone National Park is the sixth ranking county in Montana for cash receipts from farm marketing. Over $32,730,000 is generated from livestock and livestock products in Gallatin County. In Park County, to the north of Yellowstone National Park, over $16,887,000 is received from the sale of livestock and livestock products. Cow-calf pairs in the northern and western areas to Yellowstone Park are grazed on private lands and national forest allotments. To the north of Yellowstone National Park, grazing allotments have about 391 cow-calf pairs on land managed by the U.S. Forest Service. In the West Yellowstone area, there are approximately 80 pairs grazed on land managed by the U.S. Forest Service. There are two active vacant grazing allotments, Lion Creek and Cottonwood, on the north border of Yellowstone National Park. There is one active vacant allotment on the West Yellowstone border to Yellowstone National Park, Horse Butte. (U.S. Forest Service, April 2006). Eight permittees currently utilize these grazing allotments for summer pasture for cattle. In addition, cattle and horses graze on private lands in both the northern entrance area and western entrance area to the Park.

The following map (from the Department of Interior) shows property ownership in the Northern Boundary area.



Private Ownership North of Yellowstone

ERADICATION OF BRUCELLOSIS

The first national brucellosis control program began in 1934. Prior to that, control of brucellosis was limited mainly to individual herds. In 1956, there were 124,000 affected herds nationally. By 1992, this number had dropped to 700 herds, and as of June 30, 2000, there were only 6 known affected herds in the United States. As of June 30, 2000, 44 states, plus Puerto Rico and the U.S. Virgin Islands, were free of brucellosis. Montana was certified brucellosis free in 1985 by APHIS. It took Montana livestock producers more than 30 years at a cost exceeding $33 million dollars to earn the brucellosis-free status. (APHIS, 2000). This $33 million would equate to well over $62.5 million today in inflation-adjusted dollars. [1]

The national brucellosis control program was created not to ensure the health of livestock, but to protect the public's health from the disease. Brucellosis causes undulant fever in humans. Humans get brucellosis through direct contact with infected animals, unpasteurized milk, and milk products. Undulant fever was first discovered in Missoula County in 1933, with raw milk being the source of the infection. (APHIS, 2006.) The livestock and dairy industries and the American consumer have realized great financial savings from the success of the Cooperate State Federal Brucellosis Eradication Program. Annual losses from lowered milk production, aborted calves and pigs, and reduced breeding efficiency have decreased from more than $400 million in 1952 to less than $2.5 million today. (Centers for Disease Control, 2006.) In 1996, approximately 5.5 million calves were vaccinated against brucellosis, 11.8 million cattle were tested, and 112 affected herds were depopulated at a total cost of approximately $20.3 million dollars (United States Department of Agriculture, 1998.), or $25.6 million in today's inflation adjusted dollars. [2]

According to the National Centers for Disease Control, "Bison and elk in the northern Rocky Mountain states are still important reservoirs of B. abortus and provide a potential reintroduction of brucellosis into domestic livestock," (Frye and Taft presented to U.S. Animal Health Association, October 1996.)

Studies have shown that, if brucellosis eradication programs were stopped, the costs of producing beef and milk would increase by an estimated $80 million annually in less than 10 years. Brucellosis is such a devastating disease and health risk that the Centers for Disease Control continually monitors it and tracks cases.

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[1] This assumes the $33 million for Montana's eradication was all spent in 1985 when actually it was spent over some 30 or more years, making the inflation amount much higher than the $62.5 million figure here.

[2] Inflation factors used: December 1985 to March 2006: 186.38%; November 1996 to March 2006: 125.98%; December 1989 to March 2006: 158.45%; November 2000 to March 2006: 114.76%; November 1999 to March 2006: 118.72%.

According to federal rules, if a single cattle herd in a state that is free of brucellosis becomes infected with brucellosis, the herd must be slaughtered, and herds in the surrounding area must be tested to ensure the disease does not spread. If more than one herd is found to be infected, the state must implement a brucellosis testing program for certain cattle being sold outside the state. It has been estimated that vaccination costs for producers would total about $5 to $10 per year, including veterinary and handling expenses. Brucellosis testing of Idaho herds grazed in the West Yellowstone area was estimated to cost between $7.50 and $15.00 per head per test, including veterinary charges. This amount is more than the cost of vaccination because vaccinations usually take place after the calves have already been gathered for weaning or other purposes. Assuming that the producer must then pay $10 for vaccination and $15.00 for testing per animal, in addition to costs associated with quarantine, labor costs for handling his herd, and loss of grazing in certain pastures, and/or supplemental feed costs, in years of low cattle prices, these costs could offset a producer's profit margin and represent the difference between profit and loss. (U.S. Dept. of Interior, Federal EIS, 2000.) The Montana State Veterinarian estimated that the cost of testing cattle exported from Montana would have been $438,000 in 1989 or $695,000 in today's inflation adjusted dollars.

An APHIS economist has estimated that if an outbreak were to occur and APHIS downgraded Montana's certification from brucellosis free to class A, the state's cattle producers might incur additional testing from $5 to $16 million per year (1997 dollars) over several years. In addition to testing, APHIS has estimated that Montana cattle producers might forgo income of about $5 to $23 million over several years because prices would decrease if buyers reduced their demand for Montana cattle.

The Dept. of Interior Final Environmental Impact Statement, completed in November 2000, estimated that the costs associated with loss of status or sanctions could cost Montana producers between $4.1 and $16.3 million per year ($4.7 million and $18.7 million in today's inflation adjusted dollars.) That same report concurred that potential price impacts could decrease annual income to Montana producers by $4.7 to $22.5 million ($5.4 million to $25.8 million in today's inflation adjusted dollars). This analysis included consideration for 2,622 cattle that were marketed to Canada. During the period from the fall of 1999 and the spring of 2000, Montana producers sold 139,000 untested cattle to Canadian feedlots. (U.S. Dept. of Commerce, 2001.) The loss of Montana's brucellosis class-free status would close those markets to Montana producers. Based on recent sales, the impact could be a potential $12 million per year loss.

Under certain conditions, APHIS may downgrade only the affected area within a state, such as a county, or two-county area. The agency may divide a state into two brucellosis classification areas if the state has met certain requirements, including committing sufficient resources to enforce the different testing requirements in each area. For example, APHIS estimated that if just the two counties neighboring the Park were downgraded to class A, the counties livestock producers might, over several years, incur additional testing costs ranging from about $169,000 to $546,000 per year and forgo

additional income ranging from about $156,000 to $741,000 per year. (GAO, November 1999.) Adjusting for inflation to date, this would equate to from about $200,000 to $648,000 in extra costs, and from about $185,000 to $880,000 in lost income.

An analysis of costs and return on cow-calf enterprises in Montana completed in 1997 through Montana State University found that in 1997 dollars, net pretax income per cow, after withdrawals, ranged from a minimum of a negative $538 to a positive $134, with an average of a negative $35. These same values, in economic terms, ranged from a negative $538 to a positive $83, with an average pretax income of a negative $108. Economic costs include the financial costs (out of pocket costs, depreciation, and interest expenses) plus the opportunity cost for owned land, raised feed, and equity capital. When economic returns are negative, owned resources are not receiving their opportunity value. This analysis highlights the fact that testing costs and potential price declines due to reclassification could be the difference between a positive and a negative net return for an operation. The impacts associated with the length of time a class A reclassification would last should also be considered. A reclassification of all or part of Montana would probably last for several years, based on other states' experiences with reclassification.

The following table illustrates the very small margin of profit that typifies most cattle operations. Coping with brucellosis is an added expense and burden to a producer's costs.

COW-CALF PRODUCTION COSTS FOR THE WESTERN STATES

	Dollars per Bred Cow	
	1995	**2005***
Variable cash expenses**	$363.88	$466.53
General farm overhead	$43.94	$56.34
Taxes and insurance	$20.77	$26.63
Capital replacement	$82.08	$105.23
Operating capital	$15.26	$19.56
Other nonland capital	$34.17	$43.81
Land	$0.03	$0.04
Unpaid labor	$79.26	$101.62
Total	$639.39	$819.76

Source: USDA, Economic Research Service; InflationData.com

*as adjusted for inflation
**Variable cash expenses include feeder cattle, feed costs (grain, protein supplements, by-products, harvested forages, and pasture), and other costs (including veterinary and medicine, livestock hauling, marketing, custom feed mixing, fuel, machinery and building repairs, and hired labor.)

PROPERTY DAMAGE BY BISON

A consequence of free ranging bison not as well documented as brucellosis, but having significant potential for economic loss is property damage. From 1989 to 2003, 192 bison were killed due to road accidents inside Yellowstone National Park. In 1993 and 1994, visitors reported property damage to their vehicles estimated to total $17,500 for only five of these motor vehicle accidents. (Draft EIS, 1999). Applying the average of these five accident estimates to the 192 documented road killed bison would total $672,000. No estimates are available for vehicular damage outside the Park, or for accidents where bison are not actually killed. No estimates for human personal injury in these accidents are available either.

To date, losses due to road accidents, livestock damage, fences, home, and landscape destruction have not been well documented. Numerous locations in the Western Boundary area have experienced property damage including damage to fences, vegetation, landscaping, and livestock, particularly injuries to horses. Property owners on both the Western Boundary area and Northern Boundary area have reported to the Montana Department of Livestock that their landscaping has been eaten and trampled. Extensive damage to fences in the Northern Boundary area has been readily apparent for many years. Rubbing on wooden sign posts, fences, and buildings is common. During the winter of 2005-2006, the National Park Service and State of Montana reduced the speed limit, from 75 to 55 through a ten mile stretch of highway on the outskirts of West Yellowstone where free ranging bison were frequenting. The Park Service reported that there were nine bison killed in motor vehicle accidents due to bison wandering on this roadway. There was an active Park Service patrolman on duty nearly every day to alert drivers to bison on the roadway.

COSTS/BENEFIT ANALYSIS OF YELLOWSTONE BISON

Wildlife and Bison Viewing

When federal and state agencies coordinated an Environmental Impact Statement in 1998, researchers assembled information to determine the value of the public's viewing of bison. The Environmental Impact Statement explored various alternatives for managing bison and stated, "Increases and reductions in bison numbers in and around Park County (Montana) directly affect visitor wildlife-viewing experiences." (Summary, Draft EIS, 1998). According to the interagency team, because of court-imposed time constraints, its contractor was given only several weeks to assess the economic benefits associated with bison viewing in the draft EIS. These time constraints were a component of a settlement agreement, approved by the federal district court. Because of those time constraints, the contractor was unable to collect original data on bison and relied instead on published studies of grizzly bears and wolves.

To approximate a "low value" benefit for the existence of bison, the contractor used an estimate of the dollar amount that individuals would be willing to pay to ensure the existence of wolves. To approximate a "high value" benefit for the existence of bison, the contractor used an estimate of the amount people would be willing to pay to preserve grizzly bears. To then drive the total amount the United States population would be willing to pay to acquire habitat and sustain the bison population, the contractor multiplied the low and high value estimates for bison by the number of households, about 75 million, in the United States. Then, the estimate was given that the amount of money the U.S. population would be willing to pay under the preferred alternative would range from about $10 million to about $147 million. Another alternative, which provided for the acquisition of winter range was estimated to provide somewhat higher existence benefits, ranging from about $16 million to $223 million (in 1998 economic values).

These facts provided an imprecise value on bison and bison habitat. Applying data on visitor value of grizzly bears and wolves is erroneous. No estimates specific to bison are available in any studies.

Studies that have been completed to determine the economic existence or intrinsic value of specific wildlife populations include: grizzly bear recovery in the Selway Bitterroot Wilderness, elk winter range purchase near Gardiner to benefit the Northern Yellowstone herd (Duffield 1991), recovery of wolves in Yellowstone National Park (Duffield, 1989, 1991, 1992; Duffield, Neher and Patterson 1993; United States Fish and Wildlife Service 1994; protection of bald eagles in Wisconsin (Boyle and Bishop 1987); protection of a population of desert bighorn sheep near Tucson, Arizona (King, Flynn, and Shaw 1988); and preservation of whooping cranes at Aransas National Wildlife Refuge in Texas (Bowker and Stoll, 1988). As a result of similar studies in Yellowstone, the National Park Service ranked wildlife viewing as follows:

Species	**Preference to View (1997 Human Population Sampled)**
Grizzly Bear	55%
Elk	24%
Bighorn Sheep	22%
Bald Eagle	19%
Bison	16%
Wolf	15%
Whooping Crane	2.3%

There are no conclusive studies that have been completed as of this writing that distinguish bison viewing inside Yellowstone National Park versus bison viewing outside Yellowstone National Park. While studies frequently refer to the "free ranging bison", there is no clarification in the public's mind if this means free ranging inside Yellowstone Park or free ranging beyond Yellowstone National Park's borders. Furthermore, there is no value placed by the public on the numbers of bison that qualify the bison viewing experience.

Agencies have relied on information provided by Lott (1987) who used computer simulations of public bison herd demographics and mating behavior to estimate that a population of at least 580 bison would be required to prevent inbreeding and potential loss of genetic diversity. Other than those numbers, no herd size has been established as an absolute.

Comparing the work of agencies over several years, we can determine the costs that have been expended to manage Yellowstone bison under varying agency alternatives.

Bison/Brucellosis Disease Fiscal Activity in Recent Years

Government Costs Specific to the Yellowstone Bison/Brucellosis Management

(does not include National Park Service costs)

EXPENSES:	Personal Services	Operations	Total	**FUNDING:**	State Special*	Federal Funds	Total
Fiscal Year 96:	$40,996	$82,842	**$123,838**		$123,838	$0	**$123,838**
Fiscal Year 97:	$41,189	$204,621	**$245,810**		$245,810	$0	**$245,810**
Fiscal Year 98:	$24,584	$148,448	**$173,032**		$173,032	$0	**$173,032**
Fiscal Year 99:	$86,323	$243,629	**$329,952**		$298,798	$0	**$329,952**
Fiscal Year 00:	$143,845	$414,729	**$558,574**		$175,089	$383,485	**$558,574**
Fiscal Year 01:	$149,457	$467,608	**$617,065**		$19,041	$596,024	**$617,065**
Fiscal Year 02:	$244,107	$643,204	**$887,311**		$2,257	$885,054	**$887,311**
Fiscal Year 03:	$311,927	$635,107	**$947,034**		$0	$947,034	**$947,034**
Fiscal Year 04:			**$897,503**			$897,503	**$897,503**
Fiscal Year 05:	Projected:		**$897,503**			$897,503	**$897,503**

Source: Montana Department of Livestock Central Services Division

*State Special revenue used for Bison Activity is almost entirely derived from the per capita fees paid by Montana livestock producers.

NOTE: From FY96 through FY99, the livestock industry's state special revenue paid 96% of all direct and indirect costs for managing the bison brucellosis issue in Montana. The Department of Livestock entered into a cooperative agreement with USDA Veterinary Services late in FY99 and throughout all of FY00. The direct expenditures from federal funds were $31,154 in FY99 and $383,485 in FY00. This cooperative agreement continued into FY01 and subsequent years. Since 2001, a portion of the funding totals go to fund the Interagency Bison Management Plan, which includes both federal and state agencies. Congress considers this funding each federal fiscal year and if approved allocates it to the Veterinary Services. The department then renews its cooperative agreement. Federal funding greatly reduces direct costs in state special revenue.

It is important to note that indirect costs to the Department of Livestock are significant. These were costs borne by the state for the administrative and support work of department staff not directly on site at the Gardner/West Yellowstone area. The department's indirect cost were $18,809 in FY98, $74,098 in FY99 and $154,808 in FY00. This breakdown for subsequent years is not available, but is a significant part of the cost escalation. The indirect costs rise with increased hazing operations and the time consuming administrative work in setting policy, continuing MEPA analysis, negotiating agreements, establishing cooperative management plans, budgeting, accounting, personal services work and legal processes. While the escalating governmental costs associated with bison and brucellosis management are currently being offset by federal funding, it is crucial to the livestock industry and to the public health that Congress maintain this federal funding.

The following table identifies further work completed by agencies to manage bison.

BISON HAZING, POPULATION COUNTS, MORTALITY AND REMOVALS FROM 1995-96 TO 2005-06

Winter of Year	Total Bison Counted/ Estimated[1] Winter	Total Bison Hazed back into the Park	Total Bison Captured, tested negative for brucellosis and released	Total Bison Removed	Natural Mortality Estimates[2]	Total Bison Counted/ Estimated[1] Summer
1995-96	3,398			433		
1996-97	3,436		64	1,084	1300	
1997-98	2,105			11		
1998-99	2,239			94		
1999-2000	2,444			Unavailable		
2000-01	2,870	1,524		6		
2001-02	3,300	1,127		202		3916
2002-03	3,100	2,340		244		4070
2003-04	3,620	2,441	207	280		4240
2004-05	4,063	3,012		112		4879
2005-06**	4,900			947	31	

SOURCE: NPS, Meagher 1973; Meagher, unpub. data; Montana State University, Department of Ecology; Montana Department of Fish, Wildlife and Parks, Montana Department of Livestock, and National Park Service, unpub. data); NPS interview; Interagency Bison Management Team Status Review Team; US Animal and Plant Health Inspection Services.

NOTE: Sources of removals include road kill, hunting and agency shooting, and capture and slaughter. It does not include natural mortality. Research at Montana State University funded by the National Park Service and the US Geological Survey in 1998-2000 developed aerial survey methods, including a sightability model, for bison population estimation in Yellowstone. It is estimated that in winter, 90-92% of individual bison are detected on average, and in summer, 97% of individual bison are detected. Blanks indicate information not available.

[1]Counted prior to 2002, and estimated since 2002 using the "sightability model."
[2]Natural mortality estimates include winterkill and other natural causes.

**through March, 2006

Cost Summaries of Actual and Potential Impacts

Annual Costs to Producers for Loss of Brucellosis-free Status for Montana

	Statewide Worst case costs	Statewide Best case Costs	Local only Park-Gallatin costs**
Annual direct costs of testing	$18,700,000	$4,700,000	$648,000
Annual indirect costs of decreased prices and markets*	$25,800,000	$4,700,000	$880,000
	$44,500,000	$9,400,000	$1,528,000

*Loss of Canadian markets alone estimated to cost $12,000,000 annually
** Assumes only these two counties' brucellosis status is downgraded

Bison Management Practices and Alternatives: Costs to Taxpayers, Montana, and the Livestock Industry

Note: Most of these costs ultimately derive from the bison population vs. carrying capacity imbalance within Yellowstone Park.

	N.P.S. 2000 figures	Adjusted for inflation
Monitoring of bison	$400,700	$463,329
Proposed research for winter use monitoring techniques	$200,747	$232,124
Bison hunting	$481,000	$556,180
Capture, test and slaughter operations at the boundaries	$8,829,400	$10,209,435
Vaccination of bison	$2,321,100	$2,683,888
Quarantine bison	$4,372,600	$5,056,037
Bison herdwide capture, test, and slaughter of positive tests	$11,292,200	$13,057,171
Acquire additional habitat outside Yellowstone (based on prices in 2000)	$15,100,000	$17,460,130
Additional habitat already acquired	$29,100,000	$29,100,000
Agency shooting and disposal of carcasses	not quantified by N.P.S.	
Hazing	not quantified by N.P.S.	
Last 10 years total costs in Montana state budget		$5,677,622
Projected next 15 years costs in Montana state budget under status quo		$12,547,261
Total		$97,043,178

NOTE: While it may not be entirely appropriate to total all these numbers (as some are alternative or proposed actions), it is instructive to see how many dollars are potentially involved in Bison Management as a direct result of managing the population without regard for carrying capacity.

Source: N.P.S. Final Bison EIS; Montana Department of Livestock

ADDITIONAL IMPACTS FROM EXPANDED MIGRATIONS:

	Cost
Public health risks (disease, injury, safety on property, safety on roads, etc.)	**Unavailable**
Property damage (fences, forage, vehicular damages from accidents, etc.)	**Unavailable**
Decreased property values (because of perceived disease and management problems)	**Unavailable**
Increased management to guard against bison impacts and encroachment	**Unavailable**
Probable loss of use of public land grazing permits	**Unavailable**

A September 2005 status review of bison management prepared by the Interagency Bison Management Plan clearly details that the most work being completed at this time by the cooperating agencies in bison management is being done in vaccination of bison for brucellosis, particularly in finding a safe and secure method of vaccination. Considerable attention is focused on how to safely vaccinate Yellowstone National Park bison, including ballistic delivery to bison. Research is also focused on where the best geographical location to target bison with ballistic delivery is and on survivability of the brucella organism in the natural environment: i.e. how long the organism can survive. Tests are being completed to determine how quickly aborted fetuses in the natural environment will be scavenged by other animals.

There is little to no attention given to private property concerns, including property damage, risk to cattle herds, and risk to Montana's agricultural industry. There is also little follow up with concerns by private landowners, homeowners, and the public on bison behavior outside Yellowstone National Park. There is little to no discussion on how bison are integrated into human development and other societal needs and demands.

CONCLUSION

The public must analyze whether or not it is prepared to deal with the risks associated with bison outside of Yellowstone National Park. Brucellosis remains a significant health risk, both to livestock and to humans. The costs of that risk, should Montana lose its brucellosis free status, according to the Department of Interior, could reach $18.7 million and potential price impacts could decrease annual income to Montana livestock producers by as much as $25.8 million. These figures do not include the livestock industries loss of their original investment of 33 million over a 30 year period to be certified brucellosis free. There is also a sizeable economic opportunity loss for the agricultural industry in Montana, should private lands no longer be useable for agricultural use or carry the stigma of brucellosis infection from wandering bison.

Prior to Fiscal Year 1999, the Department of Livestock funded the bison/brucellosis management program with state special revenue derived from per capita fees assessed on the Montana livestock industry. By fiscal year 2002, the fiscal burden had primarily been shifted to federal sources. Ongoing Montana state expenses of bison management include personnel, law enforcement equipment, laboratory equipment and supplies, veterinarian supplies, telephone communication, rental of aircraft to count and haze bison, vehicle equipment and maintenance, and other numerous expenses. Indirect costs to the state of Montana that are not included in fiscal reports developed by the state of Montana include time, materials, communications, and travel of Montana state employees to haze and manage bison; and ongoing administrative work in setting policy, continuing environmental analysis, establishing cooperative management plans, budgeting, accounting, and legal processes. In addition to the multimillion-dollar cost to Montana's livestock industry, the public needs to consider whether the benefit of bison

outside Yellowstone Park justifies ongoing management costs funded by Montana citizens.

Under current bison management, little attention has been focused on impacts from bison outside Yellowstone National Park. There are significant public health risks from disease, damage to property, vehicular safety, and public safety. Most landowners (not only livestock operators) near Yellowstone National Park have had considerable problems with property damage, fencing destruction, loss of use of pastures and forage, and other damages associated with bison. No research has been done to determine how land values will be impacted if Yellowstone bison are a constant risk to use and enjoyment of that particular private property. Certainly, if private landowners are expected to accommodate wandering bison, then that expectation carries an economic opportunity loss. That is, a value must be assessed, through a complete economic review, on loss of opportunity to do with one's private property as one chooses. The federal and state agencies' draft environmental impact statement prepared for management of Yellowstone bison clearly states that it could very well be perceived as "unfair" for landowners to assume this economic loss of opportunity for land and resources that are privately held.

While the Montana Farm Bureau Federation (MFBF) remains concerned about brucellosis in elk, because of the significantly greater risk factor in bison, it is steadfast to its position of eradication of brucellosis in bison. While 6.9% of the Madison elk management unit are believed to be infected with brucellosis, that risk is still far less than the 50% brucellosis seroprevalance in bison. According to wildlife biologists, under natural conditions, elk prefer to calve in seclusion, meticulously cleaning up the area by consuming placental tissues and fluids to avoid attracting predators. They prefer to keep the calf separate from the other animals for the first few days before returning to the herd, a behavior pattern that reduces the risk for disease transmission. For these reasons, elk seroprevalence is less of a threat. Artificial elk feeding grounds, through which cases of brucellosis transmission from elk to cattle have been documented, are a detriment to brucellosis clean elk herds because they do not provide the spatial conditions the nature affords which significantly lessens the risk of transmission.

Wandering bison have impacted the public at large, not just livestock operators. There is strong concern for bison intermixing in a societal structure that cannot replicate prehistoric times. The public must consider the safety risks for all residents, visitors, and motorists. Bison researcher D. McCullough in 1985 characterized bison as "showing truly nomadic long range movements with migratory patterns demonstratable in some locations. The present Yellowstone situation may represent an intermediate stage between a migratory and a nomadic pattern of land use." Mary Meagher, bison biologist for Yellowstone National Park, has stated that Yellowstone bison will recolonize the Yellowstone valley. It is wrong to assume that merely adding public or private acreage in close proximity to Yellowstone National Park's 2.2 million acres will solve the management of Yellowstone bison. The Yellowstone bison herd is at an all time high. Hunting as a population control mechanism is statistically irrelevant because it cannot be

done on a scale (in the several hundreds, if not thousands) sufficient to significantly reduce bison numbers. Neither the public nor private landowners will likely condone the slaughter. Unfettered population growth and their nomadic instincts will eventually extend further "buffer zones" of colonizing bison into south central Montana.

The National Park Service has described the current interagency bison management plan as "Steps toward greater tolerance for bison outside the Park". MFBF submits that there should be a zero tolerance for bison outside the Park until brucellosis no longer remains a health risk to cattle or to humans and until there is a complete and thorough comprehension of the risk associated with bison outside Yellowstone Park, including property damage, land valuation, public health and safety, livestock health, and risk to private property rights and privacy.

Natural regulation policy, the current philosophy of the National Park Service that guides its viewpoints on bison management, poses many problems for adaptation in a society that does not operate under the same guidelines. According to a report prepared by the National Academy of Sciences in 1998, "the science (natural regulation) is insufficient to settle arguments over whether it is wise. Critical tests are difficult because the issues are linked with larger patterns of nature that are not readily reduced to research hypothesis. The "experiment" ('natural regulation') is conducted by nature, lacks controls and replications, and yields only one set of data points per year."

The heritage of agriculture and the ranching tradition precede Montana statehood. Many of the ranches near Yellowstone National Park are nearly as old, or older, than the establishment of Yellowstone National Park itself. Is it appropriate for federal and state agencies to determine that bison supercede the heritage of those ranches and the rural lifestyle that they have given to generations of people? The benefit of bison outside Yellowstone National Park is unclear and unquantifiable, while the risks are well documented, real, and monumental.

Populations of bison have thrived inside Yellowstone National Park, offering visitor experiences and sustaining a genetically viable bison herd. Yellowstone National Park's own records show the Yellowstone Park bison herd can be preserved within Park boundaries. The value of establishing populations of bison in the Yellowstone Valley and beyond has not been conclusively demonstrated, if at all. Until the public benefit of having bison outside Yellowstone Park can be shown to outweigh the risks, to human and animal health, to the financial health of our livestock industry, to our tax base and to the communities and property owners adjoining the Park, the National Park Service must take responsibility for animals under their jurisdiction or pay for the losses incurred by their failure to do so.

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Literature Cited

Anderson, N., Atkinson, M. and Barton, J. 2006. Brucellosis surveillance of elk in Southwestern Montana 2004-2006.

Animal Plant Health Inspection Service, 2006. Brucellosis and Yellowstone bison. www.aphisweb.aphis.usda.gov.

Cheville, N., McCullough, and Paulson. 1998. Brucellosis in the Greater Yellowstone Area. National Academy of Sciences.

Davis, Donald, J. Templeton, Thomas Ficht, et al. 1990. Brucella abortus in captive bison. Journal of Wildlife Diseases 26 (3) p. 360-371.

Ferlika, D.V.M., Dr. Donald. October 9, 1991. Brucellosis control in the state of Montana: a brief overview.

Ferlika, D.V.M., Dr. Donald. June 15, 1989. Personal correspondence to Mr. James Ridenour, Department of Interior.

Ferrari, M.J. and Garrott, R.A. 2002. Bison and elk: brucellosis seroprevalence on a shared winter range. Journal of Wildlife Management 66: 1246-1254.

General Accounting Office, Wildlife management: issues concerning the Management of bison and elk herds in Yellowstone National Park. GAO-RCED-97-200.

General Accounting Office, Wildlife management unresolved in Yellowstone bison-cattle brucellosis conflict. GAO-RCED-93-2.

Gates, C.G., Stelfox, B., Muhly, T., et al. 2005. The ecology of bison movements and Distribution in and beyond Yellowstone National Park. University of Calgary. Calgary, Alberta. p. 88-90.

Hawley, A.W. and D.G. Peden. 1982. Effects of ration, season, and animal handing on composition of bison and cattle blood. Journal of wildland diseases., 18: 321-328.

Houston, D.B. 1982. The northern Yellowstone elk, ecology, and management. McMillian Publishing Col, New York. 474 pp.

McCullough, Y.B. 1985. Long range movements of large terrestrial mammals.

Meagher, Margaret Mary. 1989. Evaluation of boundary control for bison of Yellowstone National Park. Wildland Society Bulletin. 17: 15-19.

_____. 1989. Range expansion of bison of Yellowstone National Park. Journal of Mammology. Vol. 70, No. 3.

_____. 1978. Bison. Big Game of North America. Stackpole Books, Harrisburg, PA. Ch.8, 123-133.

_____. 1971. Snow as a factor influencing bison distribution and numbers in Pelican Valley, Yellowstone National Park. Paper at Snow and Ice Symposium, Ames, Iowa., 63-67 pp.

_____. 1985. Yellowstone's free ranging bison. Naturalist 36: 20-25.

Montana Agricultural Statistics, 2005. United States Department of Agriculture, NASS, Montana Field Office, Helena, Montana. p. 14, 19, 23.

Thorne, E.T., M. Meagher and B Hillman. 1989. Brucellosis in free ranging bison: three perspectives. Paper presented at Symposium. University of Wyoming, Laramie. Pp. 13-15, April 1989.

U.S. Department of Interior, 1998. Draft environmental impact statement for the interagency management plan for the state of Montana and Yellowstone National Park. 3 vol.

U.S. Department of Interior, 2000. Interagency bison management plan.

U.S. Department of Interior, 2005. Operating procedures for the interagency bison management plan.

_____. 1990. Yellowstone bison : Background and Issues. p. 8-17.