



No Way Home

The Decline of the
World's Great Animal Migrations



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with Illustrations by Louise Zemaitis

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CHAPTER 4

Where the Buffalo Roamed

BY MID-APRIL, winter has released its grip on northeastern Colorado, and the Pawnee National Grassland is no longer a lifeless stretch of snow, mud, and dead grass. To the contrary, the place is fresh and green, and the newly arrived birds are engaged in a frenzy of courtship and homesteading. In this flat, treeless environment, male birds face a dilemma: how do they make their presence known to one another and to the females as they go about the business of setting up territories and attracting mates? For the grassland sparrows—the chestnut-collared longspurs, McCown's longspurs, and lark buntings—the answer is to take to the air. The males shoot up into the sky like little champagne corks, singing vigorously as they

climb. At the apex of their flights, they flair their wings and rock back and forth, thereby slowing their descent as they parachute back to earth, singing all the while. Leaning against my car, I look around and see a dozen or more of these little birds popping into the air. This place is magical.

If spring is a time of rebirth for North America's prairies, it is doubly so in this region. The Pawnee National Grassland was stitched together in the wake of the Dust Bowl of the 1930s, when the federal government bought the land from bankrupt farmers. The farmers had intended to break the sod, convert the native grasses to wheat, and then harvest the wheat for a profit—all of which they did, for a while, until drought, overzealous planting, and a stock-market crash turned their dreams into dust. Since that time, wildlife has reclaimed much of the land, as my April visit made clear to me.

Yet despite the abundance of birds, insects, and plants in the springtime prairie, I knew that something was missing. And had I been a better naturalist, I might have noticed the evidence of that loss as I wandered around northeastern Colorado: shallow depressions scattered across the plains. These are thought by some biologists to be old bison wallows, places where itchy bison used to roll around in the dirt, enjoying the bovine equivalent of a good scratch. Even today, well over a century after the last bison awkwardly lay down and kicked up a cloud of dust, the wallows persist, although now overgrown with grass—ghostly remnants of the great herds that once filled the prairies.¹

Despite all that has been written about the loss of the American bison, it remains a poorly understood event. An ecologist might even say it is a story with an ending but no beginning because we know so much more about the demise of the bison—the slaughter of the herds and the efforts to save the last few individuals—than we do about the species in its heyday. How many bison were there before the slaughter began? Where did they go?

What did they do? Questions like these will always be shrouded in mystery, partly because the destruction of the herds happened so quickly and partly because there were no scientists around to study the animals when they were abundant. The best we can do is to piece together the fragmentary accounts of the early explorers and combine them with contemporary studies of remnant bison herds to build a portrait of the presettlement situation.

This we know: prior to the American Revolution, bison occurred over most of North America, from New York State south to Georgia and Mexico, west to the Rocky Mountains (perhaps even to Nevada), and north to Canada's Northwest Territories and Alaska. Their center of abundance, however, was in the grasslands of the midcontinent. Ecologists traditionally divide this region into three sections, distinguished by the height and species composition of the vegetation. The eastern section, stretching from southern Manitoba to southern Texas and from Kentucky to Nebraska, is the tallgrass prairie, which once covered about 148 million acres. To the west, the tallgrass prairie merges into the mixed prairie, a band of drier, shorter grassland that extends from Alberta through the center of the Dakotas, Nebraska, Kansas, and Oklahoma to central Texas. The mixed prairie, in turn, merges into the even drier, even shorter shortgrass prairie, which extends along a north-south axis from the western Dakotas to northern Texas and westward to the Rockies. Prior to human disruption, the combined mixed-grass and shortgrass prairie covered over 400 million acres.

Bison were most abundant in the mixed and shortgrass prairies. Here they gathered in large herds during the summer, when a combination of warm weather, sunlight, and rain created a productive pasture. During the winter months, when the grasslands were covered in snow, the bison generally split into smaller groups and sought shelter and forage in wooded draws and riparian forests.² The animals were migratory in two contexts. First, they moved from wooded areas onto the grasslands with the advent of

warm weather. Second, once the herds formed, they moved across the grasslands over the course of the spring, summer, and fall as they depleted the forage in a given area. How far they roamed during their migrations is, unfortunately, a mystery. Naturalist Ernest Thompson Seton, writing in 1909, concluded that the herds migrated "from 300 to 400 miles in spring, and as far southward again in autumn, but that the regularity of this movement was often much obscured by temporary changes of direction to meet changes of weather, to visit well-known pastures, to seek good crossings of rivers or mountains, or to avoid hostile camps and places of evil memories."³ He may well have been right, but he provided little hard evidence in support of this statement.

Nor do we know precisely how many bison lived in the central grasslands prior to the arrival of white settlers. Early explorers were awestruck by the numbers they encountered. They describe a sea of bison moving across the plains at certain times of the year, riverboats blocked by immense herds crossing the water, and locomotives derailed by belligerent bulls. By one estimate, a single herd sighted in the vicinity of the Arkansas River may have contained more than four million animals. Fascinated by this question, Seton used a variety of approaches to estimate the original abundance of bison: he divided the area of the continent by the acreage necessary to support a single bison (allowing for different densities of bison in different habitats); he extrapolated the number of bison from the number of horses, cows, and sheep that ranchers were able to keep on the land after the bison had been eradicated; and he used the estimate of four million bison along the Arkansas River as the basis for an overall density estimate for the continent.⁴ In the end he concluded that somewhere between 50 and 75 million bison once occupied North America, with the vast majority (up to 70 million) occurring in the central plains.

More recently, some scientists have challenged the accuracy of Seton's estimate, arguing that he grossly overestimated the carrying

capacity of the range. Yet even these critics concede that millions, perhaps even tens of millions, of bison once roamed the central plains. Even at those lower numbers, it would have constituted the greatest aggregation of large mammals on earth.

Nor were bison the only large mammals on the prairies. The number of pronghorn probably rivaled the number of bison. Large numbers of elk also inhabited the grasslands. And topping all these species in sheer abundance, including the bison, were the prairie dogs. Four species of prairie dogs occur in North America: black-tailed, white-tailed, Gunnison, and Utah. Of these, the black-tailed prairie dog was by far the most numerous, occupying much of the central plains from Canada to Mexico. At an average density of four to twenty-two prairie dogs per acre, the total blacktail population must have numbered in the hundreds of millions, if not billions.⁵

Although one might not expect bison, pronghorn, and prairie dogs to have much to do with one another, given how different they are, the three species have a surprisingly complex relationship, somewhat analogous to the relationship between zebras, wildebeest, and Thomson's gazelles in the Serengeti.⁶ Prairie dogs constantly manipulate the soil and vegetation around their burrows, pushing up mounds of dirt and clipping and eating the grass surrounding their towns. Because of these activities, other types of plants, chiefly forbs and shrubs, are able to gain a foothold around the dog towns, much to the delight of the pronghorn, which prefer forbs to grasses and consequently spend a great deal of time browsing on forbs near the centers of dog towns.⁷

Along the edges of their colonies, prairie dogs clip the tall grass to prevent predators from sneaking up on them undetected. By doing so, they promote the growth of tender, young grass shoots, which in turn attract bison. In one study in South Dakota, biologists found that bison spent approximately 40 percent of their time on prairie dog towns, especially along the edges, even though dog towns made up only 12 percent of the landscape. The presence of

the grazing bison probably redounds to the benefit of the prairie dogs as well, if the bison help to keep the grass around the dog towns short (for predator avoidance) and nutritious. In this manner, the grazing mammals create a mosaic of habitats (defined by the height and species composition of the vegetation) based on where they go and what they eat.

Fire, too, contributes to the diversity of habitats within prairies by removing most of the aboveground vegetation and promoting a flush of new growth. Although ecologists have long recognized the critical role of fire in maintaining prairie ecosystems, they are less certain about where, when, and how such fires occurred.⁸ Part of the problem is that grasslands, unlike forests, retain no lasting evidence of a fire. In the case of forests, ecologists can use the scars left on tree rings to determine the frequency of wildfires; no such evidence persists in grasslands. Moreover, American Indians set fire to the grasslands for thousands of years prior to the arrival of white settlers, and there is no easy way to separate their fires from those caused by lightning. All that said, ecologists are in general agreement that fires were a frequent event in the central grasslands. Fire return intervals may have been as short as two to five years in the tallgrass prairies and every four to five years in the mixed-grass prairies.

Thus, even though the Serengeti and central grasslands of North America are a world apart and have almost no species in common, they operate under somewhat similar rules: a combination of fire and grazing creates a diversity of habitats within the grasslands. This habitat mosaic, in turn, enables the different species to find the food, shelter, and other elements they need to survive. In both cases, the movements of the large grazers are dictated by the availability of forage, which, in turn, is related to seasonal patterns of precipitation.

There are, however, some important differences between the two systems. The Serengeti represents a grazing succession. Zebras and wildebeest generally move ahead of gazelles; grazing of the

taller, ranker vegetation by zebras and wildebeest prompts the growth of the younger, more nutritious forage the gazelles require. In the case of North America, bison, pronghorn, and prairie dogs occur contemporaneously, each species taking advantage of the habitats the others have created or maintained. There is no evidence of a grazing succession in North America's grasslands akin to what is seen in Africa. However, we ought to be somewhat cautious about drawing conclusions about the Great Plains, given how little we know about this region in its undisturbed state. It is certainly possible, for example, that long before settlers decimated the bison, large numbers of pronghorn or elk followed the great bison herds in order to take advantage of the younger, more nutritious grass and forbs that would have sprouted after the bison had consumed the taller, ranker vegetation.⁹

Whether in Africa or North America, the presence of so many tasty herbivores inevitably attracts predators. In the case of North America's grasslands, the dominant nonhuman predators for the past eight thousand to ten thousand years have been gray wolves and grizzly bears. If today we tend to think of these animals as inhabitants of rugged mountains and remote forests, it is because white settlers quickly exterminated them from all but the most remote areas. But to explorers and settlers at the start of the nineteenth century, grizzlies were a familiar and frightening sight in the foothills and river valleys of the Rocky Mountains, and wolves were often encountered on the open plains.

For Indians living along the fringes of the central plains, bison were an important source of food. However, the evolution of Indian cultures wholly dedicated to hunting bison did not evolve until the eighteenth century. Prior to that time, the migratory behavior of the bison meant the tribes could not depend on them for food throughout the year. The missing ingredient was the horse, which allowed hunters to track the migratory herds. Wild horses disappeared from the New World at the end of the Ice Age and did not

appear until European explorers brought them over in the late fifteenth and early sixteenth centuries. As Spanish colonists occupied the large plateaus of northern Mexico in the late sixteenth century, they began to let their cattle roam the open range. Managing these dispersed herds required lots of horses. By the early seventeenth century, Spanish stockmen had crossed the Rio Grande and were running large herds of cattle and horses in New Mexico, usually with Indian assistance. Eventually, some of these Indians broke away from the Spaniards and rejoined the tribes, bringing with them some horses. In this way, the horse culture spread through the Great Plains, reaching all the tribes between 1650 and 1770.¹⁰

Equipped with a new mode of transportation, the tribes could now follow the bison herds year-round. As a result, a number of tribes converged on more or less the same lifestyle, adjusting their social organization to match the rhythm of the bison—rejecting permanent settlements in favor of mobility, forming large hunting parties in the summer, when herds of bison were gathered on the shortgrass plains, then breaking into smaller, more dispersed hunting groups during the winter months, when the bison herds tended to fracture into smaller groups and seek shelter in riparian areas and wooded draws.¹¹ The bison-dependent tribes limited their possessions to what they could carry, and they traded extensively with the sedentary tribes for food items and other goods they could not obtain from hunting. In short, they became as migratory as the bison themselves.

Many tens of thousands of people—primarily Arapahos, Assiniboines, Atsinas, Blackfeet, Cheyennes, Comanches, Crows, Kiowas, and Sioux—adopted this lifestyle, moving deep into the plains in pursuit of bison. Thousands more were opportunistic bison hunters, taking the animals when the herds were in the vicinity of their settlements but not pursuing them year-round.

The question naturally arises, were these tribes hunting bison at a sustainable rate? Without better data on the population sizes of the tribes, the number, age, and sex of the bison they harvested, and the birth and death rates of bison themselves, it is impossible to know. In 1859, one observer estimated that the bison-dependent tribes were taking approximately 450,000 bison per year for their own consumption and for intertribal trade.¹² Depending on how many bison inhabited the plains (a big unknown), such a harvest could have amounted to anywhere from less than 1 percent to approximately 5 percent of the total plains bison population each year. Neither percentage seems particularly high, but without knowing how many bison were perishing due to other causes, such as wolves and blizzards, we cannot place these values in any sort of context.

Whether sustainable or not, the bison-dependent societies were a short-lived phenomenon. With the arrival of white hunters and increased commerce between whites and Indians, bison hunting quickly became bison slaughter. In less than a century, the most abundant large mammal in the world would be brought to the brink of extinction. The destruction of the bison grew out of several factors: a seemingly insatiable desire for their hides; the desire of white settlers to settle the Great Plains; and a belief that if the bison could be eliminated, the Indians could be destroyed or, at the very least, “civilized,” which meant putting an end to their nomadic lifestyles and getting them onto reservations.¹³

During the first third of the nineteenth century, the market for bison skins (“robes”) grew steadily, probably because other fur bearers, such as beavers, were already suffering from overexploitation. By the 1850s, however, trade in bison robes was already on the downslide, reflecting the overexploitation of the herds. Yet before the robe trade could fade away, the rapid industrial growth in the United States in the 1870s and early 1880s created a new and

different market for bison products, this time for their leather, which was used to make belts for industrial machinery.

Factories had been using cowhide for that purpose, but the demand for leather outstripped the domestic supply, forcing manufacturers to import cowhides from Latin America. The continuing demand for leather, coupled with the high cost of importing it, made the bison herds in the West a tempting source. Once a few kinks in the treatment process were worked out, industrialists discovered they could turn bison hides into top-quality industrial leather. Add to this the invention of more accurate and powerful guns plus a growing railroad network across the Great Plains that made shipping easier, and the end of the bison was all but inevitable. As historian Andrew Isenberg has noted, "The hunting of the bison in the 1870s and early 1880s was unquestionably the work of an industrialized society. The western plains became a remote extension of the global industrial economy and an object of its demand for natural resources."¹⁴

At the same time that bison were being shot to extinction for their hides, they were also coming under fire from ranchers, who believed—justifiably—that the herds would compete with livestock for forage. Still other settlers and government officials felt that eliminating the bison would force the remaining plains Indians to give up their traditional lifestyles and settle on the reservations. Even Columbus Delano, secretary of the interior from 1870 to 1875 and the man nominally charged with safeguarding the nation's wildlife, seemed to welcome the end of the bison, noting that he "would not seriously regret the total disappearance of the buffalo from our western prairies, in its effect on the Indians, regarding it rather as a means of hastening their sense of dependence upon the products of the soil and their own labors."¹⁵

By the early 1880s, the bison stood on the brink of extinction, reduced to a handful of small herds scattered across the American and Canadian plains. A young Theodore Roosevelt, living on a

ranch in North Dakota in the wake of the slaughter, noted, "No sight is more common on the plains than that of a bleached buffalo skull; and their countless numbers attest the abundance of the animal at a time not so very long past . . . A ranchman who at the same time had made a journey of a thousand miles across northern Montana, along the Milk River, told me that, to use his expression, during the whole distance he was never out of sight of a dead buffalo, and never in sight of a live one."¹⁶

So great had been the carnage that, for a brief period, a thriving industry developed based on gathering bison bones from the grasslands and grinding them up for fertilizer and bone black (a pigment). It took one hundred skeletons to produce a ton of bones, which fetched \$4 to \$12 in the market. Thousands of tons were shipped to factories annually for a few years. Ironically, many of the people employed to gather the bones were Indians. In essence, they were being paid to harvest the remains of their culture.

If the secretary of the interior seemed unconcerned about the impending extinction of the American bison, others were horrified at the prospect. The close of the nineteenth century was a time of wholesale slaughter not just of bison but of much of American wildlife. From coast to coast, mammals and birds of all shapes and sizes were being killed in unprecedented numbers for personal consumption and commercial sale. Passenger pigeons and Carolina parakeets had all but disappeared; sea otters and northern elephant seals were nearly gone as well; and numerous waterfowl, shorebirds, and wading birds were much reduced in numbers. Add to these developments the loss of the bison, arguably the preeminent symbol of the American frontier, and the stage was set for a backlash against the carnage. A movement to save America's beleaguered wildlife began to emerge, led by members of the eastern aristocracy. In 1887, for example, Theodore Roosevelt founded the Boone and Crockett Club as an association of sportsmen dedicated to preserving America's dwindling populations of big game. The

National Association of Audubon Societies, progenitor of today's National Audubon Society, was established in 1902 to protect the nation's birdlife. People, in short, were coming to the realization that North America was no longer a limitless frontier with endless supplies of wildlife. Both the animals and their habitats needed protection.

Here and there, small bands of bison were gathered up and protected on private ranches and preserves. (The motives of some of these ranchers were suspect, to say the least; they maintained small herds of bison in order to sell the rights to shoot them to unscrupulous, wealthy hunters.¹⁷) A few zoos began breeding the animals as well. Only one free-roaming herd remained in the United States, in Yellowstone National Park, and it continued to decline due to poachers until the federal government finally stepped up protection of the park and its wildlife. In Canada, a few wild bison survived in remote parts of Alberta and the Northwest Territories.

FROM THESE REMNANTS, something of a bison renaissance has come about over the course of the past century. Today, a half million or more bison occur in North America, and the future of the species seems secure. But numbers alone can be deceptive. According to a 2002 survey, approximately 96 percent of extant bison are being raised for commercial purposes.¹⁸ Bison meat, which has markedly less cholesterol than beef, has become an increasingly popular choice of health-conscious Americans, and this, more than anything else, explains the growth in North America's bison population. Thus, the vast majority of today's bison are ranched bison, and the ranchers who manage the herds tend to select for docile, fat animals. They are, in effect, domesticating the American bison, turning it into a shaggier cow.

To make matters worse, a century ago ranchers crossbred a number of the surviving bison with cattle in an unsuccessful attempt to create a superior breed of livestock ("cattalo" and

"beefalo").¹⁹ Over the years, those hybrids were backcrossed with bison, with the result that most of today's bison herds are "contaminated" with cattle genes. Thus, if we ask how many genetically pure bison there are in the United States that are not being bred for commercial use, the answer is no more than a few thousand. And if we ask how many of those herds are free-roaming within their native range, our answer comes down to one: the population in Yellowstone National Park.²⁰

And even that nominally protected population is under siege.²¹ The problem this time is not hide hunters, but rather a small bacterium known as *Brucella abortus*. Native to the Old World, *B. abortus* was brought to North America via infected cattle imported from Europe. It spread to Yellowstone's bison around 1917 and now infects a significant fraction of the population. For the bison, it's not much of a problem since it produces little in the way of illness or disability. The symptoms in infected cattle are generally mild as well, but it does cause some infected cows to abort their fetuses and reduce their milk production, and in the low-profit-margin world of western ranching, those losses are intolerable.

Montana has worked hard to eliminate brucellosis (as the disease is called) from its livestock herds by testing each cow, destroying those that test positive for the bacterium, and by vaccinating calves. There is at least the theoretical possibility that wild bison could transmit brucellosis to cattle—it has happened in captivity when the two species were placed in close confinement—but the circumstances would certainly be unusual, such as a cow licking the afterbirth material from a bison within forty-eight hours of the bison giving birth. Should any of Montana's cattle contract the disease, the state would lose its brucellosis-free designation, a designation that allows ranchers to ship cattle outside the state without first quarantining them (a time-consuming and expensive step). That prospect has made state wildlife officials determined to keep Yellowstone's bison far away from Montana's cattle.

And there's the rub. While not migratory in the grand style of their plains ancestors, some of Yellowstone's bison nonetheless undertake an altitudinal migration during harsh winters, exiting the park and following established routes along the Yellowstone and Madison river valleys to lower-elevation sites where they have easier access to food. Some of the land they wander through is privately owned, and some of it is owned by the federal government but managed by agencies other than the Park Service, such as the U.S. Forest Service and Montana Fish, Wildlife and Parks. Ranchers are permitted to graze livestock in these areas, raising the possibility that bison could come into contact with cattle. The State of Montana has insisted that all bison wandering outside the park be quickly returned to the park or be killed, lest they infect the cattle. Because bison have a mind of their own and the brawn to exercise it, chasing them back into the park does not always work; all too often, the standoff is ended by a bullet. During the winter of 1996-97, for example, over a thousand Yellowstone bison (approximately a third of the park's population at the time) were killed by rangers and game wardens for the crime of migrating outside the park. Similar culling operations have taken place in subsequent years.

In response to public outrage over the killings, the State of Montana and the federal government developed an Interagency Bison Management Plan in December 2000.²² Under this plan, bison that leave Yellowstone are chased back into the park through the use of helicopters, snowmobiles, all-terrain vehicles, and people on horseback. Those that refuse to return to the park are captured and tested for brucellosis. Individuals testing positive for brucellosis are killed, but up to one hundred brucellosis-free bison will be allowed to remain outside both the park's western and northern boundaries, provided the animals stay within the (arbitrary) boundaries of two bison management areas. Any bison that cannot be chased back into the park and that elude capture for testing will also be shot. Moreover, if the total population of bison within Yellow-

stone National Park tops three thousand, then all wandering individuals that cannot be chased back into the park may be shot without testing them for brucellosis.

The plan is meant to appease the ranchers while providing a fig leaf to hide the State of Montana's intolerance of bison outside the park. At best, it would allow two hundred sanitized bison to exit the park, provided the total population of bison in the park is below three thousand. To be fair to the State of Montana, the goal is not to eradicate Yellowstone's bison, but rather to eradicate their migratory behavior. Whether it's even possible to accomplish the one without the other is unknown.

Other solutions to the problem have been proposed and rejected. One is to round up all bison in the park, check them for brucellosis, and destroy those that test positive. Apart from the immense logistical difficulties of corralling, holding, and testing thousands of wild bison (in a national park no less!), the end result would surely be the destruction of a large fraction of the Yellowstone herd, inasmuch as 45-50 percent of the bison test positive for exposure to brucellosis.²³

Others have suggested vaccinating the park's bison against brucellosis. In fact, a vaccine is currently being tested on a few of the park's bison, but its efficacy is low. Moreover, capturing and vaccinating bison inside the park on the scale necessary to eradicate the disease poses another logistical nightmare. In addition, bison are by no means the only wild animals that harbor the dreaded *B. abortus*. Elk are also carriers. Why ranchers and state officials are not equally alarmed about the presence of the disease in the region's elk population is difficult to fathom. Elk are apparently more fastidious in their birthing behavior than bison, with females consuming the placental tissues and fluids to avoid attracting predators.²⁴ This behavior may reduce the risk of transmitting brucellosis to livestock, but against this diminished risk of transmission per individual must be weighed the much greater population of elk—approximately one

hundred thousand in the Yellowstone region. Indeed, there have been several documented cases of elk transmitting brucellosis to cattle in nearby Wyoming and Idaho.²⁵ Perhaps the main reason elk are treated more leniently by state officials is because of the importance of elk hunting to Montana's economy.

There are ways of dealing with brucellosis that are kinder to Yellowstone's bison. For example, the federal government could terminate or buy out the ranchers' grazing leases on the public lands surrounding the park as well as purchase key private lands where bison congregate in winter, in effect creating a "safe zone" where bison and cattle never overlap. This approach has little support among western legislators, who tend to be deferential to the cattle industry, if not obsequious. Thus, the killing continues, largely unnoticed by the public during mild winters when few bison leave the park, but hugely controversial during harsh winters, when lots of bison are killed. It would appear that even in Big Sky country, there is no longer room for a remnant of the American bison's grand migration.

Bison are by no means the only migratory mammals falling victim to human greed or indifference within the Yellowstone ecosystem. Yellowstone's bighorn sheep, elk, and pronghorn all engage in altitudinal migrations, abandoning the higher elevations during the winter and finding refuge and forage at lower levels. All three species have suffered greatly from the rapid development now under way across much of the West. Ecologist Joel Berger of the Wildlife Conservation Society recently estimated the number of pronghorn, elk, and bison migratory routes that have disappeared over the past century in the Yellowstone region.²⁶ He scoured the published literature, agency reports, and historical records such as trappers' journals to determine the locations of summer and winter ranges, as well as migratory routes. He then compared these historical data with the current situation, identifying winter and summer ranges that had been abandoned either because the ranges them-

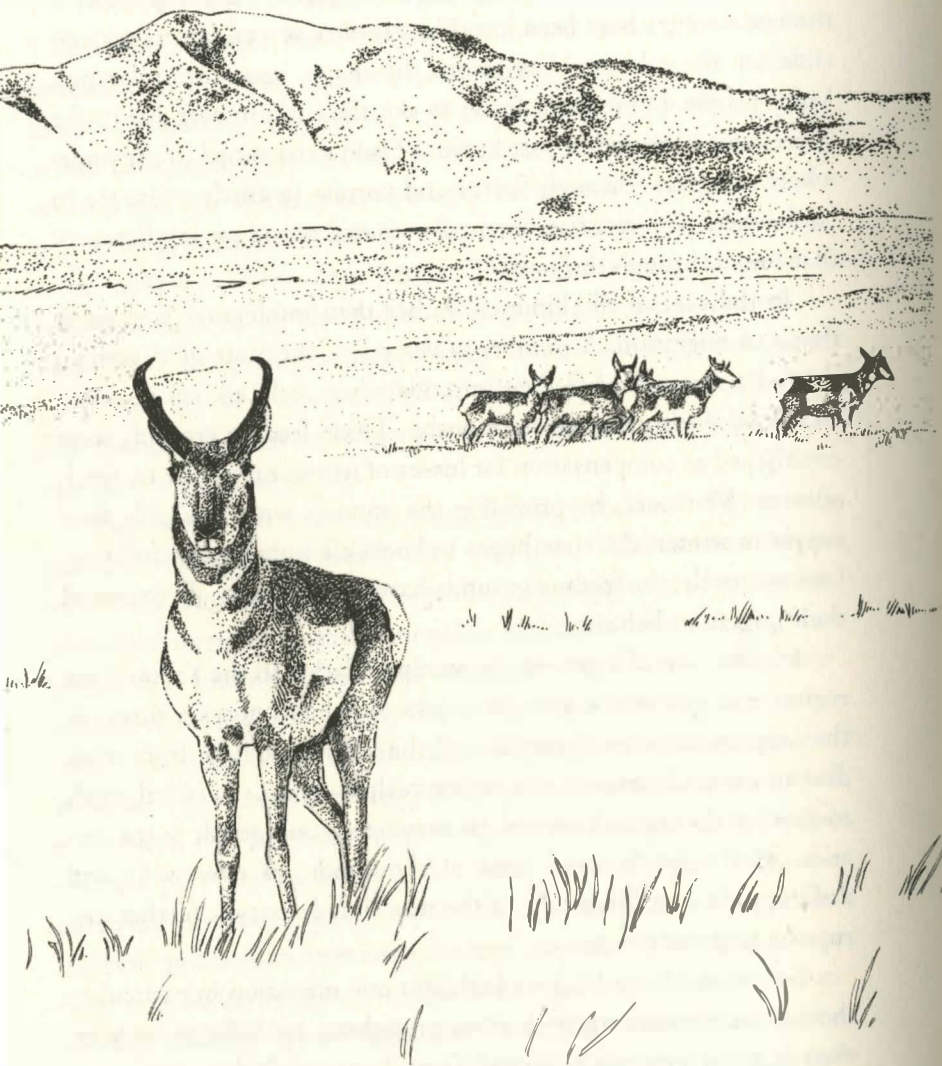
selves had been developed or because the intervening migratory route had been blocked by development.

Berger estimates that within the twenty-seven-million-acre Yellowstone region, encompassing the park and surrounding federal, state, and private lands, no fewer than 58 percent of the elk migratory routes, 78 percent of the pronghorn routes, and 100 percent of the bison routes have been lost. He identifies several factors responsible for these losses. For bison, the major issue is intolerance. Many people do not want bison to exit the park, in part due to the brucellosis issue and in part because bison determined to get somewhere can plow through fences and corrals (a costly nuisance to landowners who must repair the fences and round up any livestock that exited through the gaps).

In the case of elk, kindness rather than intolerance is a major threat to migration. A number of years ago, the State of Wyoming created a network of feeding grounds where wild elk are provided with food during the winter months. These feeding grounds were established as compensation for losses of winter range due to development. Moreover, by providing the animals with a reliable food supply in winter, the state hopes to boost elk numbers for hunting. Unfortunately, the feeding grounds have caused many elk to curtail their migratory behavior.

Finally, a rapidly growing human population in the Yellowstone region, along with the associated loss of habitat, poses a threat to the migratory routes of virtually all the large mammals, from mule deer to bison. Moreover, the recent zealous, almost fanatical, push to develop the region's oil and gas resources could result in the creation of thousands, even tens of thousands, of new wells and drilling pads over the course of the next decade or two, further disrupting migratory routes.

Berger and his colleagues highlight one migration in particular: the 340-mile round-trip trek some pronghorn annually make from their summer grounds in Grand Teton National Park to their win-



ter grounds in Wyoming's upper Green River Basin. It is probably the longest migration currently undertaken by any terrestrial mammal in the coterminous United States.²⁷ The pronghorn making this journey must contend with four natural bottlenecks. These occur in places where the terrain forms a narrow corridor, such as a pass between towering cliffs or across a mountain range. This inherently challenging journey has become vastly more difficult in recent decades, thanks to the 105 fences, miles of highways, acres of housing developments, and numerous drill pads for fossil fuels that have been placed along the way. Today, only about two hundred to three hundred pronghorn continue to make the trek. Given plans to expedite oil and gas development in the southern portion of the route, combined with a growing human population in the north, it seems only a matter of time until the last pronghorn faces a fence too high or one too many drill pads, thus ending a migratory tradition that has endured for thousands of years.

Although elk, pronghorn, and bison are in no danger of disappearing completely from Yellowstone, the loss of so many migratory routes, especially the long ones, surely diminishes the splendor of the region. Moreover, the Greater Yellowstone Ecosystem is one of the least-disturbed regions of the country. If it can suffer so many losses of migratory populations, even greater losses must be happening elsewhere in the West, as new housing developments, roads, strip malls, and other potential obstructions spring up across the landscape.

Berger and colleagues have proposed some sort of federal protection for migration corridors, analogous to the way we currently designate (and protect) national scenic highways, historic trails, and wild and scenic rivers. From an ecological perspective, the proposal makes eminent sense inasmuch as the current patchwork of conservation laws and regulations seems ill-suited to the task of safeguarding complete migratory corridors. But with the focus of so many elected officials now on resource extraction and development

rather than conservation, there seems little chance of such a law being enacted any time soon. The fallback—turning to the individual states and pressuring them to protect migratory corridors—ignores the prime reason for federal action in the first place: many migration routes cross state borders and cannot be protected adequately in piecemeal fashion.

IN CONTRAST TO THE SITUATION in the Northern Rockies, bison, pronghorn, and other migratory species may be poised to make something of a comeback in the Great Plains. If this happens, it will not be the result of some grand federal plan, but rather a combination of economic, ecological, and sociological factors.

Even in the best of times—and those have been few and far between—the Great Plains are a tough place to make a living. Here one finds, in the words of Rutgers University geographers Frank and Deborah Popper, “the nation’s hottest summers and coldest winters, greatest temperature swings, worst hail . . . , fiercest droughts and blizzards, and therefore its shortest growing season.”²⁸ Yet the federal government has been trying for almost a century and a half to put people on the plains, first by offering them free land via the Homestead Act of 1862, then by providing crop subsidies and technical assistance (especially following the Dust Bowl calamity of the 1930s), and finally by financing an expensive infrastructure of dams and other irrigation projects. Despite these efforts, the region seems trapped in a cycle of boom and bust, with the bust years growing more frequent. For many of the ranchers and farmers, a good income is impossible, an adequate income is barely possible, and financial ruin is a real possibility. Younger people, faced with the prospect of a lifetime of hard work and little to show for it, are abandoning the farms and rural towns and heading elsewhere. As a result, the Great Plains is one of the few regions of the country to have seen a net decrease in population over the past two decades.

Pondering these trends, Frank and Deborah Popper proposed a

radical solution to the region’s declining economics and social conditions in 1987: a Buffalo Commons. The Great Plains, they argued, cannot sustain intensive agriculture and livestock ranching—not economically, not ecologically, and not socially. What this region can do is grow bison, lots of bison, along with pronghorn, elk, sharp-tailed grouse, prairie dogs, and myriad other species adapted to living in this harsh land. The federal government can either stand back and witness the eventual depopulation of the Great Plains, the Poppers argued, or it can intervene to prevent this region from becoming “an utter wasteland, an American Empty Quarter.”²⁹ They recommended that the federal government step in and buy back the land, then tear down the fences, remove the cattle, and restore the native wildlife.

Farmers and ranchers, not to mention governors and congressional representatives from the affected states, were openly hostile to the idea when it was first proposed. It seemed beyond the pale that two academics (from New Jersey, no less) would purport to tell these people that a way of life they had known for generations was unsustainable and unwise. But time appears to be proving the academics right, at least with respect to the broad outlines of their vision. As more farms and ranches face bankruptcy and as younger generations continue to desert the rural towns, some residents of the Great Plains are reconsidering their once-fierce opposition to the Buffalo Commons.

One such person is Mike Hayden. As governor of Kansas, he disputed the notion that rural communities were living on borrowed time. “Tell the Poppers that America’s Great Plains do not equal the Sahara,” he declared when the Poppers’ article came out. Nearly two decades later (and no longer in office), his attitude has changed. “To stay the course is essentially a dead-end road,” he now admits. “The Poppers were right.”³⁰

Up to a point, they *are* right. Something like a Buffalo Commons may be building in the Great Plains, but it is not the result of

any bold action on the part of the federal government, which continues to dole out subsidies to traditional agricultural interests. Nor is it happening on quite the scale the Poppers envisioned. Instead, the initiative is being taken by nonprofit organizations like the American Prairie Foundation and the World Wildlife Fund. In less than four years, these two organizations quietly raised about ten million dollars, which the American Prairie Foundation used to purchase and lease 58,500 acres of ranchland in Phillips County, Montana.³¹ The groups' goals are eventually to acquire several hundred thousand acres from willing sellers and to restore bison and other plains animals to the landscape. By teaming up with the nearby 1.1-million-acre Charles M. Russell National Wildlife Refuge, the organizations hope to create a large enough reserve to reestablish something close to a free-ranging, genetically pure bison population. It won't be a migratory population of the sort settlers encountered nearly two centuries ago. But the animals will surely move around over the course of the year in search of new forage, and in so doing they may create their own small-scale migrations.

In October 2005, sixteen healthy, brucellosis-free bison were captured in South Dakota's Wind Cave National Park and brought to the American Prairie Foundation's reserve in Phillips County. On November 17, before a delegation of reporters and conservationists, the gates of the acclimation corral were opened, and several minutes later the first brave bison ventured forth, quickly followed by the others.³² The following spring, five calves were born, an auspicious start to the restoration effort. Meanwhile, the foundation is working to secure additional bison to increase the herd. Sometime soon, I intend to visit that reserve, preferably in the spring. The longspurs should be in fine form at that time of year, catapulting themselves into the air and singing lustily. But what I really hope to see is something far less graceful: an itchy bison rolling around on the ground, kicking up a cloud of dust and leaving a new and enduring imprint on the land.

In the Water ~