



## WILD MIGRATIONS: ATLAS OF WYOMING'S UNGULATES

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**Review by:** Michelle Church, Michigan State University

*Wild Migrations: Atlas of Wyoming's Ungulates* is beautifully written and illustrated, and describes the historical and contemporary migrations of Wyoming's ungulates (hoofed mammals). The atlas is divided into seven chapters, the first five of which are thematically focused, followed by two of reference material. The thematic chapters each begin with short one-page essays by Emilene Ostlind, introducing the concepts covered. Most of the essays narrate a journey undertaken by one or more representatives of the species discussed in that chapter. The narrations are both informative and entertaining, and effectively pull the reader deep into the story.

Ostlind opens the introductory chapter with an essay entitled "A Migratory Landscape." In it, we follow a female mule deer as she leaves her winter range and heads north, wearing a GPS collar that allows researchers to trace her migration route. The story of this deer's journey helps us to understand the importance of ungulate migration to the ecosystems of the American West. Early on, we learn that an ungulate is a mammal that walks on hooves, that there are eight ungulate species in Wyoming, and why it is that they migrate. A two-page spread features drawings of the animals—male, female, and young—along with detail illustrations of their antlers, horns, and hooves. The visuals here, and throughout this entire atlas, are beautiful. They are bright and clear, and best of all, self-explanatory—the important facts are highlighted, but the maps are easy to read and understand, and not overloaded with

text. Through them, we see ungulate migration patterns within Wyoming, as well as how they fit into the patterns of ungulate migration around the world.

The rest of the chapter explains not only *what* animal migration is and *why* it is important, but how the *when* and *where* is as important as the *what* and *why*. The atlas tells us, through text and pictures, that the habitats of the Wyoming ungulates are dominated by sagebrush steppe, but that the animals also seasonally range into areas of alpine meadows, coniferous forest, deciduous woodland, grassland, and cropland. Elevations range from a low of 3,099 feet along the Belle Fourche River in the northeast to 13,804 feet at the summit of Gannett Peak in the Wind River Range. Temperatures range from -40° to 100° Fahrenheit, and while some areas in the state receive less than 10 inches of precipitation a year, the surrounding mountains get over 60 inches. Another important fact to note is that Wyoming has a low human population density—and it is this, along with topography and weather, that makes it possible for the ungulates to migrate. The next section of this chapter contains detailed looks at each of the eight ungulate species—mule deer, pronghorn, elk, moose, bighorn sheep, bison, white-tailed deer, and mountain goat. Two-page spreads feature graphics and field notes showing the current range, distribution, estimated population, and harvest statistics for each species, along with migration routes and seasonal habitat, including their summer and winter ranges.



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The second chapter concerns the long history of ungulate/human relations in what is now Wyoming. In it we learn about the first hunters, the American Indians, and about the newcomers: the trappers and explorers. The chapter tells the story of ungulate population decline due to exploitation and over-harvesting, but also the establishment of national parks, forests, and refuges, and how the restoration of feeding grounds has led to a recovery of the populations. The opening essay, “Ancient Rituals” (wherein we follow another collared mule deer, this time during hunting season), explores the age-old practices and rituals that have surrounded the hunting of ungulates from ancient to modern times. We learn about how these animals were hunted, and what the practice meant to the first hunters, as well as what it means to the hunters of today—after the repopulation of stocks that had been hunted out. In the essay, our deer and her fawns get safely away, while the hunter, “participating in the ancient rituals that [have] sustained humans since they first arrived on this western landscape,” continues to wait (35).

Chapter Three takes us behind the science of migration. In her “Studying Migration” essay, Ostlind narrates the story of a deer that has been captured, examined, and collared by researchers. We learn how scientists are working to understand ungulate migration, where it has been and where it is going. This deer was captured at the end of one winter, with the intention of recapturing it early in the next to analyze the data on her collar and to measure the fat she had put on over the summer.

The chapter continues to outline the history and ever evolving methods of migration research, from collared neckbands to radio telemetry to GPS collar studies. The discussion of research methods is divided into two parts: collection and analysis. Data collection covers topics such as satellite-upload versus store-on-board GPS collars, animal capture and collaring, and raw GPS data points. The discussion of analysis deals with how these findings are mapped and analyzed, and, in particular, about the way migration patterns and timing are revealed in the data. There is a graph and timeline of the pattern and timing of each species’ migration and stop overs.

A section entitled “Surfing the green wave, the quality of forage” delves into topics of nutrition and other events that trigger migration. In this section we follow a mule deer on its journey, with particular attention focused on the energy she expends lactating (to feed her fawn) and trudging

through snow. This leads into a discussion of the effects of snowpack on four of the migrating ungulate species—pronghorn, mule deer, elk, and moose—illustrated with precipitation graphs for 2013, a drought year, and for 2015, a wet one. These species exhibit *fidelity*, which is what researchers call the tendency among animals to return to the same habitats year after year. For example, over one hundred moose winter along the Buffalo Fork River, just east of Grand Teton National Park, returning year after year to the same place throughout their up-to-twenty-year lives. The atlas illustrates this fidelity with photos and maps of their migration routes and seasonal ranges.

Not all ungulates in Wyoming migrate: some reside in a fixed range, and others just wander like nomads. Still others, like the bison, had migrated in the past, but ceased to do so as their populations dwindled (by 1902 only 25 bison remained in the Yellowstone National Park refuge), although as their numbers have rebounded, migrations have begun again.

Wolves and grizzly bears also inhabit the Wyoming ranges, and their activities have significant impacts on the state’s migrating ungulate populations. The atlas covers these relations with maps, graphs, and charts. The fourth chapter is about these threats, along with others, dramatized in the opening essay: “Barriers to Migration.” This time we are with eight mule deer on the migration trail at night. They have already passed through several towns, crossed hundreds of lawns, and jumped miles of fence, and only one barrier remains before reaching the open range of the Red Desert: State Highway 28. As it starts to snow, seven of the eight successfully leap over the fence and onto the road, but one, a fawn, cannot. Truly, “a changing landscape makes it ever more difficult for migratory animals to complete their seasonal journeys” (89). This particular fence was just one in a long series of impediments and barriers along the migration route—and just one example of the multiplying threats and challenges discussed in this chapter.

Population growth and energy development bring fences, roads, and rural development. Widespread, industrial-scale exploitation of gas, oil, and wind power, especially along the Interstate 80 corridor, has resulted in winter range habitat loss and constriction of migration corridors, forcing changes in migration routes, travel speeds, distances traveled, and available stopping places. In addition to these artificial migration bottlenecks, there are natural

restrictions as well, such as Trappers Point, an open sagebrush-covered ridge about a mile wide that as many as 50,000 deer, pronghorn, elk, and moose traverse.

Other challenges to the ungulate population covered in this chapter include hunting, diseases (including brucellosis and chronic wasting disease), climate trends, the changing landscape (lost forest cover, wildfires, bark beetle infestation), and food web disruption.

Conservation efforts are discussed in Chapter Five, in particular the efforts being made by ranchers like Maggie Miller. Miller's ranch in western Wyoming spans the roughly twenty-five miles between the Wyoming Range mountains and the Green River. Unlike many other ranches in the area that have been broken up and parceled out, the Miller ranch preserves the open ranges needed by various migrating species, including ungulates. Emilene Ostlind's final essay, "Sustaining Migration," recounts the experience of observing curlew migration with the ranch owner as she tells about her wildlife conservation efforts. Many areas in Wyoming have experienced land closures (primarily fencing) related to human pressures, but research findings have led to greater awareness, especially in Western Wyoming, of the critical ecological role played by wildlife migration. Conservation efforts there are in full swing, but land closures and industrial sprawl continue to creep closer and closer.

The atlas provides numerous maps and other graphics that clearly portray and contextualize the efforts by rangers like Miller, as well as the significant challenges those efforts have faced. Legal disputes swirl around the discovery, assessment, conservation, and protection of migration corridors—which often stretch hundreds of miles, crossing, merging, and dividing, and which are commonly used by multiple herds and species—that lie on land seen by

humans as owned resources to which they have exploitation rights. The Red Rim Fence Dispute is one notorious example. In the mid-1970s, a rancher—who wanted to mine coal—enclosed "his" land with a twenty-eight-mile fence. That land, however, also happened to be critical wintering habitat for a large herd of pronghorn. Blocked from their winter range, an estimated seven hundred of them perished the first year. The dispute dragged on for close to twenty years before the State of Wyoming purchased the land and established Red Rim-Daley Wildlife Habitat Management area.

The atlas concludes with seven pages of reference maps covering the state's physical geography, counties and cities, and land ownership, and a list of data sources and atlas sponsors. I have nothing negative to say about *Wild Migrations: Atlas of Wyoming's Ungulates*. It is everything a good thematic atlas should be, and all its parts work together seamlessly as a coherent whole. Emilene Ostlind's opening essays are outstanding. She gently pulls you into each story, and makes you feel like you *are* the deer, the hunter, or the researcher, and an integral part of the unfolding story. The other writing is also excellent—packed with information, yet delivered in a clear and readable manner, and supported by maps and graphics that could almost tell their stories all by themselves, but that work together with the text to make each issue or situation crystal clear. The maps and graphics throughout the *Atlas* are colorful and easy to read and understand; they are enjoyable and informative at the same time. Each is well laid out, with text that enhances but does not overwhelm—in each instance there is just enough text to let us know what is going on. The pictures throughout the *Atlas* are breathtaking. They are so real and vibrant, there were times I felt like I could reach out and touch the animal. I could look at this atlas, at the pictures, the graphics, and the maps, all day.

