

TO SAVE THE WILD BISON

Life on the Edge in Yellowstone

MARY ANN FRANKE

UNIVERSITY OF OKLAHOMA PRESS : NORMAN

shipped to Wood Buffalo National Park. This was done despite objections raised on behalf of the 2,000 disease-free "wood buffalo" at the park. Half of the shipped bison may have died during or soon after the six-day, 620-mile trip by train and barge, but the survivors thrived in their new home. In 1926, after bison were seen south of the Peace River, which formed the park's southern boundary, the Canadian government expanded the park by more than half, making it five times as large as Yellowstone. Nonetheless, by 1929 Wood Buffalo National Park also had abattoirs to slaughter excess bison for the meat market.⁶⁵

CHAPTER 6



Under More Natural Conditions

The overall trend in Yellowstone wildlife management during the twentieth century was toward more "natural" conditions, letting wilderness be wild, with ecological processes instead of humans determining the fate of individual animals. But the change proceeded by fits and starts, with different species subject to different policies, and abrupt transitions reflected political and administrative constraints rather than just a gradual learning process. For example, Yellowstone's initial policy of predator removal was intended to protect human life and property, including livestock. With that rationale, bears as well as wolves, coyotes, and mountain lions were killed. As the emphasis shifted to protecting the animals most popular among visitors, bears were removed from the enemies list, but pelicans and otters were added, because they ate trout that might otherwise be caught by fishermen.

During the 1920s, as part of the movement toward more ecologically based wildlife management, predator control in national parks began falling from favor. Yellowstone's bison and elk herds grew substantially during the first three decades of the century, along with a concern that they would have to be reduced by some means to prevent habitat degradation and starvation. National Park Service policies were revised in 1931 to halt the killing of predators except "when they are actually found making serious inroads upon herds of game or other animals needing special protection." However, coyote trapping was still occurring in Yellowstone after elk herd reductions by slaughter began in 1934. Other changes toward more natural conditions in Yellowstone also occurred sporadically. Winter feeding of

ungulates ended in the 1940s, but the feeding of bears at park dumps was allowed to continue until the 1960s. The diversion of hot springs for public bathhouses and the stocking of lakes and rivers with fish continued until the 1950s. Wildland fires were automatically fought until the 1970s. More recently the Park Service goal of removing the effects of human interference in ecological processes has led to new interference in the form of wolf reintroduction. Intensive management of that species is expected to continue indefinitely in order to restore what are regarded as more natural conditions in Yellowstone as a whole.

Returning the Yellowstone Bison to a Wild State

By the 1920s the Lamar bison herd had begun finding its own way toward more natural conditions. As the herd expanded its summer range, it began mingling with the wild herd, and starting in 1932, no effort was made to distinguish between the two herds in population counts. Castration of calves ceased in 1931 because, as chief park ranger George Baggley explained, "the resulting animal is not a true buffalo and detracts from the appearance of the herd as a whole."¹ But many of the bison were still consuming artificially cultivated forage including both native and nonnative grasses. Baggley believed that winter feeding would probably always be necessary as the only means of keeping the herd from drifting into the elk's lower winter range and "possibly even outside of the Park."

The Lamar Valley is part of what is referred to as the northern range, about 378,000 acres of grassland and forest lying in the lowest area of the park and extending beyond the park boundary to private and U.S. Forest Service land. Albright obtained private funding to pay for a study of elk on the northern range by William Rush, a Forest Service biologist whose work helped establish the idea that wildlife policies should be based on scientific research rather than managerial or public whims. Although his 1932 report focused on elk, which is by far the most abundant large animal on the northern range, Rush mentioned the effect that other animals had on the "carrying capacity" of the range. "The buffalo herd is kept at about 1,000 head and there does not seem to be any good reason why this number should be changed," he observed.² This figure became the accepted goal, but it was soon interpreted as a winter count of 800 on the northern range so that the calving season did not boost the population over 1,000. "I have no hesitancy in recommending a reduction of the herd to 800," said

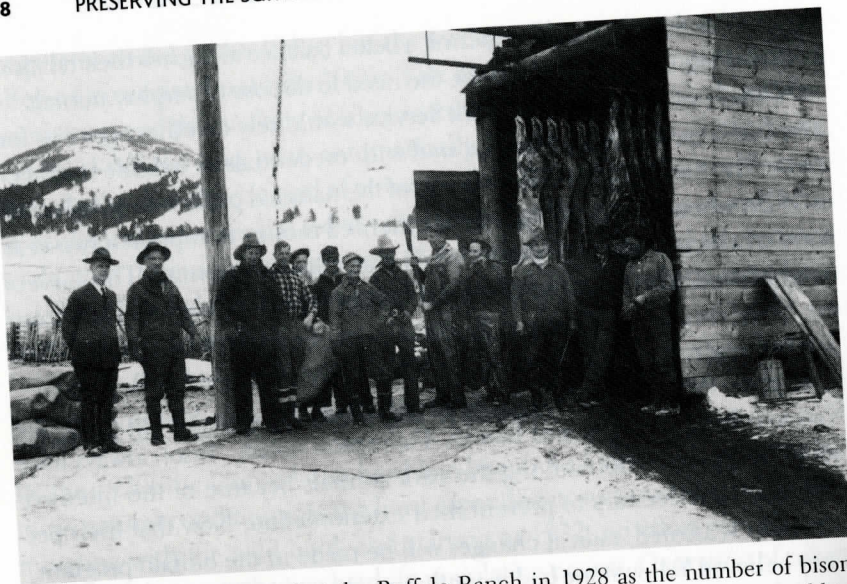
Baggley. He thought it would "permit a better balance as regards their relation to other Park animals" and reduce the need to dispose of surplus animals.³

Albright intended that the Park Service would rely on other agencies for scientific expertise, and it lacked staff with credentials in wildlife management. The first formal wildlife surveys of the national parks were conducted in 1929, when George Wright used inherited money to support a two-year leave of absence from his position as a naturalist at Yosemite. The surveys he produced with the help of several other former ecology students from the University of California at Berkeley were well received, and the Park Service gradually began funding a Wildlife Division based at Berkeley.⁴

In their 1934 "Report on the Current Status of Large Mammals in the National Parks," Wright and Ben H. Thompson noted, "Bison always have held a unique position among the park animals because of the intensive management necessary to prevent their extermination. Now that their perpetuation is assured, radical changes will be made in the buffalo program." They believed Yellowstone had recently ended a period "devoted to building up a new herd by every means at human command" and had begun one that would be "devoted to the task of returning the Yellowstone herd to the wild state insofar as the inherent limitations of the park will permit."⁵ A natural sex ratio of about one to one was to be maintained in the Lamar herd, and management was to be limited to three activities: an annual roundup, which was considered necessary as long as there was a "surplus" to slaughter; winter feeding at the Buffalo Ranch, which was considered necessary as long as the herd must be "held within present park boundaries"; and disease prevention and treatment. Wright and Thompson believed that under this management program, "there will be once again a wild herd of bison in the United States." They did not specify the criteria by which they defined bison as "wild" nor whether any effort should be made to eliminate brucellosis. They noted that an estimated 40 percent of the herd was "affected" by the disease and that the 88 bison that were tested in 1934 would continue to be monitored "to determine prevalence and progress of infection, effect on reproduction, period required to attain individual immunity, if any, and probable general effect on the future of the herd."

Outlaws, Cripples, and Good Breeding Stock

Summarizing bison management in Yellowstone during the prior three decades, Wright and Thompson reported that a total of 297 bison had been



An abattoir was constructed at the Buffalo Ranch in 1928 as the number of bison slaughtered in the park to limit herd size began to increase. The meat was sold to wholesalers (circa 1930). Courtesy of Yellowstone Photograph Archives.

shipped alive from the park, 682 had been sent to the slaughterhouse, and “48 outlaws and cripples have been destroyed.” (During this same period Yellowstone also shipped more than 3,300 elk to zoos and parks across the United States and Canada.) Although part of a new wave of ecologists who did not discriminate between “good” and “bad” wildlife species, Wright and Thompson were still of a mindset that could refer to individual animals as “outlaws” or “cripples” for failing to meet standards of acceptable conduct or appearance. Despite the “radical changes” Wright and Thompson reported in bison management, the impulse persisted to enhance visitor enjoyment regardless of the means. The small corral for bison near Mammoth Hot Springs was regarded as unsatisfactory, not for the bison, but for visitors, who could not photograph them “without having one or two fences appearing in the picture,” as Baggeley explained. To remedy this problem, 530 acres on Antelope Creek was fenced in 1935 for about 30 bison, which were driven into a five-acre corral near the park’s main loop road during the day.

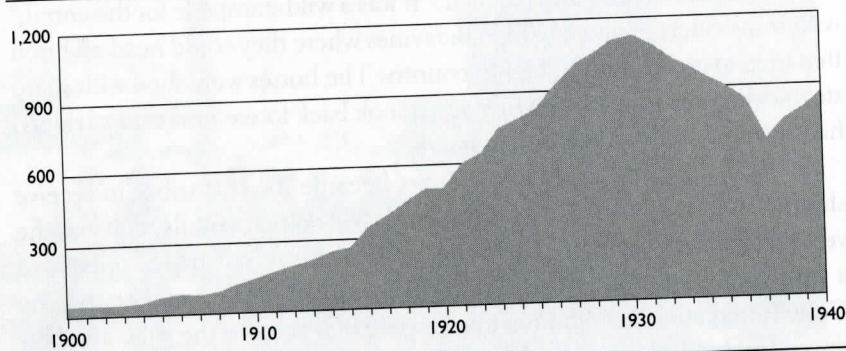
Once a year, rangers on horseback continued to round up as many bison as possible and herd them to the Lamar Valley for culling. This was usually done around Christmas, when “all available rangers and most anybody that

could ride a horse” were mobilized for the operation in subzero weather, one of the participants later recalled. “It was a wild stampede for the corral,” with some riders assigned to hide in ravines where they could head off bison that tried to escape toward higher country. The horses were shod with sharp steep calks, but “once in a while you’d look back to see how many [riders] had suffered spills or horses had fallen.”⁶

In 1934 the Crow and Oglala Sioux became the first tribes to receive shipments of live bison from federal land. Not coincidentally, that was the year that Robert Summers Yellowtail became the first Indian to be appointed a reservation superintendent. Yellowtail cajoled white ranchers on the Crow Reservation in Montana to return 40,000 acres to the tribe and borrowed trucks to transport the bison 350 miles from Yellowstone. The Crows received a total of about 200 bison during the 1930s, mostly from Yellowstone and the rest from the National Bison Range. Journalist Frank Ernest Hill in the *New York Times* lauded the new government policy that had made establishment of these herds on tribal land possible. “This policy holds that the Indian is intelligent, that he has a valuable culture of his own, that if encouraged to adapt himself in his own fashion to modern conditions he can become fully self-sustaining and will make an important contribution to American life as a whole.” Hill also noted that although “the white American has found no place for buffaloes in his economy,” the buffalo’s “hardiness”—its ability to “graze successfully in rougher, colder, and more barren lands” than domestic cattle—was something to appreciate given the drought-stricken condition of much western range.⁷

The Oglala Sioux began with 43 bison on a fenced pasture at the Pine Ridge Reservation in South Dakota, nine of them from Yellowstone and the others from Wind Cave National Park. Although the bison selected for slaughter at Yellowstone included “old bulls, dry cows, steers, and any crippled, deformed, or diseased animals,” the opposite criteria were applied when filling requests for live shipment, because the new owners wanted “good breeding stock or a nearly perfect specimen for exhibition purposes,” as Chief Ranger Francis LaNoue explained. An exception to that policy was made in the second bison shipment to the Crow Reservation, in which about half of the 96 animals were considered good breeding stock and the rest were animals that the park wanted to eliminate from the herd. LaNoue believed this decision was justified by the large number of bison the Crows had received. Because ordinarily the fittest bison were selected for live shipment, LaNoue advised against trying to use live shipment to control

Yellowstone bison population, 1900–1940



The Park Service began killing bison in the 1920s to limit the population size, but population goals were not set until the early 1930s.

herd size over an extended period. "It is unlikely that we will have many requests like that of the Crow Reservation where numbers taken are sufficient so that some inferior animals can be taken from the herd."

Reducing Elk and Bison on the Northern Range

In their 1934 report Wright and Thompson called for an end to the winter feeding of elk because it had "proved so much more harmful than beneficial." Although they were generally opposed to meddling with the landscape or wildlife for the sake of tourists, Wright and his colleagues believed that in order to combat the "harmful effects of human influence" and restore the "primitive state" of the parks, humans sometimes had to interfere with nature in a big way. They recommended reducing the northern elk herd, which was then estimated to number 12,000 to 14,000, by 3,000 a year until it could be sustained without artificial feeding. With drought affecting the range in the late 1920s and early 1930s, a population crash was believed to be imminent. Claiming that the herd was on the "brink of disaster," Wright warned that the next severe winter would bring "hideous starvation and wastage."⁸ From a humanitarian standpoint, shooting the elk seemed preferable.

As with the accuracy of early wildlife population estimates, observations of habitat degradation made in the 1930s are difficult to evaluate in retrospect. Opinions were usually based on aesthetics rather than quantitative

measurements, and long-term data were not available for comparison. By the time wildlife ecology and range management were professional disciplines, the native grazing system in most of the United States had been replaced or altered by domestic livestock operations with different goals and effects on the landscape. Under the prevailing range management dogma, heavily grazed ranges were evidence of too many animals. The goal was therefore to manage the northern range so that elk "productivity" was as steady as possible and mortality was kept to a minimum.⁹ To address these concerns, the Park Service, Forest Service, and Montana Game Commission cooperated on a program that reduced the northern elk herd by about 3,300 during the winter of 1934–35. One-fifth were shot by rangers in the park and most of the others were shot by hunters outside the park. But even after a similar reduction was made in 1936, Adolph Murie, a highly respected wildlife biologist, believed the condition of the range required removing another 4,000 elk. At the end of the decade, the northern elk herd remained at about 11,000 and the bison herd on the northern range had been reduced to 582.

The 20-year tenure of Edmund Burrell Rogers as Yellowstone superintendent that began in 1936 was described by historian Aubrey Haines as one "dominated by expediency and diplomacy," and Haines credited Rogers with accommodating a tripling in annual visitation despite the "appalling obsolescence" of park facilities.¹⁰ Unlike park visitors, the bison population was periodically culled, and it increased by only half during Rogers's term, but it also required park managers to adapt and make do. With the winter bison population in Pelican Valley back up to 136, it was tallied as a separate herd again, and 71 bison were relocated from Lamar Valley to Hayden Valley and Fountain Flats. These areas had once been part of the bison's winter range in Yellowstone, but the relocation was not done in the name of "ecosystem restoration," as it might today. Instead, as Rogers explained, "this was done in an attempt to scatter the herd over a wider range and provide more opportunity for park visitors to see buffalo running free and wild." As their size and ranges increased, the two new herds merged and were referred to by various cumbersome names, including the "Hayden Valley–Nez Perce–Firehole herd." Since the 1970s, bison in this area have often been referred to as the "Mary Mountain herd."

Rogers found that the buffalo show corral on Antelope Creek was popular among visitors, but the daily routine of driving the animals into it ended in 1937. Instead, the buffalo were left to roam in the large fenced

pasture several hundred yards from the road, where they could be seen "in a more desirable setting even though they are at a greater distance." After 35 years of having to be there for visitors, liberation from the show corral was only a small step for Yellowstone bison, but a large step for Yellowstone bison management. In 1939 Rogers concluded that this compromise between natural conditions and visitor proximity had been the right thing to do. "Many favorable comments were received regarding the method of display in a large enclosure which simulates natural conditions," he reported.

A Formula for Carrying Capacity and Confusion

Another Yellowstone tradition bit the dust in 1939 when instead of a horse-back roundup of the Lamar herd for culling, the rangers began drawing bison to the corral by baiting them with hay. This eliminated one form of physical human interference, but it provided no spectacle for tourists. The change was consistent with a policy that the Wildlife Division had developed in 1932 and the National Park Service officially distributed in 1939: "Presentation of the animal life of the parks to the public shall be a wholly natural one." The policy also called for an end to artificial feeding. "Every species shall be left to carry on its struggle for existence unaided, as being to its greatest ultimate good, unless there is real cause to believe that it will perish if unassisted." However, the policy recognized that keeping ungulate populations within the carrying capacity of the range would necessitate limiting their size artificially.¹¹

In an effort to determine the northern range's carrying capacity, park ranger Rudolph Grimm used a figure of three acres per elk for the six-month winter season. This was based on Rush's data and "observations of the feeding habits of elk."¹² Grimm calculated a "forage acre factor" of 0.16 (based on the quantity of forage plants present that elk were likely to consume) and multiplied it by the number of range acres (145,437) to arrive at a carrying capacity of 7,756 "elk units." To allow for the overlapping diets of other ungulates, he reduced this number to 7,059, but that would leave room for only 245 bison on the northern range, each of which was assumed to use up 1.5 elk units. And the 7,059 elk figure was an "average winter carrying capacity"; it dropped to 4,781 during February and March, according to Grimm's estimate.

Traditional estimates of carrying capacity made in this way by livestock managers referred to the number of animals that would provide the highest

economic return on a sustainable basis. This differs from the more recent concept of "ecological" carrying capacity, which is the number of animals that a range can sustain without human assistance. Ecological carrying capacity varies from year to year, depending on environmental factors, but it is generally larger than economic carrying capacity because each animal does not have to justify its existence by being a worthwhile investment. However, this difference was not generally recognized by wildlife managers until the 1970s, and it is still not accepted by some of those who criticize Yellowstone officials for allowing the range to become "overgrazed."¹³

In a peculiar attempt to explain how elk had thrived on the northern range for decades in numbers far in excess of his computed carrying capacity, Grimm noted that, "apparently due to the almost yearly recurring forage shortage, a stamina has developed in the surviving animals that permits them to live through such periods without suffering permanent physical injury so long as the dearth is not excessive." Grimm therefore concluded that the "true carrying capacity for the winter range under conditions that prevailed during the winter of 1937-38" would be a compromise between the average and the low carrying capacity figures. This came to 6,307 elk, plus 900 for the range north of the park.

In 1940 Daniel Beard, a wildlife biologist who would later become superintendent at Everglades and then Olympic National Park, reported that the "artificiality" of bison in national parks was inevitable. "The 'wildest' herds in the United States today are in Yellowstone," Beard argued, "but even they are not living as they did in a primitive environment. I suspect that now that the species has been saved, we should think of its future in federal areas where it must be maintained in semi-domestication."¹⁴ However, Newton Drury, who became director of the Park Service that year, was determined to "work toward the ideal of placing all species, including the bison, as rapidly as practicable upon a self-sustaining basis."¹⁵ A consensus within the Park Service favored reducing the Lamar herd to the "computed carrying capacity of the winter range" in order to eliminate the presumed need for winter feeding, but there was no consensus about what that number was.¹⁶

Without any elaborate calculations Drury issued an order in 1942 to reduce the Lamar herd by 200 animals, and this was done by slaughtering 193 bison and shipping 17 from the park. Nonetheless, more than a hundred bison headed north out of the park the following winter, the most severe since that of 1919-20. For park managers this large exodus was evidence

that feeding alone would not keep bison in the park. Most of the bison returned within several weeks, along with complaints about damage to ranchers' haystacks and fences. Some of the bison traveled 30 miles to Carbella Flats, and one was reported on a ranch 50 miles from the park. The following August, nearly 150 bison were seen outside the park's northeast corner near Lake Abundance.

By 1943, when the parkwide winter bison count was 964, Drury had accepted the theory that Yellowstone's carrying capacity was about 350 bison for the northern range and 300 for the rest of the park. The increasing number of bison that spent the winter in the park's interior without artificial feeding was considered proof that the Lamar herd could be weaned from its "boarding house habits."¹⁷ To help meet that goal, 405 bison were removed from the Lamar herd, leaving a count of 352. Drury also issued orders to stop using the fenced pasture at Antelope Creek and announced his intention to eliminate the Buffalo Ranch buildings and irrigation system because they were inappropriate in a national park. When 68 of the 313 bison in the Lamar herd left the park in the mild winter of 1948, their movement was regarded as evidence that before ranchers settled in the area, the bison's range had "probably extended down the Yellowstone valley to, or perhaps below the present town of Livingston," which is 50 miles from the park boundary.¹⁸

The changes in bison management and the reduction in the northern elk herd roused some opposition in surrounding communities and sportsmen's groups, but the Park Service's chief biologist, Victor Cahalane, staunchly defended the new policy. "A hundred nationally known scientists were first consulted for their opinions of these measures," he claimed. "They almost unanimously approved."¹⁹ But among those who objected was a nationally known nonscientist.

Albright's Last Stand

Horace Albright was gone from the National Park Service but not forgotten. He corresponded energetically with people in high places and remained influential on conservation issues.²⁰ As Yellowstone superintendent, Albright had come to believe that the problem with bison was how to manage the population "under nearly natural conditions and at the same time get it near the main highways where it can be easily and safely observed," and he never swerved from that illogical goal.²¹ Differing fundamentally from

Drury on the role of wildlife in a national park, Albright opposed the reduction in the Lamar herd and the elimination of fenced bison pastures. "It is argued," he wrote in 1944,

that the law governing National Park administration requires that everything must be kept as nearly as possible in its natural state, and hence there must be no artificial care or direction of bison. The question is, can these herds, widely separated and with half of the total number of animals ranging on high altitude plateaus often swept by violent snowstorms accompanied by intense cold, survive without reserves of hay in the lower valleys and the facilities of the buffalo ranch for dealing with disease? The answer is "no." Even the Lamar River herd, if not fed in periods of deep snow or under blizzard storm conditions, will move down the valley and out of the Park into towns and farms, and in such drifts there is always the possibility of excessive losses of bison as well as great property damage by the restless hungry animals.²²

As usual, Albright's concern for the Yellowstone bison was matched by his concern for the Yellowstone tourist, who he predicted would have "hardly one chance in a thousand of seeing one animal in a week's stay" after the herd was reduced. Albright lamented that under the new policy, "the bison must never be rounded up for any purpose, not even a few fine animals for the Antelope Creek enclosure. We all know that most visitors to Yellowstone would be unlikely to see the bison even if they were near at hand unless they should be pointed out."²³

Cahalane countered that "700 healthy, vigorous wild animals were worth more than 1,200 animals lazily waiting for hay. No one is interested in sightseeing domestic cattle." He believed that feeding, fencing, and culling had changed the appearance and nature of the Lamar herd. "Members of the 'tame' herd do not seem to be as vigorous, as energetic, as hard, or as glossy-coated as those of the original herd of wild animals that has continued to exist and increase in Yellowstone without man's attention." Comparing the Lamar herd to the bison described by fur trader Alexander Henry in North Dakota in 1800, Cahalane asked, "Is the buffalo of today 'sagacious, alert, wary?' No, he is heedless, dull, almost stupid. Man must take the predator's place in keeping the herds within natural bounds, and thus from eating themselves out of house and home."²⁴

Writing to Drury, Albright contended that the national parks were "not biologic units where animals can live in natural conditions the year round." He insisted that the display pastures were "absolutely essential," and that the public was entitled to "full opportunities to enjoy the animal life of the parks" even if this required "some small measure of artificiality in living conditions of the animals." According to Albright, George Bird Grinnell, "the grand old man of wildlife conservation," had watched the roundup of the big herd in Lamar Valley with tears streaming down his cheeks and said it was "the greatest sight that his eyes had beheld since 1876 when he was a reporter attached to Custer's staff on the plains." In response, Drury pointed out that Yellowstone was not a "complete biologic unit" for elk, deer, or pronghorn, yet no longer did the park "feed them hay and otherwise manage their lives."²⁵ Nonetheless, perhaps because his family had donated the land, in 1948 Laurance Rockefeller succeeded in pressuring the Park Service to provide 20 Yellowstone bison for a display in the Jackson Hole Wildlife Park. Drury hoped the scheme would fail, but bison remained in the enclosure long after it became part of Grand Teton National Park in 1950.²⁶

Avoiding Public Criticism

Limited brucellosis testing resumed in Yellowstone in 1941, after a seven-year lapse, with four veterinarians using various methods to check blood samples from 200 bison at the Buffalo Ranch. They found that from one-third to two-thirds of the animals were "reactors or suspects."²⁷ Reactors are animals whose blood contains antibodies for brucellosis and are therefore considered seropositive; suspects are those whose test results are inconclusive. From 1941 on, only seronegative bison were to be used for live shipment from the park. However, of the 400 bison removed in January 1944, only three were shipped live, and blood tests were not used to determine which bison were slaughtered. Instead, a simpler selection process was used. "Since it was desired to retain the most independent and self-sufficient members of the herd, the earliest arrivals on the feeding grounds were trapped without regard for sex or other considerations," explained Cahalane.²⁸

But later that year, a report that Yellowstone was shipping brucellosis-infected bison was made at the annual convention of the American Veterinary Medical Association. The blood test can detect only the presence of

antibodies an animal may create to fight the bacteria, not the *Brucella abortus* itself. Therefore, an animal that is carrying the bacteria may test seronegative if the blood sample is taken when antibodies are absent or too sparse to be detected. Nonreactors from an infected herd are not assumed to be brucellosis free unless they have completed an approved quarantine period.

The veterinarians' complaints led to the suspension of live bison shipments from Yellowstone and an investigation by Erling Quortrup of the U.S. Fish and Wildlife Service. In his findings Quortrup downplayed the significance of brucellosis in the Yellowstone bison and supported the continued shipment of nonreactors to other herds. He could not find any evidence of undulant fever among American Indians or other people who had handled bison carcasses in the past, and he noted that the bison may have acquired "a natural immunity" to the disease through years of exposure, as suggested by the rarity of abortions and gross lesions. He believed that "if control methods are to be instituted, this should be done to avoid public criticism and to facilitate future live shipments rather than to safeguard the herd itself." He also supported feeding the Lamar herd during the winter to reduce defections from the park.²⁹

A brucellosis vaccine for cattle had been approved in 1940, but its effects on bison were unknown. Quortrup's position was "If all the calves could be handled annually, I would unhesitatingly recommend vaccination; inasmuch as this is impossible, the value of vaccination is open to debate." Don Coburn, the next veterinarian assigned to the case by the U.S. Fish and Wildlife Service, recommended vaccinating all calves and eliminating all seropositive adults despite the logistical difficulties, but the Park Service considered such measures unrealistic because of the impossibility of corralling all of the bison and the prospect that even a "clean" herd could be reinfected by elk. In addition to the 38 bison that drowned in January 1946 after breaking through the ice and becoming trapped in the Yellowstone River, 200 bison were slaughtered, most of them seronegative, to reduce the Lamar herd to about 350.

Coburn did vaccinate 86 untested calves and yearlings during the 1946 roundup. The next year, nearly half of these bison were tested and vaccinated again, including three reactors. Another 78 untested calves were vaccinated in 1947, along with 13 tested yearlings, including nine reactors. The next phase of Coburn's study, which was to determine the likelihood of bison transmitting brucellosis to elk, was canceled due to lack of funds.

Superintendent Rogers reported to his superiors, "In our personal discussions with Dr. Coburn it is clear to us that there is no present objective of establishing a disease-free herd in Yellowstone."³⁰

Improving the condition of the northern range did remain an objective, but an elusive one. The relative abundance of native ungulates that inhabited the area before the arrival of Euro-Americans "has not been, and probably cannot be, definitively determined," stated Yellowstone ranger Wayne Alcorn. "This leaves some doubt as to which species are chiefly responsible for the over-grazed winter range, and which ones should be reduced to bring the large game animal population into natural balance once more," he explained, assuming that a numeric balance had once existed. However, in his enumeration of the reasons why it was not possible to return the Lamar bison "to a truly natural existence," Alcorn noted that the presence of brucellosis in the herd "made it highly desirable to trap periodically as large a number of bison as possible for testing, vaccination and removal of reactors."³¹

Reduce, Remove, Reconsider

The Buffalo Ranch had a squeeze chute stronger and heavier than those used to hold cattle in place while they are being worked on, but it was not suitable for bison calves. When vaccinations were given during the 1946 roundup, some of the calves were eight months old with eight-inch horns, and it took four men to safely pin a calf so that a blood sample could be taken and an inoculation given. The animal was held down while the sample was rushed to the warming shed, because the blood would often freeze before the test had been completed and another sample would have to be taken.³²

No bison were removed in 1947, but the Buffalo Ranch facilities were remodeled to handle the large reduction planned to get the population back down to about 350. Now there was a wood-burning stove to provide heat for the building, and a series of chutes with gates that could be remotely controlled by one man using a system of ropes and pulleys to sort the bison into different corrals for slaughter, shipment out of the park, or veterinary attention. One bison was separated from the herd at a time and worked into the squeezer, and a gate closed, preventing forward or backward movement. One side of the squeezer was hinged at the bottom and operated with a heavy lever that clamped the bison into a viselike grip, and

four small trap doors were positioned so they could be opened to vaccinate, take blood samples from, and apply ear tags to the animal.

The Park Service director lifted the embargo on shipping live bison from Yellowstone in 1947 because of the presumed progress in reducing brucellosis. The following January, 309 bison were corralled and 54 nonreactors were vaccinated and shipped; of the 181 bison that were slaughtered, only 32 had been identified as reactors or suspects. This practice was repeated during the bison removals conducted periodically until 1966: in order to meet the reduction goal, nonreactors were slaughtered along with reactors and untested bison. The effect of the herd reduction on brucellosis was therefore negligible.

Winter feeding of the Lamar herd, which had been discontinued in 1946, resumed in 1948 because the roundup and reduction activities had caused "critical range forage conditions" in the Lamar Valley. Summarizing the results of the 200 bison that were tested, Rudolph Grimm reported that the "incidence of infection" had been reduced from 62 percent in 1941 to 15 percent in 1948.³³ That was mistaken; what had been reduced was the percentage of bison that were reactors to the test or suspects, indicating that they may have been exposed to brucellosis. The actual infection rate in the Lamar herd was not known, and given the fallibility of the blood test, the apparent reduction in seroprevalence was not evidence that the partial vaccination and herd reduction program had had any effect. (Even with the more reliable tests that are used now on slaughtered bison, park managers are cautious in estimating infection rates, but about half of the Yellowstone bison whose blood was tested in the 1990s were seropositive, and probably no more than half of those seropositive bison were infected with brucellosis.)³⁴

In 1949 brucellosis specialists at the National Institutes of Health rendered their opinion that efforts to test and vaccinate bison at Yellowstone and Wind Cave national parks should be suspended because of "the great difficulties and expense" and because no effort was being made to control the disease in livestock on nearby ranches. Furthermore, the NIH doctors believed that even if brucellosis eradication were possible in those bison herds, it could be detrimental to them because "clean" herds would be more susceptible to an "explosive outbreak of brucellosis with an accompanying storm of abortions" if the disease were transmitted to the bison by elk or by livestock on the surrounding ranges.³⁵

The Park Service adopted this position but reinstated the embargo against live bison shipments from Yellowstone in 1951 because of concerns about

brucellosis. By then, Superintendent Rogers had approved a plan to reduce the Lamar herd to no more than 125 so that the bison could be kept in the Buffalo Ranch corrals during elk-trapping operations and would not get in the way as they had previously. The following January, 131 bison, both reactors and nonreactors, were killed at the Buffalo Ranch pens, and 111 bison that could not be baited into the corral were shot on the open range. Another 81 untested bison were kept in a corral until April 8; they dropped 15 calves before their release, none of which were viable.

In 1952 Montana began a more concerted effort to eliminate brucellosis from livestock in the state. In most cases brucellosis eradication has required slaughtering the entire herd in which an infected animal is found, or testing the entire herd and slaughtering those that are seropositive; the remaining animals are vaccinated, quarantined, and periodically retested until they pass the requisite quarantine period. Strain 19, the vaccine used until RB51 was approved for cattle in 1996, was considered only 67 percent effective in preventing infection and abortion in cattle and of uncertain effectiveness in bison.³⁶ The blood test used to determine if the animal was seropositive was even less reliable, especially since inoculation with strain 19 often caused animals to produce antibodies that made them seropositive on subsequent tests. That made it difficult to determine how much, if at all, the vaccine contributed to brucellosis eradication in a herd. With or without an effective vaccine, if the test-and-slaughter process is repeated in a confined herd over a long enough period, eventually all the *Brucella abortus* bacteria are eliminated, along with both infected and uninfected animals.

Participation in the livestock program was voluntary at first, and many livestock owners did not volunteer. As Park Service managers would in subsequent decades, the ranchers objected to the inaccuracy of the blood test and believed that the herd reductions were more detrimental than was brucellosis. The risk of people getting undulant fever from infected livestock had diminished because of pasteurization requirements for dairy products.

As Much Progress as Possible

In Yellowstone, officials still considered a parkwide test-and-slaughter program impossible. But several hundred bison were culled about every other year, and in 1953, after a group wandered across the park's east boundary into the Absarokas, three were legally shot by hunters for the first time in

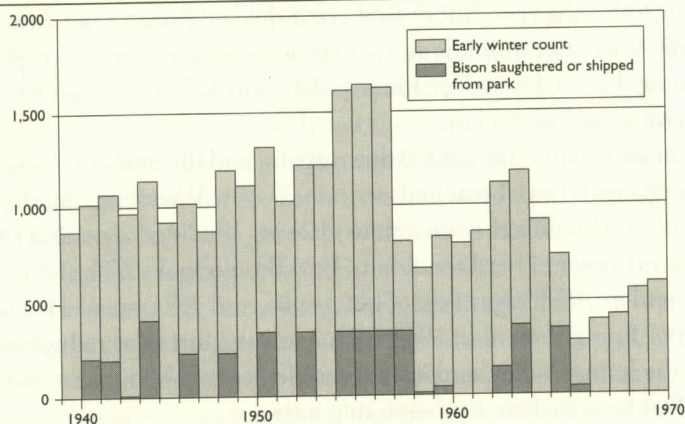
Montana since the 1880s. The park's bison count reached a record high of 1,477 the following year. But in 1956, on Edmund Rogers's last day of work as Yellowstone superintendent, he sent a memorandum to his superior confirming the need to reduce the population to 425 because of "the deteriorated condition" of the range.

The bison count was whittled down again, and the embargo against live bison shipments was breached on behalf of a Wyoming rancher who apparently had political connections. Having obtained a contract to trap bison for purposes of herd reduction, Bud Bosolo took 143 bison from the Lamar herd in 1962, regardless of test results, and 357 untested bison from the Mary Mountain herd in 1963.³⁷ That was the first herd reduction done outside the Lamar Valley, and it was possible because helicopters were used for the first time to drive the bison into a trap.

In July 1964, after the U.S. Department of Agriculture (USDA) "strongly recommended" that Yellowstone undertake "a major brucellosis control program," the National Park Service headquarters issued instructions calling for "the immediate development" of a program that would include testing all bison in the Mary Mountain herd and reducing the herd by removing reactors and suspects.³⁸ That did not happen. According to the "Long Range Wildlife and Habitat Management Plan" that Yellowstone superintendent John McLaughlin signed in October, the Lamar herd would be tested to the maximum extent possible with existing facilities, but there was no provision for trapping more bison if the number of reactors found fell short of the reduction quota; nonreactors would be killed instead, and no plans were made to test the Mary Mountain herd.

Yellowstone's shorter-term "Bison and Habitat Management Plan" for 1964–65 began with the cheerful notion "The least wildlife management necessary in national parks, the better the management, is an agreeable statement to most of us." However, the plan acknowledged that "it is necessary for us to make as much progress as possible each year toward a brucellosis-free bison herd," even though it would not be feasible to trap all of the bison in the park. Another change was the inclusion of the Pelican Valley herd in the program for the first time, with 94 bison to be removed "in accordance with long standing management goals" that allowed for 180 in that herd. A survey by the Soil Conservation Service had found that more than half of the Pelican Valley range was "in less than good condition" and that "present knowledge indicates that this deterioration resulted from excessive bison and elk use." However, because no trap had been constructed

Yellowstone bison population, 1940–1970



in Pelican Valley, the bison were to be shot without testing them first. The chief ranger notified his men that “this program will be difficult, and one undertaken in close cooperation with personnel of the Division of Animal Disease Eradication [USDA] and Mr. Ricks of the Quick Freeze Packing Plant of Livingston.”

Yellowstone had been conducting aerial bison censuses since 1949, and these were assumed to be more accurate than those previously done by rangers on skis, but what was counted from the air did not always match what was found on the ground. When the time came to reduce the Pelican herd to 180, the rangers could find no more than 175 bison. They shot 34 anyway. In the Lamar and Mary Mountain herds, 320 bison were removed (both reactors and nonreactors), leaving 388 bison counted in the park. Although the elk removals of the 1960s attracted far more attention because of the much larger number of animals killed and the concerns of hunters, the bison herd was much more drastically reduced.

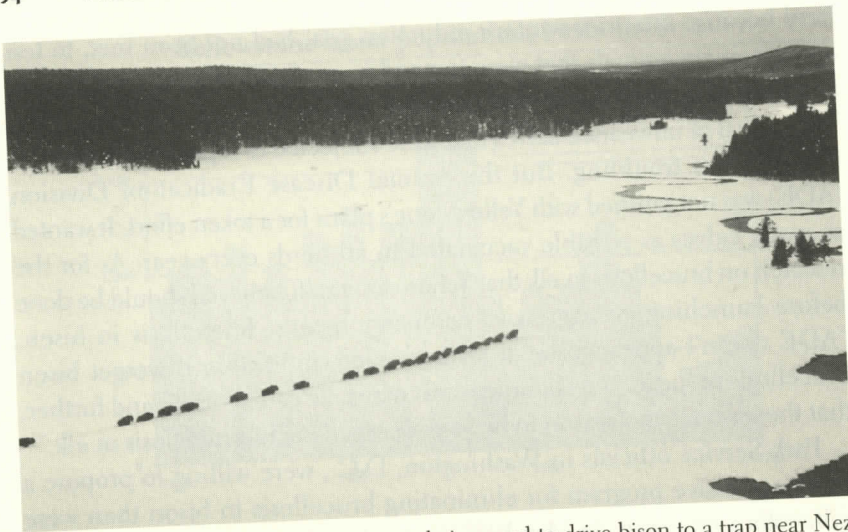
A Token Eradication Program

Whatever commitment the Yellowstone staff felt to “minimize” brucellosis in the park’s bison herds, it was weaker than the desire to reduce interference with the animals. At a staff meeting McLaughlin held in April 1965, the consensus favored “a token brucellosis eradication program” that was incidental to “habitat management” (i.e., overgrazing) concerns. The plan for the next winter was to remove 100 bison from the Mary Mountain

herd because the prior winter’s reduction goal had not been met, to test and vaccinate animals that were trapped in connection with the removal, and then to hold off for at least two years before trapping any more bison. The ordeal of unweaned calves that were subjected to repeated driving and trapping was troubling. But the Animal Disease Eradication Division (ADE) was not satisfied with Yellowstone’s plans for a token effort. It wanted as many calves as possible vaccinated in all herds every year. As for the research on brucellosis in elk that Yellowstone staff believed should be done before launching an aggressive campaign against brucellosis in bison, “ADE doesn’t appear to be at all interested, indicating if we get bison brucellosis reduced, the elk brucellosis may take care of itself, and further, that there’s really no reason to be so concerned about brucellosis in elk.”³⁹

Park Service officials in Washington, D.C., were willing to propose a more aggressive program for eliminating brucellosis in bison than were Yellowstone managers. In May 1965 the assistant director of the Park Service wrote to ADE officials to explain that “fulfillment of our primary responsibility for conserving all components of the natural ecosystem . . . should not be construed as a debasement of our responsibilities for attempting to achieve brucellosis-free bison herds.” Plans were drawn up to construct a trap and holding facilities in Pelican Valley so that testing could begin there. However, Yellowstone was excused from undertaking any immediate action in Pelican Valley by pleading lack of funds for both the construction and the staff needed to conduct a more intensive corralling effort.

The following winter, even an intensive corralling effort of the Mary Mountain herd failed to accomplish much, according to the park’s 1966 wildlife report, because “the usual concentration of animals” in the herd’s winter range did not show up. The usual concentration of bison may have no longer existed, or the bison that did exist may have found it prudent to winter elsewhere or were able to do so because of the mild winter; and the Mary Mountain bison that were on their customary range had an attitude that thwarted trapping operations. While some of the bison observed during the helicopter drives were described as “flighty,” the solitary bulls were often impossible to move at all, and the mixed groups sometimes escaped when the lead cows became experienced in turning back underneath the helicopter.⁴⁰ This learned behavior was reinforced in bison that tested seronegative because after they were released from the trap, they were subject to more helicopter herding along with the untested bison. As a result, only 50 were removed that winter, including 5 that died at the site



This photo was taken as a helicopter was being used to drive bison to a trap near Nez Perce Creek in 1966. Courtesy of Yellowstone National Park.

from injuries and 19 that were reactors or suspects. The other 73 nonreactors and untested bison were released, including 8 calves that were vaccinated.

This reduction left the park with a bison count of only 266, and a bison herding experience that provided further evidence of "the desirability of reducing harassment by conducting trapping operations only every two or three years or when winter conditions permit maximum trapping efficiency." Therefore, the wildlife management plan for 1966–67 explained, no bison trapping, testing, vaccinating, or removals were to be done that winter. And after the next winter count found 397 bison, none were done the following year either, and plans to build a trap in Pelican Valley remained on hold.

Other Infected Bison Herds

Managers of other bison herds had already made or were undertaking more aggressive efforts to eliminate brucellosis. The bison that the Crow Reservation had received from Yellowstone and the National Bison Range had grown to a herd of more than 700 by the late 1940s, and they were leaving their 14,000-acre range and mingling with cattle. When many of the harvested bison tested seropositive in 1953, pressure for brucellosis eradication increased. The U.S. Fish and Wildlife Service eventually determined that the only practical solution was to eliminate the herd. The range was

converted to a cattle operation, but the Crows started over in 1972 with 50 bison from Theodore Roosevelt National Park, and they now maintain the brucellosis-free herd at about 1,000 bison.

The 20 bison sent to the Jackson Hole Wildlife Park in 1948 were tested and vaccinated before they left Yellowstone, but reactors were found in 1963, when the group was next tested, and all 13 adults in the herd were killed. The nine calves and yearlings were vaccinated and soon joined by 12 bison from Theodore Roosevelt National Park. Grand Teton National Park, which had taken over the herd, agreed to a program to vaccinate all calves and test adults every three years, but it was suspended when the herd became free roaming in 1969. Evidence of brucellosis later appeared, and the herd remains infected.⁴¹

The 23 bison selected to start a free-roaming herd in Utah in the early 1940s were also tested and vaccinated before they left Yellowstone, but reactors were found when the next testing was done, on seven bison carcasses in 1961. The herd occupies a range of about 600 square miles in the Henry Mountains, most of which is administered by the Bureau of Land Management, but the bison are the responsibility of the Utah Division of Wildlife Resources. In the spring of 1963 they were able to vaccinate 12 yearlings in a herd of about 80 by using two airplanes to drive them to terrain where they could be shot with an immobilizing drug. Three of the yearlings died as a result of the procedure, but a corral was constructed, and the following fall, 69 bison were driven into it using two planes, a helicopter, and 10 men on horseback. Any "excited" bison were tranquilized, but five animals died from injuries received during capture, and five others apparently died from the testing or vaccination procedures or general stress.⁴² Fourteen calves were vaccinated and released along with the yearlings that had been vaccinated the previous spring. The 27 surviving adults were also released, but the 10 that were considered reactors or suspects were marked so that hunters would know which ones they could shoot. Additional testing of the blood samples found more bison that should have been marked as reactors, and 4 of the 11 marked bison were not shot until the Division of Wildlife Resources finally located them after the 1964 hunting season.⁴³

As a brucellosis eradication effort, the Henry Mountains program seemed to have been long on unintended casualties and short on results. No further vaccinations or live testing was done, but perhaps because the herd was relatively small and dispersed, the *Brucella abortus* apparently failed to

perpetuate itself. No further evidence of brucellosis has been found in tested carcasses. Today the herd is maintained at about 400 bison through hunting.

The Wichita Mountains National Wildlife Refuge began vaccinating bison in the 1940s, but bison and elk suspects were found during routine testing in the 1964 roundup. Over a period of years, all bison that could be captured were tested, all seropositive bison and those that could not be captured were killed, and the herd was reduced from 781 to 345. The herd has been considered brucellosis free since 1974 and is maintained at about 600 by auctioning live bison. Both Custer State Park, which then had more than 2,000 bison, and the adjacent Wind Cave National Monument, with 250 bison, began programs of testing, vaccination, and slaughter in 1963. Custer's herd has been designated brucellosis free since 1973, but Wind Cave did not achieve that status until 1985.⁴⁴

In Canada the bison shipped from Wainwright Buffalo Park to Wood Buffalo National Park in the 1920s brought both brucellosis and tuberculosis with them. The diseases were confirmed there in the 1950s, when the bison population numbered about 10,000. Until the 1980s, Wood Buffalo was considered remote from cattle grazing, and transmission to domestic livestock was not a major concern, but the health of the bison population itself was. Tuberculosis can be fatal to bison, and it makes the animal more vulnerable to other causes of death, such as winterkill and predation. In 1953 a scheme was worked out in which the Royal Canadian Air Force would conduct a search-and-destroy mission of all the bison so that they could be replaced with disease-free animals, but the plan was rejected as too extreme. Instead, a test-and-slaughter program was conducted until 1962, but according to government reports, the experiment did more to supply meat for northern communities than it did to eliminate disease from the herd, which remains infected.⁴⁵

An Infringement on the Sanctuary Idea

In Yellowstone the perceived overgrazing of the northern range remained more worrisome than was brucellosis in bison. From 1956 to 1962 an average of 1,774 elk were removed each year, most of them killed in the park, including animals that might otherwise have left the park for areas where they could have been shot by hunters.⁴⁶ Enraged local communities that depended on the business generated by sport hunting demanded changes

to the federal laws that prohibited hunting in Yellowstone. U.S. senator Gale McGee of Wyoming convened hearings in Bozeman, Montana, to consider the issue. Elk hunting was permitted in Grand Teton as part of the political compromise needed to establish the park, but the Park Service continued to oppose hunting in Yellowstone for a variety of reasons. It would be impossible for hunters to remove enough elk to meet the reduction goal; their pack animals would damage the range and disrupt other wildlife; and a large public hunt might cause elk to avoid humans in the park, so visitors would see fewer of the animals that now wandered in plain view.⁴⁷ Cahalane assured the Park Service director that "with a few selected marksmen, the necessary killing can be done with minimum disturbance and in the briefest time. Such conditions cannot be duplicated by inviting in the general run of hunters, many of whom can't distinguish between species and can't shoot accurately at their targets. . . . The official reduction by killing is an infringement on the sanctuary idea, but it is not as damaging and violent as public hunting."⁴⁸

A survey in 1961–62 showed continuing deterioration of the northern range, and the experts were certain it could support only half the estimated herd of 10,000 elk. Elk removals in the park peaked in 1962, when 4,309 were shot in the park, 310 were trapped and shipped live, and only 125 were killed outside the park by hunters.⁴⁹ This triggered an uproar in local communities and "letters from schoolchildren in faraway places," and the remaining elk produced a bumper calf crop the next spring.⁵⁰ Public doubt about the pronouncements of the range experts increased as elk reductions seemed to have no effect on the condition of the range, and statements made by the Park Service took on a more defensive tone:

The NPS does not plan to continue to sacrifice its capital, the soil, in a vain effort to save a few hundred elk for a winter or two so they can die of starvation. No responsible authority questions the poor condition of the northern range or the fact that more elk will ruin it. And, if in the final judgment of the years of study and experience the experts and the administrators should prove utterly wrong, natural reproduction on understocked range will restore any desired herd size in a relatively short period of time. True, aspen and other browse recovery is less than it should be, and much of the range is still overgrazed, but we know we are moving in the right direction in our management plan for range recovery.⁵¹

The controversy over elk reductions in Yellowstone and Rocky Mountain national parks prompted Secretary of the Interior Stewart Udall to appoint the Special Advisory Board on Wildlife Management in the National Parks in 1962. The committee of prominent scientists and conservationists was chaired by A. Starker Leopold, Aldo Leopold's son and a professor at the University of California at Berkeley. The 1963 Leopold Report, as it became known, affirmed the principle of carrying capacity as the calculation of how many animals a range could support, and the goal of restoring a "balance" between animal populations and their habitat. The committee also supported the use of direct reduction to limit elk populations and stated that removal programs at some parks had not been large enough; future removals would "have to be larger and in many cases repeated annually."⁵²

The Park Service worked with the U.S. Forest Service and the states of Montana and Wyoming to develop a long-range plan for the northern range that called for continuing to remove enough elk to maintain the herd at 5,000. It also advocated removing about 200 pronghorn and up to 45 bison from the northern range. To prevent elk slaughter in the park, the Wyoming Game and Fish Commission agreed to take the excess animals, even though the state did not want them, and 4,543 elk were trapped and moved outside the park over a four-year period. In 1965 Superintendent McLaughlin avoided what he called the "distasteful practice" of slaughtering animals in the park by trucking live elk and bison to a commercial slaughterhouse, a change that he regarded as "one of the highlights of this year's wildlife management program," with all of the hides, horns, and processed meat turned over to the Bureau of Indian Affairs for distribution to reservations.

The use of a commercial slaughterhouse is more sanitary for humans and makes it easier to put more of the carcasses to good use. But for some people, live shipment is not only distasteful but also hypocritical for wildlife managers, because killing wild animals on the land where they were born is surely more humane than subjecting them to confinement and a truck ride to the slaughterhouse. Nonetheless, McLaughlin hoped the new policy would reduce public criticism of the elk culling. Yellowstone wildlife biologist Bill Barmore wrote optimistically to a concerned citizen, "I think we have finally convinced the local public that an undesirable ungulate-habitat situation has existed in the Park a long time, that serious habitat damage has taken place, and that the situation must be corrected. . . . I think the forthright stand taken by the National Park Service on the basis of good factual information has impressed people." But Barmore thought

the "violent criticism" of "a local minority" had abated primarily because elk were no longer being killed in the park. "Fortunately, with newly developing techniques, we should not have to shoot large numbers of elk in the Park in the foreseeable future."

However, Yellowstone announced plans in February 1967 to immediately shoot 600 elk in the park because removals during the previous two winters had been insufficient. In the park's Annual Wildlife Report that year, Barmore attributed the resulting outcry in local communities to "widespread public misunderstanding of our elk program." But the fury over the loss of 600 elk expressed by residents of states where more than 100,000 game animals were harvested each year sprang from more than just a lack of good factual information or a passion about hunting; it indicated a resentment of Park Service dictates. Wyoming governor Stanley Hathaway insisted that the elk be trapped instead of shot, and Senator McGee held a hearing in Casper on March 11. The Park Service announced that it had stopped killing elk in Yellowstone as of that day. Hathaway asked for 1,000 elk to be relocated to Wyoming ranges, but after about half that number had been shipped, ranchers who did not want the elk consuming their hay persuaded the governor to rescind his demand.⁵³

The Park Service did not promise that elk culling was over forever, but no elk have been killed in Yellowstone for the purpose of limiting herd size since then. If negative publicity were the only reason for this policy shift, Yellowstone managers could have resumed the bison culling that was suspended in 1966 because of operational difficulties. The bison program was far smaller and less conspicuous and controversial than the elk reductions. The bison were not of interest to hunters, and pressure was mounting to do something about brucellosis in the bison. But Yellowstone's 1964 "Long Range Wildlife and Habitat Management Plan" turned out to be short-lived, and 30 years passed before the next Yellowstone bison was killed because it tested positive for exposure to brucellosis. Park managers had reasons besides public opinion for changing the elk management policy, reasons that also applied to bison.