

## Invited Paper:

# GREATER YELLOWSTONE'S BISON: UNRAVELING OF AN EARLY AMERICAN WILDLIFE CONSERVATION ACHIEVEMENT

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**Abstract:** The Greater Yellowstone region's bison-brucellosis controversy has triggered troublesome proposals giving federal and state agriculture agencies jurisdiction over wildlife to eradicate a domestic livestock disease. Many of the region's bison (*Bos bison*) and elk (*Cervus elaphus*) carry the bacterium *Brucella abortus*, which can cause brucellosis. Local livestock officials fear bison and elk could transmit brucellosis to domestic livestock, jeopardizing state brucellosis class-free status. However, no cases of such transmission in an open range setting have been verified scientifically. Various federal and state agencies have jurisdiction over the region's wildlife and livestock; these agencies are having real difficulty reaching consensus on how to address brucellosis in the wildlife populations. Montana and Idaho recently vested state livestock officials with jurisdiction over bison leaving Yellowstone National Park (YNP), and the U.S. Department of Agriculture's Animal, Plant, and Health Inspection Service (APHIS) has indicated it may propose regulations asserting jurisdiction over bison. An interim bison management plan, the result of a recent court settlement, provides for the National Park Service (NPS) to participate in capturing, testing, and slaughtering Yellowstone's bison, but makes no provision for addressing brucellosis in elk. The region's brucellosis problem could be adequately addressed through a risk management disease control policy rather than a costly and perhaps fruitless eradication effort. Such an approach can be implemented without the unwelcome precedent of livestock officials taking jurisdiction over wildlife.

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**Key words:** bison, *Brucella abortus*, brucellosis, disease, elk, jurisdiction, law, livestock, policy, wildlife disease, wildlife law, Yellowstone National Park.

More than a century ago, the American bison was saved from near extinction when YNP officials initiated an aggressive campaign to protect a remnant population within the new park. By then, the once numerous bison herds roaming the Great Plains had been ruthlessly slaughtered and displaced to make room for the new settlers and their cattle. But with the assistance of transplanted bison, the United States Cavalry, which was then administering Yellowstone, successfully supplemented the park's dwindling bison population and gradually rebuilt the herd (Hampton 1971, Haines 1977). Originally managed intensively at the park's Buffalo Ranch, the introduced bison were later intermixed with the remnant wild bison and allowed to roam free (Meagher 1973). Today, Yellowstone's free-ranging bison stand as a symbol of the Old West and our wilderness experience (Schullery 1986). More importantly, the Yellowstone bison recovery story represents a major early success in America's commitment to preserving its wildlife heritage.

Now, however, Yellowstone's bison are at risk

once again. Many bison from Yellowstone and Grand Teton national parks, along with some of the region's elk, carry *Brucella abortus*, a bacterium that can cause brucellosis (Thorne et al. 1991a). Brucellosis is a disease that can cause cattle to abort during pregnancy. For decades APHIS has directed an aggressive national campaign to rid the country of this disease in domestic cattle. As APHIS has gradually eliminated the disease elsewhere, it has shifted attention to Greater Yellowstone's wildlife. Because the park's bison are viewed as a troublesome remaining disease reservoir, more than 400 bison have been shot annually during the past 2 winters after crossing from the national park onto adjacent lands (Nat'l. Park Serv. 1996). A recent final—and quite controversial—interim plan calls for the NPS and Montana officials, in conjunction with APHIS, either to shoot or to capture, test and slaughter most Yellowstone bison that stray outside the park (Nat'l. Park Serv. 1996). A longer-term plan is presently being prepared, while an assortment of federal and state agencies are struggling to fashion a

coherent regional policy addressing brucellosis in wildlife.

For wildlife management, the ramifications surrounding the Greater Yellowstone bison controversy are considerable. State wildlife officials in Montana and Idaho have already lost most jurisdiction over wild bison to their livestock counterparts, who are treating these bison as diseased domestic livestock (Keiter and Froelicher 1993). Regional federal and state wildlife managers are on the verge of losing additional legal authority over bison to federal agriculture officials under drafted—but not yet published—proposed regulations that would vest APHIS with authority over the region's bison (Assoc. Press 1996, Greater Yellowstone Interagency Brucellosis Comm. 1996). Although these draft regulations supposedly would not extend to elk, APHIS's commitment to eradicating brucellosis means it will have to address brucellosis in the region's elk population to have any chance of success. Congressional legislation has been introduced that would require the NPS to implement an immediate test and slaughter program for all of Yellowstone's bison (Senate Bill 745, 1996). Moreover, in the aftermath of highly publicized compensation litigation in Wyoming, both federal and state wildlife managers face the threat of judicially imposed liability in the event of a livestock brucellosis outbreak linked to wildlife (Keiter and Froelicher 1993, Carlman 1994). The result could be disastrous for wildlife management as well as the region's livestock industry, and totally avoidable.

Unfortunately, the Greater Yellowstone brucellosis controversy has become a major test of will involving the federal government and the states, as well as wildlife and livestock interests. A high-stakes drama is being played out in political and legal arenas, with bison being portrayed as the villain. Indeed, the currently proposed solutions threaten to unravel an important wildlife recovery achievement, both jeopardizing a valuable national wildlife resource (Dobson and Meagher 1996) and involving a major shift in wildlife management authority. However, neither the scientific realities nor the underlying policy concerns justify the extreme proposals that have surfaced. Given the uncertainties and minimal risks associated with brucellosis in some of Greater Yellowstone's wildlife, a revised risk management disease control policy—rather than an uncompromising eradication policy—could solve the problem. As im-

portantly, such an approach would not require any change in jurisdiction over wildlife, and thus would avoid the precedent of agriculture officials taking management responsibility for wildlife populations harboring a disease organism.

## POLICY BACKGROUND

Since its inception in 1872, YNP has been managed to preserve its wildlife populations. By the turn of the century, however, Yellowstone's small bison population was dwindling. In 1902, the military officials, who were then responsible for administering the park, imported bison from Montana and Texas to supplement the park's remnant bison population (Hampton 1971, Meagher 1973, Haines 1977). Although the 2 bison populations were managed separately, the experiment was successful. The park's bison population numbers gradually increased, growing to more than 1,000 bison in 1930 (Meagher 1973).

Until the mid-1960s, the Yellowstone bison population was managed intensively. The imported bison were confined to the park's Buffalo Ranch in the Lamar Valley, separated from the remnant free-ranging bison population (Meagher 1973, Schullery 1986). After 1917, when brucellosis was first detected in the population, park bison were occasionally tested for the disease, and those testing positive were slaughtered (Despain et al. 1986). Following World War II, the Buffalo Ranch operation was discontinued and the bison were allowed to intermingle, though the NPS still kept the population at a low level by culling the herds (Schullery 1986). A similar management approach was employed with the park's Northern Range elk herd (Houston 1982). In both cases, the culling program reflected the then-prevailing view that wildlife numbers had to be limited by human removals to meet the area's carrying capacity (Houston 1982, Despain et al. 1986).

During the 1960s, however, the NPS significantly changed its wildlife management policy and stopped culling its bison and elk herds. In response to the groundbreaking 1963 Leopold Report (Leopold et al. 1963), the NPS adopted a general noninterventionist philosophy toward managing park resources. It began relying on natural forces, including the region's notoriously harsh winters, to control park wildlife population numbers. The park's bison population rose

sharply, growing from 397 bison in 1967 to more than 2,500 in 1988. The population peaked at about 4,200 animals in summer 1994, and now numbers 3,000–3,500 bison (Natl. Park Serv. 1996). Although the bison initially congregated in 3 fairly distinct herds (Northern Range, Mary Mountain, and Pelican Valley), these populations now intermingle freely and can no longer be reliably segregated into separate herds (Meagher 1993).

Yellowstone's bison originally wintered in the park, but they are now moving outside it in greater numbers (Meagher 1993). Some observers have suggested that the bison's new found winter migration tendency is in response to depleted park ranges (Chase 1986). Another view, however, attributes the increased migration to bison learning how to use the park's roads, which serve as snow machine trails during the winter (Meagher 1993). The snowpacked roads enable bison to access winter forage areas that previously were inaccessible due to deep winter snows. On the Northern Range, the bison may simply have learned of new foraging areas and nomadically begun using this new food source. Whatever the reason, winter movement puts the Yellowstone bison on private ranchlands and public grazing lands, where they might come in contact with domestic cattle. To discourage bison from leaving the park, Yellowstone officials have experimented with hazing techniques and localized fencing, but neither strategy has stopped the bison from crossing park boundaries (Meagher 1989).

Faced with Yellowstone's winter bison exodus, the surrounding states of Montana, Idaho, and Wyoming have become deeply involved in bison management policy. Because the largest numbers of bison are moving north and west from the park, Montana is the most heavily affected state. The Montana legislature originally authorized a controversial public bison hunt, but was forced to cancel it because of extensive public protests (Keiter and Froelicher 1993). The legislature then split jurisdiction over bison between the Department of Fish, Wildlife and Parks and the Department of Livestock, ultimately vesting livestock officials with responsibility for managing bison that have been exposed to a contagious disease (Keiter and Froelicher 1993, Mont. Code Ann. § 81-2-120(4)). Under this approach, Montana has essentially adopted a "zero tolerance" policy for bison leaving the park; most bison exiting Yellowstone into

Montana have been shot by state officials (Natl. Park Serv. 1995). Idaho has adopted a similar policy, and exiting bison are likewise being shot (Keiter and Froelicher 1993). However, Wyoming continues to treat bison as wildlife, and allows bison outside the park.

In the case of Wyoming, its policy is influenced by the Grand Teton National Park (GTNP) bison herd and the prevalence of brucellosis in the state's elk populations (Thorne et al. 1991a). Since 1969, GTNP has maintained a small, free-ranging bison population that has now grown to more than 200 animals (Grand Teton Natl. Park et al. 1994). These bison regularly migrate south to the National Elk Refuge near Jackson, Wyoming, where they commingle with wintering elk and sometimes come in contact with domestic livestock (Grand Teton Natl. Park et al. 1994). The National Elk Refuge was established to provide winter elk habitat, and the Wyoming Game and Fish Department maintains another 22 feedgrounds for about 23,000 elk throughout western Wyoming (Thorne et al. 1991a). Many of these elk also have been exposed to *Brucella abortus*, some are infected with brucellosis, and abortions are not uncommon (Thorne et al. 1991a). Because elk and bison are often in contact with each other during critical birthing periods, these feedgrounds are prime sites for transmission of brucellosis.

In short, the Greater Yellowstone brucellosis problem involves 2 of the region's most charismatic species. Bison in both parks have been exposed to brucellosis, and elk in Wyoming and Montana have also tested positive for the disease (Gen. Accounting Off. 1992). As a result, an effective brucellosis policy must address the disease in both bison and elk (Thorne et al. 1991a, Dobson and Meagher 1996). A policy directed solely at bison cannot succeed as long as elk carry the disease and as long as the 2 species continue to congregate annually in close quarters. Moreover, any policy that fails to recognize the economic and cultural importance of these 2 highly visible species cannot be reconciled with the significant shifts that are occurring in the region's economic and social fabric (Power 1991, Rasker et al. 1992).

## SCIENTIFIC UNCERTAINTY

Brucellosis is endemic in Greater Yellowstone's bison and elk populations. The disease was first detected in Yellowstone's bison in 1917,

and confirmed in the regional elk population during the 1930s (Meagher and Meyer 1994). Scientists generally agree that brucellosis was originally passed from infected livestock to bison and elk (Meagher and Meyer 1994). Although more than 50% of Yellowstone's bison test positive for *Brucella* antibodies through blood tests, tissue culture tests—ordinarily viewed as a more reliable testing protocol for identifying active infection—indicate a much lower infection rate (Meyer and Meagher 1995a). With tissue culture tests, only 12% of 213 bison that were killed during the 1991–92 winter tested positive for brucellosis, and only 1 of 9 females (who was below reproductive age) tested positive for brucellosis in her reproductive tract (Gen. Accounting Off. 1992, Meyer and Meagher 1995a). A somewhat higher prevalence was found in the Grand Teton bison (Smith and Robbins 1994, Meyer and Meagher 1995a). Moreover, blood tests indicate that elk from herds using 18 of Wyoming's 23 feed grounds tested positively, which means about 18,000 elk have been exposed to the disease (Thorne et al. 1991a). Brucellosis-exposed elk (1–1.5%) have been found in the northern herds migrating into Montana, but none has been detected in Idaho's herds (Thorne et al. 1991a, Natl. Park Serv. 1996).

*Brucella abortus* is transmitted among animals primarily through infected reproductive material. This transmission can occur when a brucellosis-free animal consumes forage contaminated by the organism after an animal has expelled an aborted fetus, or when a susceptible animal directly ingests the organism from fetal material, or when it licks the reproductive organs of an infected animal during birth or abortion (Boyce 1989). The risk of transmission is greatest during the last half of pregnancy, which usually occurs during mid-March to late May for bison and during late April to mid-June for elk (Thorne et al. 1991a). The risk also is increased when animals are in contact with one another, as regularly occurs in Wyoming's elk feedgrounds (Thorne et al. 1991b). Brucellosis also may be transmitted among bison through milk when female bison nurse their calves (Meyer 1992, Meyer and Meagher 1995a).

Disagreement persists over whether bison can transmit brucellosis to domestic livestock. One widely cited veterinary research study, which involved bison and cattle in a controlled setting where the animals were in proximity to one another, observed that brucellosis-infected bison

passed the disease at the same rate as cattle passed it to one another (Davis et al. 1991). This experiment has been severely criticized for its use of an unusually large infective dose and for its limited utility in the Yellowstone setting, where bison and cattle are free-ranging and not confined in close quarters (Meyer and Meagher 1995b). Other scientists have concluded that Yellowstone's bison are not a threat in transmitting brucellosis to cattle (Gen. Accounting Off. 1992). These scientists note that Yellowstone's bison are not affected by brucellosis in the same manner as domestic cattle, citing little fetal loss among the park's bison and the exceedingly low rate of reproductive tissue infection among the park's bison (Meyer and Meagher 1995b). During the 1988–89 winter when 569 bison were killed in Montana outside Yellowstone, agriculture officials tested 810 cattle for brucellosis in 18 herds located near where bison had travelled, and all tested negative for the disease (Ferlicka 1989). Federal courts in Montana and Wyoming, however, have concluded that wild bison can transmit brucellosis to livestock, though no court has ruled that park wildlife are responsible for a specific brucellosis infection (Keiter and Froelicher 1993).

Vaccination can help protect livestock from the disease. Scientific studies have established a 70% effectiveness rate in preventing brucellosis-induced abortion in cattle vaccinated against the disease (Nicoletti 1990, State of Mont. 1990). The Wyoming Game and Fish Department is experimenting with an elk biobullet vaccination program on the state's feedgrounds. Early reports suggest some success in immunizing elk against the effects of brucellosis, but researchers do not believe the program can fully eliminate brucellosis from the area's elk populations (Thorne et al. 1991a). Bison vaccination experiments have not been successful (Thorne et al. 1991a, Davis et al. 1991b). Presently, the only way to address the disease in bison is through an ongoing capture, test and slaughter program of indefinite duration, which would deplete the park's bison population over time. Brucellosis has never been eliminated from domestic cattle herds in the United States without employing both vaccination and test and slaughter protocols (M. Meyer, Univ. Calif.-Davis, pers. commun.). Neither the NPS nor state wildlife agencies ordinarily employ such intensive management techniques on free-ranging wildlife populations.

## THE LEGAL SETTING

Under current law, Greater Yellowstone's bison-brucellosis controversy is shrouded in jurisdictional complexity and legal ambiguity. Federal and state laws establish clear authority and standards for addressing brucellosis in domestic livestock, but these laws have not been extended to wildlife (Parker Land and Cattle Co., Inc. v. United States 1992, Keiter and Froelicher 1993). Although federal law governs wildlife management on national park and national wildlife refuge lands, the states traditionally have been responsible for wildlife management on other federal lands, as well as state and private lands (Coggins and Ward 1981). Federal law is largely silent on brucellosis in wildlife, and individual states cannot fully address the problem. Idaho and Montana have adopted statutes for brucellosis in bison, but not elk. Although Wyoming has the greatest number of brucellosis-infected wildlife, this state does not address brucellosis in its wildlife law. As a result, the current patchwork of laws governing wildlife and brucellosis suffers from a serious lack of clarity and raises sensitive federalism concerns.

### Livestock Management and Brucellosis

In 1884, relying upon its power over interstate commerce, Congress passed legislation extending federal authority over contagious animal diseases to prevent their interstate dissemination (21 U.S.C.A. § 111). In subsequent amendments, Congress authorized the Secretary of Agriculture to "control and eradicate any communicable diseases of livestock or poultry, including . . . brucellosis of domestic animals" (21 U.S.C.A. § 114a). To enforce this mandate, the Secretary is empowered to seize, quarantine, and destroy infected livestock moving in interstate commerce (21 U.S.C.A. § 134a(a)). But unless interstate commerce is involved, the states retain the general responsibility for addressing contagious livestock diseases. For the most part, states have adopted similar programs to protect their domestic livestock industries, relying on quarantine, testing, importation restrictions, and slaughter policies to eliminate contagious diseases (Keiter and Froelicher 1993).

In the case of brucellosis, federal and state agricultural officials have cooperatively established a comprehensive brucellosis eradication program for cattle. The program is administered by APHIS and its Veterinary Services Of-

fice based on brucellosis regulations (including Uniform Methods and Rules for Brucellosis Eradication) that extend to domestic livestock but not wildlife (9 C.F.R. §§ 78.1–78.44, *Parker Land and Cattle Co., Inc. v. United States* 1992). The regulations divide states into different disease prevalence classifications, ranging from a brucellosis class-free status to a quarantine status, and impose various restrictions on shipment of cattle depending upon the state's classification. As a state's classification status drops, it becomes more difficult and expensive to ship cattle interstate and official vaccination requirements attach. In the event of a positive disease test, the affected cattle herd is quarantined and put through a test, slaughter, and recertification program. Under both federal and state law, compensation is available to ranchers who lose an infected herd (21 U.S.C.A. § 134a(d), Keiter and Froelicher 1993). A confirmed brucellosis outbreak can trigger reclassification of a state's status, but APHIS also cannot reclassify if the infection was imported and brucellosis has not spread to other herds (9 C.F.R. § 78.40, Uniform Methods and Rules, Chap. 2, Part II(2)). In addition, APHIS has the authority to address an outbreak by subdividing a state for brucellosis classification purposes (9 C.F.R. § 78.40).

Because Idaho, Montana, and Wyoming presently are classified as brucellosis class-free states, local ranchers can ship cattle interstate without restriction. However, in response to Yellowstone's migrating bison, APHIS has threatened to downgrade Montana's brucellosis-free status (*State of Mont. v. United States* 1995), and other states have threatened to impose import restrictions on Montana cattle (*Natl. Park Serv.* 1995). As a result, local ranchers are concerned that loss of the brucellosis class-free status could impede their access to interstate markets and add additional expenses (*Gen. Accounting Off.* 1992). Yet Montana has not experienced any incidence of brucellosis in Yellowstone area cattle, and APHIS officials have managed to handle a few Wyoming incidents without downgrading its brucellosis status (Keiter and Froelicher 1993). A threatened downgrade in Montana's brucellosis classification status, therefore, seems premature and the result of political rather than scientific or legal calculations.

Originally, neither federal nor state livestock disease law extended to wildlife. However, in 1962, with little discussion or consultation, Congress extended the Secretary of Agriculture's

authority over contagious diseases to include “all members of the animal kingdom,” including “wild” animals (21 U.S.C.A. § 134). Under this amendment, Congress also authorized the Secretary to issue necessary regulations, which appears to give federal agriculture officials some authority over wildlife to address contagious disease problems (21 U.S.C.A. § 134f). Although the Secretary has not yet asserted this authority, APHIS is evidently considering draft regulations that would give it authority over Greater Yellowstone’s bison (Assoc. Press 1996, Greater Yellowstone Interagency Brucellosis Comm. 1996). Among the states, Montana and Idaho recently have vested state livestock or agriculture officials with authority over bison that pose a contagious disease risk (Mont. Code Ann. § 81–2–120, Idaho Code § 25–618), thus effectively displacing the comprehensive authority that state wildlife officials had exercised over wild bison. This jurisdictional shift in state wildlife law may have encouraged APHIS to consider also asserting its authority over the region’s bison.

Under APHIS’s dual federal-state brucellosis eradication program, brucellosis in the United States has been substantially reduced. Presently, 34 states are listed as “class-free” states (9 C.F.R. § 78.41(a) (1996)). But after more than 50 years and \$3 billion in expenditures (Gov. Accounting Off. 1992), the program has not eliminated brucellosis from domestic cattle, and it costs more than \$60 million annually (Thorne et al. 1991a). Any effort to extend the program to eradicate brucellosis in Greater Yellowstone’s bison and elk populations would add to this cost and could impose heavy burdens on livestock operators in the 3-state region. Moreover, it would generate considerable political and legal opposition. And there is little assurance of success.

### Wildlife Management and Brucellosis

In Greater Yellowstone, wildlife management responsibilities are shared among the NPS, U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), and state wildlife departments. The national parks are governed by the National Park Service Organic Act, which provides that the NPS must “conserve” wildlife, leaving it “unimpaired for future generations” (16 U.S.C.A. § 1). The organic legislation establishing YNP contains a similar wildlife preservation provision (16 U.S.C.A. § 26). These statutory

provisions provide the NPS with clear legal support for its noninterventionist wildlife management policy. In GTNP, the NPS and the State of Wyoming are jointly responsible for the “permanent conservation” of elk, and hunting may be permitted inside the park (16 U.S.C.A. § 673c). In the National Elk Refuge, the USFWS and Wyoming also share management responsibility for elk (16 U.S.C.A. § 673c); the refuge itself is managed under a “compatibility” standard for determining whether hunting or other secondary activities should be permitted (16 U.S.C.A. § 668dd(d)(1)(A)). This appears to give the USFWS authority to pursue a noninterventionist policy for wildlife diseases.

In the national forests, the USFS shares wildlife management responsibility with state wildlife officials. The USFS is responsible for habitat management, while the states are responsible for managing wildlife populations (16 U.S.C.A. § 528; 43 U.S.C.A. § 1732(b)). Although the USFS has an obligation, under the National Forest Management Act, to conserve biological diversity (16 U.S.C.A. § 1604(g)(3)(B)), none of the Greater Yellowstone national forests have designated bison as an indicator species. In addition, the USFS manages livestock grazing on national forest lands: it can regulate grazing permits to protect wildlife resources (16 U.S.C.A. § 528; *Light v. United States* 1911).

Two other federal laws—the National Environmental Policy Act (NEPA) (42 U.S.C.A. §§ 4321–4361) and the Federal Tort Claims Act (FTCA) (28 U.S.C. § 2671 et seq.)—have significantly affected wildlife and brucellosis policy in the Greater Yellowstone region. Under NEPA, federal agencies are responsible for preparing an Environmental Impact Statement (EIS) whenever a major federal action significantly will affect the quality of the human environment (42 U.S.C. § 4332(2)(C)). Several NEPA lawsuits have been litigated challenging federal bison management proposals (Keiter and Froelicher 1993), including one that sustained the policy allowing Yellowstone bison to be shot upon leaving the park (*Fund for Animals v. Lujan* 1992). Clearly, given this litigation history, any regional policy addressing brucellosis in wildlife must be adopted in accordance with NEPA procedural requirements. Under the FTCA, a Wyoming rancher sued the United States alleging that federal wildlife management policies were responsible for a brucellosis outbreak in his cattle herd. The court, while

absolving the United States of liability by finding that federally managed wildlife did not cause this outbreak, also concluded that wildlife disease claims were covered by the statute (*Parker Land and Cattle Co., Inc. v. United States* 1992). This conclusion, however, ignored substantial precedent under the FTCA's discretionary policy exception (28 U.S.C. § 2680(a)), which supports the view that federal wildlife management policies are not reviewable through the medium of a tort suit (Keiter and Froelicher 1993). Nonetheless, the ruling leaves Greater Yellowstone federal land managers with the specter of tort liability looming over their wildlife management decisions—a situation that could also influence regional public land livestock grazing policy.

Until recently, the 3 Greater Yellowstone states treated bison as wildlife, which meant state wildlife officials had exclusive responsibility for these animals outside the national parks or wildlife refuges (Keiter and Froelicher 1993). In Wyoming, which has the highest incidence of brucellosis in wildlife, bison and elk are still treated as wildlife and are subject to being hunted (Wyo. Stat. § 23–2–107). During the 1995–96 winter, 8 bison that had moved eastward out of Yellowstone were killed during a public hunt, which occurred without incident on national forest lands (Hassler 1996). Under the Wyoming wildlife damage compensation law, a rancher losing a cattle herd to an elk-induced brucellosis outbreak can maintain a claim against the state (if he/she can prove elk are the cause of the outbreak), but bison are not covered under this law (Wyo. Stat. Ann. § 23–1–901(c); *Parker Land and Cattle Co. v. Wyo. Game and Fish Comm.* 1993). In Montana, the state wildlife department now shares jurisdiction over wild bison with livestock officials. Since cancelling its controversial public bison hunt in 1993, the Montana legislature has given the Department of Livestock responsibility for managing wild bison that have been exposed to a contagious disease (Mont. Code Ann. §§ 81–2–120, 87–1–216). All bison originating from YNP have been designated “a species requiring disease control” (Mont. Code Ann. § 87–1–216(a)). Montana livestock officials are statutorily authorized to physically remove or destroy any bison presenting a livestock disease threat (Mont. Code Ann. § 81–2–120). In Idaho, the state has likewise vested state agriculture officials with authority for removing or shooting wild bison entering the state

that “pose a significant threat to property, livestock, or other animals” (Idaho Code § 25–618). In both states, however, wildlife agency officials continue to have sole jurisdiction over elk. As a result, state law is anything but uniform concerning brucellosis in wildlife.

## SEARCHING FOR COMMON GROUND

With their diverse missions and cultures, the federal and state agencies involved in the Greater Yellowstone wildlife brucellosis problem have had difficulty developing a common policy. Intent on accomplishing their goal of eradicating brucellosis from domestic livestock, APHIS and state livestock officials have endorsed a similar eradication approach to Greater Yellowstone's wildlife brucellosis problem (Gen. Accounting Off. 1992). The NPS and USFWS, relying upon a minimal human intervention wildlife management policy, have resisted intensive bison or elk disease management on their own lands while promoting the public importance of free-ranging wildlife. The states of Montana and Idaho, frustrated over increased bison numbers and fearful of losing their brucellosis class-free status, have given state agriculture officials responsibility for managing wild bison from Yellowstone and forbidden these bison from entering the state. With its large brucellosis-infected elk population and important winter feedgrounds, Wyoming has continued treating bison as wildlife while exploring technical solutions such as biobullet vaccines. Little attention has been given to the region's elk population, even though many more elk test positive for the disease than bison.

Past bison management strategies have not been effective in keeping bison within park boundaries. Since implementing its nonintervention policy, the NPS has sought to discourage bison from migrating outside Yellowstone by hazing them back into the park and by supporting culling efforts outside park boundaries. Hazing has proven unworkable because bison are notoriously difficult to herd (Meagher 1989). Culling has been controversial with the public, raising such an outcry that Montana's legislature rescinded its public bison hunt. Nonetheless, bison wandering outside Yellowstone have continued to be shot by Montana livestock officials, though local residents have strenuously objected to this indiscriminate shooting policy (Robbins 1996). In Wyoming, a more limited culling pro-

gram was proposed for Grand Teton bison leaving the park, but it has not yet been implemented (Grand Teton Natl. Park et al. 1994).

In 1995, to bring pressure on Yellowstone region federal land managers, the state of Montana initiated litigation against the federal government. Naming both the NPS and APHIS as joint defendants, Montana alleged that APHIS was arbitrarily threatening to downgrade its brucellosis class-free status while the NPS was violating statutory obligations by not aggressively managing bison to eliminate the risk of brucellosis transmission (State of Mont. v. United States 1995). Rather than litigate, the United States settled the case on behalf of both agencies, even though the NPS and APHIS operate under dramatically different—perhaps even conflicting—statutory mandates and have quite different interests at stake. The settlement agreement, which is subject to ongoing judicial oversight, requires the NPS, APHIS, and Montana to implement intensive interim bison management procedures and to complete a long-term plan and EIS (State of Mont. v. United States 1995). The NPS has now agreed to participate in capturing, testing and slaughtering its bison, essentially treating them like domestic cattle. This raises the legal question of whether the NPS, consistent with its statutory preservationist obligations, can slaughter its wildlife at the behest of neighboring states and private landowners—an issue that may be resolved in recent lawsuits challenging the interim plan.

The NPS and the state of Montana have recently released the interim bison management plan and an Environmental Assessment (Natl. Park Serv. 1995, 1996). Under the interim plan, bison capture facilities would be established on Yellowstone's northern and western boundaries to prevent most bison from entering Montana. Any bison moving northward toward adjacent private lands will be captured within the park and shipped to slaughter regardless of its brucellosis condition. In the West Yellowstone area, Montana Department of Livestock officials will capture, test and slaughter any brucellosis-exposed bison found on public or private lands, including all pregnant female bison. Male and female nonpregnant bison that test negative for brucellosis will be allowed to remain on public lands from 1 November through 30 April, after which they either will be hazed back into the park or shot. Bison will be allowed outside the park on adjacent national forest lands in loca-

tions where there is no risk of contact with domestic livestock. No provision is made for addressing the related problem of brucellosis in the region's elk population. In sum, the interim plan represents a significant departure from the NPS's traditional noninterventionist approach to bison management and thus constitutes a victory for opponents of this approach to wildlife management.

Moreover, APHIS has indicated that it is prepared to issue proposed regulations asserting jurisdictional control over Greater Yellowstone's bison population for brucellosis purposes (Assoc. Press 1996, Greater Yellowstone Interagency Brucellosis Comm. 1996). Not only would such regulations divest the states (and perhaps the NPS) of their traditional jurisdiction over a wildlife resource, but it would undermine any real opportunity to achieve a cooperative, coordinated solution to the problem. Such a move would surely trigger litigation over the legal basis for APHIS's asserted authority over a wildlife resource (D. Shubert; Meyer and Glitzenstein Attorneys at Law, Washington, D.C., pers. commun.), and provoke real concern among the states over this federal intrusion in an area of traditional state responsibility. The move also would raise troubling questions of whether APHIS, with its zealous commitment to eradicating brucellosis, would limit its assertion of authority to bison. Specifically, is APHIS contemplating a further assertion of federal authority over the region's free-ranging elk populations? Is the goal to force a permanent change in regional wildlife management policy? Or is APHIS preparing to assert additional federal authority over the states' livestock industries?

Meanwhile, federal and state officials have entered a Memorandum of Understanding establishing the Greater Yellowstone Interagency Brucellosis Committee (GYIBC) as a forum to address management differences and to formulate a coordinated policy (Greater Yellowstone Interagency Brucellosis Comm. 1995). Participating agencies include APHIS, NPS, USFWS, USFS, the Idaho, Montana, and Wyoming wildlife departments, state veterinarians, and state livestock boards. As a general policy goal, the GYIBC has agreed "to protect and sustain the existing free-ranging elk and bison populations in the Greater Yellowstone Area (GYA) and protect the public interests and economic viability of the livestock industry in the States of Idaho, Wyoming, and Montana" (Mem.



of Understanding 1995). At the same time, a key GYIBC objective is to “plan for elimination of *Brucella abortus* from the GYA by the year 2010.” Given these potentially conflicting policy objectives, whether the profound differences between the agencies can be surmounted remains to be seen. Neither the interim bison management plan nor APHIS’s contemplated assertion of regulatory authority over the region’s bison bode well for achieving a rational consensus to solve the problem.

## DEFINING A COHERENT POLICY

A jurisdictional power struggle is neither necessary nor desirable to address Greater Yellowstone’s problem of brucellosis in wildlife. Indeed, a logical solution is adoption of a coordinated disease control policy based on risk management principles that leave traditional jurisdictional responsibilities in place (Keiter and Froelicher 1993). Because neither bison nor elk can be constrained within the ecologically artificial boundaries that define Greater Yellowstone’s national parks and wildlife refuges, the control policy must be implemented and coordinated on an ecosystem basis (Clark and Minta 1994). The GYIBC, with its diverse membership, reflects this reality; therefore it could provide a viable forum for reconciling conflicting agency policies, evaluating the scientific data objectively, and securing reciprocal concessions from all parties. To accomplish these objectives, however, the GYIBC participating agencies must be sensitive to each other’s statutory obligations, the diverse national and local concerns at stake, and the objective scientific, ecological, and economic realities surrounding the region’s brucellosis issue (Clark and Minta 1994). In addition, GYIBC participants must avoid raw assertions of power that can upset the delicate federal-state balance and interagency relations.

A threshold question is whether eradication, rather than control, of brucellosis in wildlife is a necessary or viable policy option. The existing law does not mandate eradication of brucellosis (Keiter and Froelicher 1993), and the disease persists in the nation’s domestic livestock despite a lengthy and expensive campaign against it (Gov. Accounting Off. 1992). There have been no scientifically established cases of wildlife transmitting brucellosis to domestic livestock in an open-range setting, and Wyoming’s Teton County ranchers have lived uneventfully with brucellosis in bison and elk for years (Keiter and

Froelicher 1993). Given that bison and elk both carry the *Brucella abortus* organism and that they appear to pass it among themselves, the only foolproof way to achieve eradication is to depopulate both species simultaneously and replace them with “clean” animals (Kistner 1982, Dobson and Meagher 1996). However, this is not feasible in the Greater Yellowstone wilderness-like setting, and the ecological and genetic consequences are not acceptable. Moreover, because ranching plays a limited role in the regional economy compared to wildlife-related tourism and recreation (Powers 1991, Rasker et al. 1992), an eradication policy would be economically and politically difficult—if not impossible—to support. In short, the objective risks of transmission and the difficulties involved in implementing a brucellosis eradication policy in wildlife do not justify the dire consequences that would attach to such a policy.

In the Greater Yellowstone region, the key to an effective disease control policy is minimizing contact between wildlife and cattle during the periods when brucellosis might be transmitted (Keiter and Froelicher 1993, Dobson and Meagher 1996). This procedure can be accomplished without dramatic changes in the way the region’s wildlife and cattle traditionally have been managed. For bison, the GYIBC should recognize that their critical habitat extends beyond national park boundaries, and they should be allowed to forage on adjacent public lands separate from cattle. For elk, the GYIBC also should recognize that their range extends well beyond the NPS and other boundaries, and that virtually it is impossible to prevent elk from coming in contact with livestock. In Wyoming, an effort should be made to reduce the use of elk feedgrounds, which would reduce the risk of brucellosis transmission among wildlife species, and elk biobullet vaccination experiments should continue to reduce the prevalence of brucellosis (Thorne et al. 1991a). Public hunting will continue to cull some diseased elk from the Greater Yellowstone herds, and small-scale public hunting might be used to keep bison from wandering onto private ranch lands. It may also be necessary to continue removing female bison that persist in moving from public to private lands during the critical transmission period.

Unlike Greater Yellowstone’s free-ranging wildlife, cattle are much easier to control and therefore should be the focal point of a coordinated disease control effort (Keiter and Froe-

licher 1993, Smith and Robbins 1994, Dobson and Meagher 1996). On private ranch lands, cattle should receive priority; interloping bison or elk should be either hazed off these lands or shot during periods when disease transmission is a real risk. On public lands, seasonal adjustments in grazing leases, which also might entail providing alternative grazing opportunities, can keep livestock separated from bison or elk during the critical birthing period when brucellosis transmission is most likely to occur (Boyce 1989). Calfhood vaccination for cattle, which has been proven highly effective against brucellosis (Nicoletti 1990), should be required where segregation measures are not fully effective. In high risk areas, potentially exposed cattle might be subject to surveillance testing, with costs split between the affected parties. Such a policy would, of course, require some concessions from the livestock community, which has made few concessions in addressing the problem.

Until and unless a brucellosis outbreak attributable to wildlife occurs, APHIS and state agriculture officials should refrain from threatening to downgrade any state's brucellosis classification status. In the unlikely event of an outbreak, APHIS has the legal authority to isolate the problem by subdividing the state for brucellosis classification purposes (9 C.F.R. § 78.40, Keiter and Froelicher 1993), which should free ranchers outside the affected area from marketing constraints. Moreover, both federal and state laws make compensation available to a rancher whose herd must be slaughtered to contain an outbreak. In sum, it is more efficient and effective to concentrate brucellosis disease control efforts on the region's cattle (Boyce 1995), rather than undertaking an expensive and unnecessary bison management policy that is almost certain to fail and sure to provoke sustained litigation and political opposition.

## CONCLUSION

Although the Greater Yellowstone wildlife brucellosis controversy is fraught with contentious political, legal, and scientific overtones, the problem can be adequately addressed and resolved within the existing jurisdictional framework without jeopardizing the region's bison, elk, or livestock. The multi-agency GYIBC provides a logical forum for devising and implementing a coordinated, regional disease control policy based on risk management principles. A comprehensive disease control policy would

provide the regional livestock industry with adequate protection against brucellosis in wildlife while also acknowledging the national importance of Yellowstone's wildlife. As importantly, such a policy can be implemented without disturbing traditional federal or state management responsibilities and without expanding APHIS's jurisdictional authority. In short, a risk-based, disease control policy would acknowledge the objective risks and ecological realities associated with brucellosis in wildlife as well as the political-legal realities of contemporary wildlife management. Such policy would ensure the survival of Greater Yellowstone's free-ranging bison—an important American wildlife conservation legacy.

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