WHERE BISON ONCE ROAMED

The Impacts of Cattle and Sheep on Native Herbivores

Bill Willers

Livestock grazing seriously impacts wild ungulates such as elk, bighorn sheep, and pronghorn through forage competition, disease transmission, social displacement, habitat degradation, and plant community alteration. On the majority of public lands, more forage is allotted to livestock than to native large herbivores. Whereas native species are an integral part of the ecosystems in which they have evolved, alien, domestic animals represent a denial and violation of ecological integrity.

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Consider Yellowstone, not simply a region harboring the crown jewel of America's parks but, for many, a standard for their very idea of wilderness—such a treasure as to have captured the imagination of millions of people around the world who may never hope to see it. Now consider the fact that in the Yellowstone ecosystem as a whole, the ratio of domestic livestock to all wild ungulates combined (elk, moose, mule deer, white-tailed deer, pronghorn, bighorn sheep, mountain goat, and bison) is greater than 2:1. For every wild hoofed mammal there are two domestic ones.[1]

Particularly startling is the ratio of domestic sheep to wild bighorn sheep, which succumbed in huge numbers from diseases and parasites introduced through domestic herds. In the Yellowstone ecosystem, the most optimistic figure for bighorns is 7,800, compared with more than 265,000 domestic sheep grazed there, a ratio of 1:34.

Actually, the Yellowstone ecosystem (the national park and surrounding lands—an area of some 16 million acres), beautiful and beloved as it is, and 76 percent of which is federal land, is managed with a great deal more care and attention to natural conditions than is the rest of the public domain. Not far to the east, for example, in the Bighorn Mountains, the creatures for which the range was named are gone, save perhaps for a few introduced individuals, some with identifying collars hanging about their necks. In their place are grazed some 52,500 of the sheep industry's stock. On warm summer days in the Bighorns, a visitor might experience surprise at seeing what at first appear in the distance to be banks of snow, only to have them be revealed as densely packed herds of domestic sheep.

Negative consequences as a result of livestock grazing, past and present, have been reported for "virtually all wild ungulates."[2] Joseph Townsend and Robert Smith minced no words: "Livestock grazing is the single most important factor limiting wildlife production in the West. It has been and continues to be administered without adequate consideration for wildlife, especially on federally owned lands."[3] Likewise, Frederic Wagner called livestock "the most ubiquitous influence for change in the West."[4]

Domestic sheep. On many public lands, if not most, livestock far outnumber the large native grazers, such as elk, deer, and bighorn sheep.

The lush, heavily vegetated riparian areas adjacent to watercourses are of great biological richness, so the destructive impacts on them by cattle are particularly important in the arid West, where riparian areas constitute but 1 percent of federal rangelands. According to a 1990 publication by the Environmental Protection Agency, "Extensive field observations in the late 1980s suggest riparian areas throughout much of the West were in the worst condition in history."[5] Moreover, a study done by the General Accounting Office for the House Committee on Interior and Insular Affairs concluded that degradation of riparian areas on public lands is "largely a result of poorly managed livestock grazing [because] livestock tend to congregate in the riparian areas for extended periods, eat most of the vegetation, and trample the stream banks."[6]

The common argument that cattle are the ecological equivalents of bison is erroneous. Bison, being wanderers, are less likely to regraze a given site in a single season than are cattle. Bison can use drier, rougher forage than cattle and can forage more effectively in deep snow. And whereas cattle are well known for their ability to lay waste to riparian areas, bison typically go to water only once a day.[7]

Some of the comparisons of bison with cattle are done from a strictly managerial perspective—that is, how specific traits can "be more effectively exploited in land management."[8] But Glenn Plumb and Jerrold Dodd, who studied bison and cattle in a fenced "natural area," did admit that "bison reflect a greater degree of evolutionary context to a grassland natural area [and that] differences between the influence of free-roaming bison on pristine grasslands and semi-free-roaming bison on a fenced natural area must be much greater than those of the latter and domestic cattle." This admission is not only a concession to the importance of scale but also an invitation to question the use of "natural" in their fenced "natural areas." Others also have alluded to issues of scale and freedom of movement when they acknowledged that the change from "nomadic bison to resident cattle herds" coincided with subdivision of the land into fenced areas with managed watering and feeding situations, thus altering the spatial and temporal patterns of grazing and its impacts on vegetation.[9]

Wild, grazing herbivores in expansive, unfenced grazing ecosystems tend not to remain stationary, migrating instead toward optimal grazing conditions. Defoliation caused by native grazers passing through an area removes older plant tissues and promotes the growth of new shoots—a coevolved situation allowing for rapid recovery of habitat. Fenced lands and management for maximum yields of sedentary domestic livestock inhibit such recovery. Confining native grazers in such fenced-in situations has a similar effect.[10]

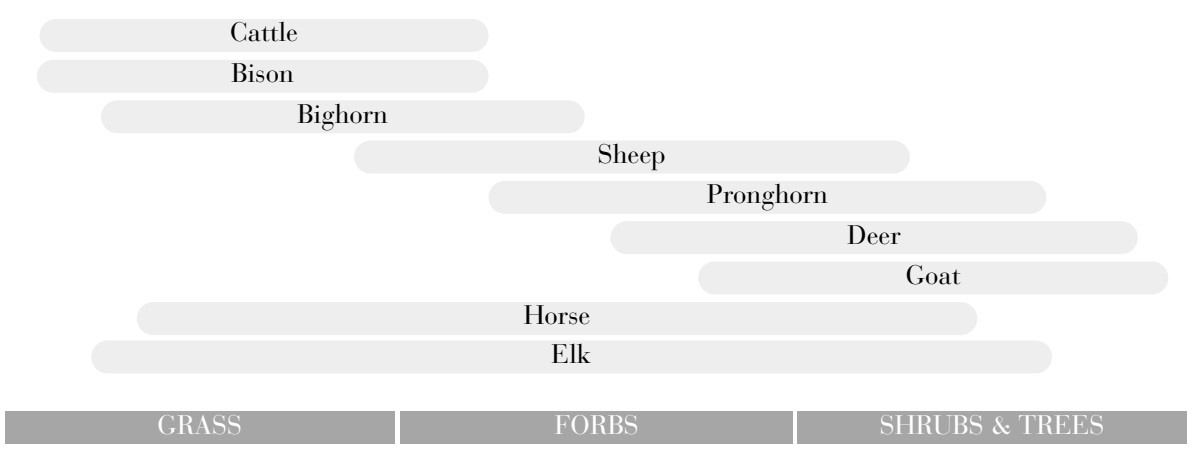
Andrew Isenberg, reporting on the history of bison, which were ultimately confined to a series of small sanctuaries, writes that "the creation of refuges both limited the ability of bison to seek new grasses and cemented the fragmentation of the bison population." He went on to comment about the genetic ramifications of this on the creature: "The fragmentation of the herds had a deleterious impact on the genetic diversity of the bison. All bison in North America are descended from the roughly five hundred survivors of the commercial slaughter of the nineteenth century, a so-called 'bottleneck' in the transfer of genes."[11]

Vegetational changes wrought by livestock may have a profound effect on wild species. For example, where cattle graze on grasslands so heavily that there is conversion to shrubland, they reduce the suitability of the land for grazing competitors such as bison and bighorn. In his 1978 essay, Frederic Wagner reported specific accounts of cattle-bighorn, cattle-elk, and domestic sheep-pronghorn competition.[12]

Impacts on vegetation may be purely mechanical. Where cattle are grazed, most of the vegetation loss may be due to "trampling effects."[13] Loss of shrubs and grass amounts to a loss of cover for deer and antelope fawns and elk calves, and a coinciding increase in their vulnerability to predation and weather.

Animals that feed on grasses and forbs (broad-leaved, nonwoody plants, such as wildflowers) are referred to as "grazers," whereas those tending toward shrubs and trees are called "browsers." These are broad generalizations, because a given species may have a wide preference range that would place it in both categories. A lack of preferred vegetation may also drive creatures to

Figure 1. Feeding Niches of Wild Ungulates and Domestic Herbivores, and Potential Competition Among Them



Source: Redrawn from F. Wagner, "Livestock Grazing and the Livestock Industry," in *Wildlife and America: Contributions to an Understanding of American Wildlife and its Conservation*, edited by H. P. Brokaw (Washington, D.C.: Council of Environmental Quality, 1978).

feed on plants they would normally pass up, thereby placing them in competition with species they wouldn't compete with under more typical conditions. In addition, feeding patterns may vary with season or with geographic location. Northern bighorns, for example, are primarily grazers, whereas desert bighorns tend to browse. Nevertheless, the norms for various species may be compared to allow for a general estimate of the potential for competition between and among species (see Figure 1).

Wild ungulates, having coevolved with native vegetation, tend to have more narrowly defined food preferences and more fixed feeding patterns than do domestic animals, in which selective breeding has apparently conferred an ability to shift diets with less stress: "As vegetation composition is altered through grazing, wild species may be affected detrimentally by slight or subtle changes while the range may still be in quite favorable condition for domestic animals."[14] Even if livestock use certain plants only in limited amounts, the impact may be magnified to the extent that those plants are specifically preferred by wild species.[15]

Livestock may have "psychological" effects on wild species. There are reports of avoidance by moose, deer, and elk of areas used by domestic stock. Such effects are in addition to any "operational impacts" that exist in the form of roads, fencing, brush control, pesticides, and disease transmission that come along with the livestock industry. One study found that 13 percent of deer mortalities being reported were due to "fence kills."[16]

The graph that appeared in Frederic Wagner's 1978 essay (see Figure 2), and which is still being widely reproduced and distributed, is an estimate of the shift from wild to domestic animals in the rangelands of the eleven western states since the middle of the nineteenth century. The unit used is an "animal unit month" (AUM), the amount of forage consumed in a month by a cow and her calf. The graph therefore shows the relative amounts of forage removed rather than sheer numbers of animals, but it does amount to a concise estimate of what we have lost in terms of wildlife on western lands managed for an industry now yielding less than 3 percent of the beef produced by the nation. Wagner estimated that between 1890 and 1940, the number of livestock on western ranges may have been close to twice the values for wild ungulates prior to European-American settlement. Livestock grazing pressure may have been half again as high as that exerted by wild ungulates.[17]

Another way of estimating impacts of domestic livestock on native creatures may be seen in governmental tables expressing "forage ratios." Although they are approximations that may vary one way or another, depending on a host of variables (such as quality of forage, variations in daily intake, species preferences, condition of animals, and the like), they give insight into the cost of the

Table 1. AUM Equivalents Based on 650 Pounds of Forage per Month (USDA)

Domestic cow with calf	1.00
Domestic bull	1.25
Horse	1.25
White-tailed deer	0.15
Mule deer	0.20
Pronghorn	0.20
Bison	1.25
Bighorn sheep	0.20

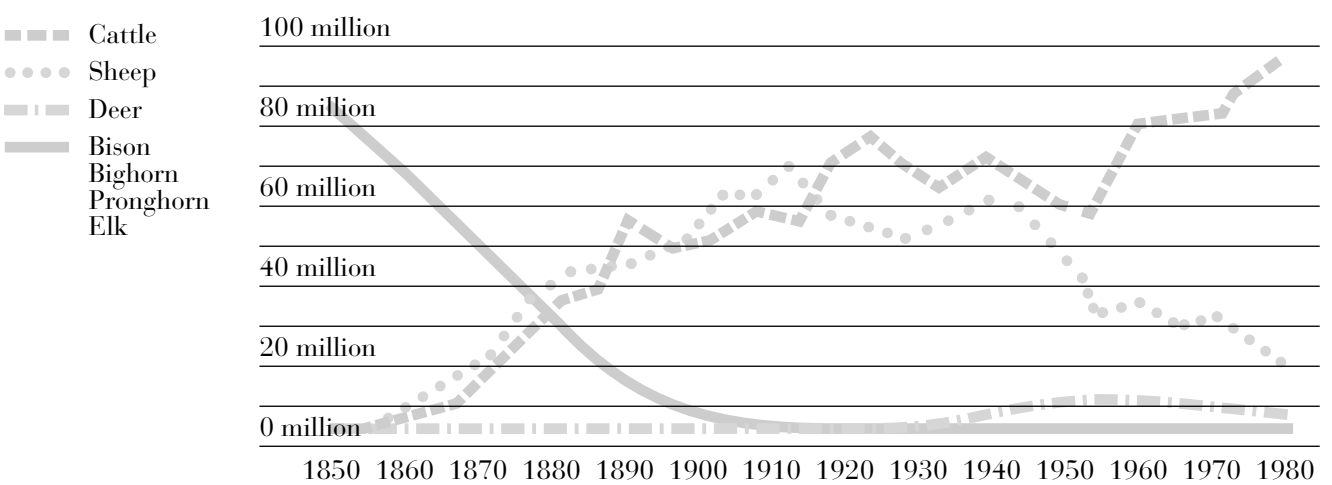
Source: U.S. Department of Agriculture, *National Range Handbook*, 1976.

Table 2. Wild Species Equivalents to 1 Cow-plus-Calf AUM (Wyoming)

Bighorn sheep	6.9
Pronghorn	10.8
Mule deer	7.8
Elk	2.1
Moose	1.2

Source: Wyoming Game and Fish Department, internal data, 1998.

Figure 2. Conjectured AUMs of Wild and Domestic Grazing Pressures on Rangelands of the Eleven Western States



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livestock industry in terms of wildlife lost. The amounts of forage required by native game animals may be expressed as fractions of AUMs (as in the U.S. Department of Agriculture guide in Table 1) or simply in cow-game ratios (as in the State of Wyoming guide in Table 2).

There is lack of uniformity in these estimates. For example, an AUM is listed as the equivalent of 5 mule deer in the federal table (a mule deer is 0.20 AUM), but as 7.8 mule deer in the Wyoming table. Likewise, the federal table estimates an AUM to be the equivalent of 5 bighorns, as opposed to 6.9 bighorns in the Wyoming table. Through it all, though, there emerges a powerful message: the cost in lost wildlife from management of the nation's public lands for livestock is immense. And the fact that some 70 percent of the land area of the eleven western states is subject to grazing at least on a seasonal basis makes the public lands all the more valuable as safe havens for wild native species.

America's public lands, though, are managed primarily for the livestock industry. Big wild mammals there have become outnumbered or replaced by domestic beasts that are foreign to the landscape, unsuited to it, destructive of its habitats, but nevertheless maintained for the economic benefit of a small but vocal and politically powerful minority of individuals who believe that the country has an obligation to maintain their "way of life."

It is one of the great ironies of life in America that the 30,000 or so wealthy ranchers who wax fat at public expense detest "big government" as they do, for it's hard to imagine a group that receives more support from the rest of the nation's tax-paying citizens—this handed to them by the federal government. Looking at it another way, and since the population of the country is now at about 270 million, one can say that, on average, 9,000 American citizens pay to support each livestock baron operating on public lands. Ironic also is the fact that so many of these welfare recipients see themselves as paragons of rugged independence.

Biologically, it is significant that public lands are now managed for creatures not only alien to the environment but also selectively bred according to human values and whims. Paul Shepard, who wrote extensively on the subject of domestication, had this to say:

> "To domesticate" means to change genetically. . . . Man substitutes controlled breeding for natural selection; animals are selected for special traits like milk production or passivity, at the expense of overall fitness and nature-wide relationships. . . . The animals become crude pawns in the farmer's breeding game, shorn of finesse and the exquisite detail so characteristic of wild forms. The animal departs from the hard-won species type. For man the animal ceases to be an adequate representation of a natural life form. Its debased behavior and appearance mislead us and miseducate us in fundamental perceptions of the rhythms of continuity and discontinuity, and of the specific patterns of the multiplicity of nature. . . . Civilization . . . has loosed a horde of "goofies."[18]

The issue of domesticity, as it pertains to the public lands of the West, is not trivial. It is a recognition of the fact that native animals, having been forged over countless generations as wild creatures, have evolved as integral parts of their environments. This goes to the very heart of biological integrity.

The failure to see native creatures as integral parts of larger entities—the ecosystems of which they are a part—has been our overriding problem all along. The reductionist worldview, having permeated all aspects of our culture, allowed for the reduction of western landscapes into parts that have never been allowed to come together again. We have failed to look at the larger systems as entities to be regarded, respected, and maintained.

If unmolested in the Intermountain West, "bison, elk, deer, antelope, mountain goats, bighorn, javelina, wolves, bear, and jaguar [would have] proliferated . . . on a scale unimaginable in terms of historical observations."[19] Moreover, "a drastic reduction in livestock numbers on western ranges and a return to large wildlife populations would be the most conservative [option] ecologically."[20] If citizens will work for removal of livestock and the return of native animals to a land that belongs to all citizens and to the descendants to whom they will bequeath it, they can become part of the move toward the reality. This is no pipe dream; it is very much in the realm of possibility. Those magnificent creatures know how to mate and to raise their young in the lands in which they are true natives. Give them the space and the habitat they require, and they will do the rest.

Livestock, ranchers say, benefit wildlife. If a mob of strangers tromped into your house, ate all your food; busted up your walls, windows, and furniture; and camped out in your living room, would you deem this of benefit to you?