FALCON POCKET GUIDE

Bighorn Sheep

JACK BALLARD

FALCON POCKET GUIDE

Bighorn Sheep

Jack Ballard

FALCON GUIDES

GUILFORD, CONNECTICUT
HELENA, MONTANA

AN IMPRINT OF ROWMAN & LITTLEFIELD

FALCONGUIDES®

An imprint of Rowman & Littlefield

Distributed by NATIONAL BOOK NETWORK

British Library Cataloguing-in-Publication Information is available on file.

Library of Congress Cataloging-in-Publication Data is available on file.

ISBN 978-0-7627-8491-2

This book is dedicated to my son, Micah, our many shared outdoor adventures, and a bighorn ram.

Contents

Acknowledgments

Several wildlife professionals have expanded my understanding of bighorn sheep and provided valuable information for this book and my other writings on bighorns. They are: Dr. Bob Garrott, Professor of Ecology at Montana State University; Shawn Stewart, Wildlife Biologist with the Montana Department of Fish, Wildlife & Parks; Doug McWhirter, Wildlife Biologist with the Wyoming Game & Fish Department; and Hank Edwards, Wildlife Disease Specialist with the Wyoming Game & Fish Department. I am especially grateful to Melanie Woolever, National Bighorn Sheep Program Leader, of the United States Forest Service for reviewing and making helpful suggestions on the manuscript.

Swarovski Optics has generously supplied superb binoculars to support my field observations of wildlife. Thank you!

Introduction

On a November elk hunt several decades ago, my older brother and I found ourselves sliding downward from an exceedingly high ridge on the flank of the Madison Range in Montana. Cresting a bulge on the vertiginous slope, the sight of three animals in a tiny, open basin found us scrambling for our binoculars. My initial impression of the animals assumed a small herd of mule deer, but even before I peered through my binoculars, I knew what they were. Three lordly bighorn rams lounged in the snow, the brown coats on their muscular bodies appearing thick and sleek under the midday sun. Their horns were much lighter, massive, an arcing from their heads like fence posts bent into a circle. The rams failed to detect our approach from above, allowing us to sneak within a distance of perhaps half a city block from the nearest sheep.

For some time we watched them in silence. I can still recall their white nose patches and the pale fur on their rumps, the grinding of their molars as they chewed their cud, and the dark, cloven hooves at the end of their outstretched front legs. Beyond the rams the landscape peeled away in an emerald mosaic of timber and an endless chain of barren mountain peaks melding into an ageless blue sky. The wildness of the space and the strengt of life that seemed to radiate from the lounging bighorns will remain with me until erased by death or dementia.

Despite their apparent virility, bighorns are fragile creatures. They snort at -30°F temperatures, yet have less resistance to certain respiratory diseases than a newborn huma Perhaps more than any other species of hoofed mammal in North America, they need the care of thoughtful people to survive. After reading this book, I hope you'll be amply motivated to do your part.

Names and Visual Description

Bighorn sheep are creatures of the mountains and may also inhabit rough, badland regions o the plains. Their overall appearance is brown, varying from hues of rich chocolate to reddish or golden brown, depending on the region the animal inhabits and the time of year. Bighorns have stout, blocky bodies. Their tails are brown and stubby, and are only easily observed by the unaided eye from the rear at close range. The rump of the bighorn looks large, partly due to its highly developed muscles but also enhanced by its distinct coloration. In contrast to the brown body of the sheep, the rump appears cream-colored or pure white. Bighorns also have a pale patch of fur on the end of their nose, and varying levels of lighter fur on the inside of their legs and belly.

Although “sheep” in the truest sense of the word (bighorns can actually mate with domesti sheep in controlled conditions), observers expecting the long, woolly coat of the domestic sheep on a bighorn are mistaken. The bighorn’s fur is sleek and much shorter than that of a domestic sheep. In late winter their coats may fade considerably. Their fur becomes patchy when shedding in the spring and early summer, but for most of the year, their hair-coat looks sleek and well-groomed.

Both female and male bighorn sheep have horns. The horns of a mature male dwarf those of a female. The horns grow from the top of the head and curl out and backward. Exceptionally large males may have horns that spiral into a full circle when viewed from the side.

Bighorn sheep are named for the massive, spiraling horns found on males of the species.

American Indians inhabiting what is now the western portion of the United States utilized bighorn sheep for food and other purposes. Various tribes had different names for the sheep The Blackfeet of northwestern Montana referred to the bighorn as “big head.” The Mandans of the Dakotas called the animal “big horn,” while the Crees of western Canada referred to th species as “ugly reindeer.” Early European trappers and explorers sometimes adopted the names of the native peoples for bighorn sheep, but naturalists were often confused about the specific identity of the animal.

Such was the case with members of the Lewis and Clark expedition. The captains were aware of the presence of bighorns before they encountered or killed one, based on verbal accounts from other explorers and a spoon Clark observed in a village of Teton Sioux fashioned from the horn of a bighorn sheep. On May 25, 1805, Clark killed a female bighorn the bluffs along the Missouri River in eastern Montana. The captain described the animal as “a female ibex or big horn animal,” reflecting some of the confusion that surrounded the species in his day. Some American naturalists believed bighorns were a type of ibex, goatlike creatures that are native to central Europe, Asia, and northern Africa. Others believed them to be a strain of argali, wild sheep indigenous to eastern Asia. The confusion in the minds of Lewis and Clark is evident on their maps. In eastern Montana they named two separate watercourses “Argalia Creek” and “Ibex Creek” in the region where they first encountered bighorn sheep.

On Clark’s eastward (return) journey down the Yellowstone River, he encountered a major tributary known by the Crow Indians as the “Bighorn River,” the name he adopted on his map which persists today. After decades of confusion in the nineteenth century regarding the river’s namesake animal, biologists successfully differentiated bighorn sheep from the argali and ibex of yonder continents and agreed upon the name “bighorn sheep,” which the animals carry today. The scientific name for bighorn sheep is *Ovis canadensis*.

Related Species in North America

Bighorn sheep share summer and winter range with several other species of hoofed mammals, including elk, mule deer, and mountain goats. They may also be occasionally four in the proximity of moose and whitetail deer. Bighorns are kin to the “thin-horned” sheep of North America, the Dall’s and Stone’s sheep of northwestern Canada and Alaska.

Stone’s and Dall’s sheep are very close relatives to bighorn sheep—so close, in fact, that they have been successfully crossbred in captivity. However, the ranges of these northern-dwelling sheep and bighorns do not overlap, although both species exist in the mountains of British Columbia, Canada. In contrast to bighorns, Dall’s sheep are completely white. Stone’s sheep, technically a subspecies of Dall’s sheep that inhabit the southern portio of its range, are found most abundantly in northern British Columbia. Compared to bighorns their coloration is more grayish than brown. While some Stone’s sheep have a dark, solid charcoal appearance, most have a more mottled gray-brown coat. The horns of Dall’s and Stone’s sheep are somewhat thinner than those found on bighorn sheep, and tend to flare farther from the head as well.

In portions of their range in the western United States, bighorn sheep are found in proximit to mountain goats. Early European hunters and naturalists sometimes confused the identities of mountain goats and bighorns if they hadn’t encountered both species. Once both animals had been viewed, they quickly realized they were seeing two different creatures.

Bighorn sheep are close relatives of Dall's and Stone's sheep that live in more northern habitats than bighorns.
SHUTTERSTOCK

The overall creamy-white appearance of the mountain goat contrasts sharply with the brown body of the bighorn sheep. Mountain goats sometimes exhibit a dirty coat of dingy gray, but are still lighter than bighorns. The fur of a mountain goat is longer than that of a bighorn sheep, especially in the cold months of the year when adorned in their winter coat. In comparison to the sleek coat of a bighorn, mountain goats appear shaggy. Like sheep, both male and female mountain goats have horns. However, their horns are colored and shaped differently than those on a bighorn. The smooth horns of a mountain goat are black, with bases that sometimes appear as gray when soiled. Their horns sweep up and back from the top of the head, ending in sharp, daggerlike points. In contrast, the horns of bighorn sheep are tan or auburn in color, slightly rough in appearance, and not nearly as pointed as those of a mountain goat.

Bighorn sheep also share habitat with several members of the deer family in some locations. Compared to moose or elk, bighorns are much smaller. Moose are darker in color and have much longer legs than a bighorn. Elk are also taller and heavier than bighorns, and their coats generally appear lighter and more reddish or golden brown than a bighorn. The neck of an elk is much longer. Female elk have neither horns nor antlers; male elk have antlers that are bony protrusions from the head, unlike the curling horns of a bighorn.

From a distance, mule deer may be the animal most likely confused for a bighorn sheep. They are roughly similar in size. Like bighorns, mule deer exhibit a light rump patch, and in the summer a mule deer's coat may be light brown or reddish in appearance. However, several details easily distinguish these species. First, a mule deer has a leaner, athletic look and longer neck than a bighorn. The name "mule deer" hearkens to their oversize ears that are much larger than those of a bighorn. Like elk, mule deer either have antlers if they are male, or lack horns or antlers if female.

Subspecies of Bighorn Sheep

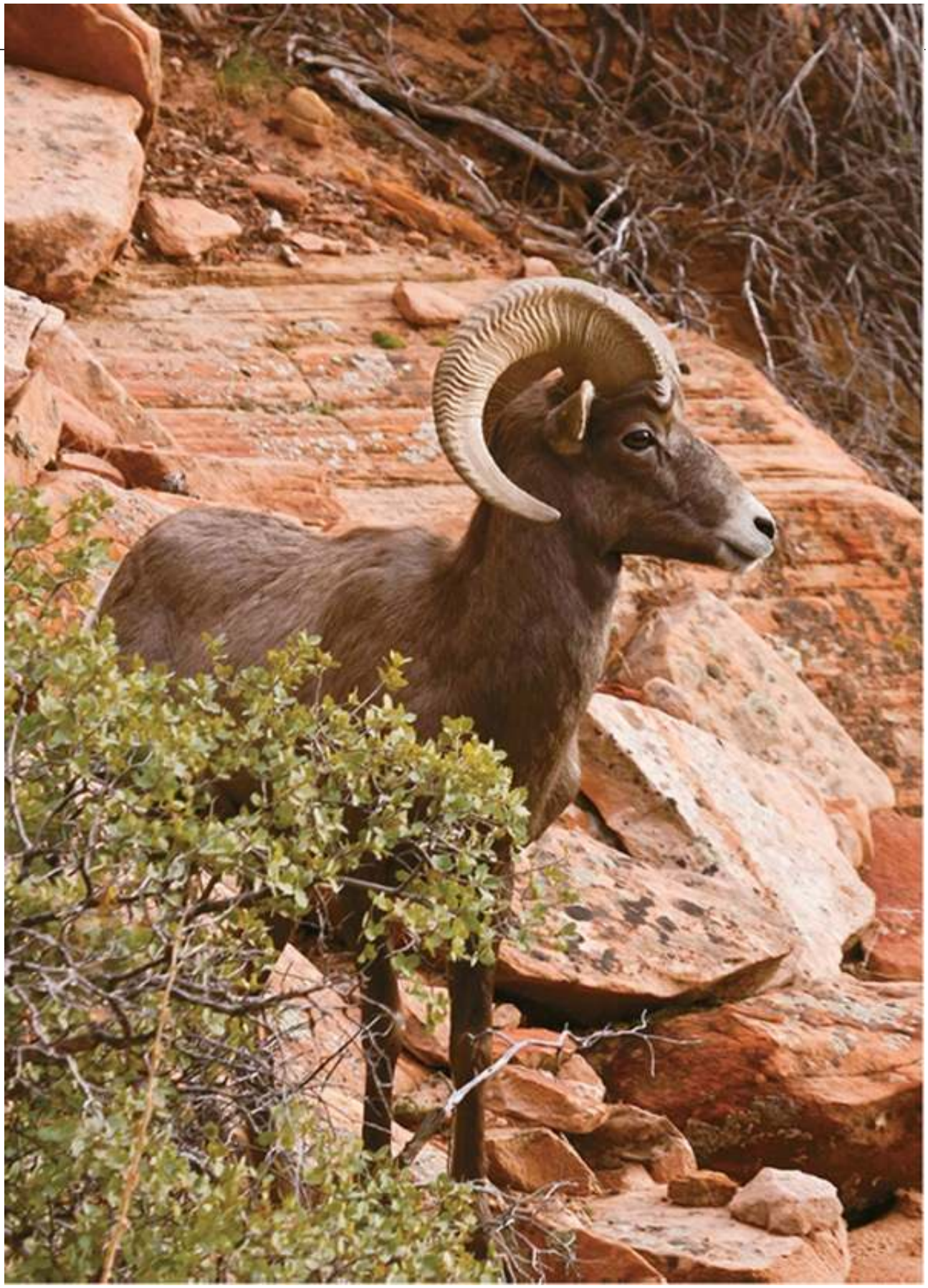
Animals that inhabit range that is isolated from other populations of the same species often develop physical and/or behavioral characteristics that are different from other members of their own kind. For example, southern populations of many species are smaller than those in the north. Their coloration may differ as well. Regional variations within a species have led biologists to identify these different groups as subspecies.

In the twentieth century many naturalists were nearly subspecies crazy, sometimes identifying a dozen or more subspecies of a single North American mammal. Currently most biologists are much more conservative in their delineation of these distinct population groups. In most cases the number of subspecies for large mammal species on the continent has bee whittled from many to a few. Such is the case with bighorn sheep. At various periods in history, as many as seven subspecies of bighorn sheep have been identified in North America.

Today most biologists recognize two or three subspecies of bighorns, while some might argue there is but a single species with no subspecies at all. Subspecies designations are sometimes muddled when biological and management classifications differ. Such is the case with bighorn sheep in the United States.

The two subspecies most commonly identified with bighorn sheep are the Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) and the desert bighorn sheep (*Ovis canadensis nelsoni*). The Rocky Mountain subspecies ranges across portions of western Canada and the western United States as far south as New Mexico. Desert bighorns are found in the southwestern United States. Occupied states include Utah, Nevada, Arizona, New Mexico, western Texas, and southern California, with a growing population also found in southwestern Colorado.

Distinguishing between Rocky Mountain and desert bighorns based on appearance alone is a difficult (some would argue impossible) task. In general, desert bighorns are thought to be smaller and exhibit a lighter coloration than their Rocky Mountain counterparts. Some believe the horns on female desert bighorns are longer than those on the Rocky Mountain subspecies. The horns of rams on the southern subspecies may be longer but less massive than those found on northern animals.



Desert bighorn sheep, like this ram in Utah's Zion National Park, are a subspecies especially adapted to living in arid environments. They are slightly smaller than Rocky Mountain bighorns. SHUTTERSTOCK

In some biological circles a third subspecies of bighorn sheep is theorized, the California bighorn sheep (*Ovis canadensis californa*). This subspecies is identified as those sheep historically occupying range west of the Rocky Mountains, including the Sierra Nevada of California and the Cascade Range in Oregon, Washington, and British Columbia. California

bighorn males are thought to have smaller skulls and smaller, more widely flaring horns than Rocky Mountain bighorns. Whether these characteristics and geographical separation from most Rocky Mountain bighorn populations warrant subspecies classification remains a matte of debate among biologists.

When management and conservation enter the picture, the subspecies designations for bighorn sheep become even more muddled. The United States Fish & Wildlife Service (USFWS) has designated two population segments of bighorn sheep occurring in California with special status. The first is the population of desert bighorn sheep occupying the Peninsular Ranges in southern California from the San Jacinto Mountains south to the Unitec States–Mexico border, and Baja California, Mexico. These are called Penisular bighorn shee by the USFWS and are technically known as a Distinct Population Segment (DPS), not a separate subspecies. Under the provisions of the Endangered Species Act (ESA), geographically isolated populations of a species can be given status as an endangered species. Such is the case with the Peninsular bighorn sheep that were declared an endangered species via their status as a DPS in 1998.

The bighorn sheep subspecies discussion becomes even more convoluted in relation to th Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*), a subspecies designated by the USFWS in 2008. In 2000 bighorn sheep in California's Sierra Nevada were granted endangered species protection by the USFWS after their population crashed to a low of around 125 animals. At this time the bighorns of the Sierra Nevada were considered representatives of the California bighorn sheep subspecies as described above. Utilizing research indicating that the bighorns found in the Sierra are more closely aligned genetically with animals of the southwestern deserts than the northern mountains, but genetically different in some ways from both, the USFWS officially concluded these animals were a separate subspecies and named them Sierra Nevada bighorn sheep. However, a change in subspecies designation by a federal agency does not automatically make its decision accepted science, and not all biologists specializing in the natural history of North American wild sheep would agree with the position of the USFWS.

To conclude the subspecies discussion, it is interesting to note that some biologists would prefer to regard all bighorn sheep as members of a single species, no subspecies included. These scientists point out that historically interchanges between all populations now regarde as subspecies occurred on the edges of their range. They might further argue that even the most expert observer would be hard-pressed to identify individual animals as belonging to a particular subspecies in the absence of its known geographical range. Neither size nor horn shape, two physical characteristics often related to subspecies distinctions in bighorn males, consistent. Small mature males from the Rocky Mountain subspecies on poor range may be similar in size to large desert males. The flaring horns offered as a physical characteristic of the California bighorn sheep subspecies are sometimes observed on Rocky Mountain animals. I have personally observed bighorn males in Montana with flaring horns that could easily be taken for the California subspecies.

If one wishes to push the issue even further, some biologists admit that all wild sheep of North America, both the bighorn and thin-horned varieties, might legitimately be classified as

single species, since they can interbreed and produce fertile, functional offspring.

Physical Characteristics

Bighorn sheep are not particularly tall or heavy animals. They are considered medium-size ungulates in comparison to others in North America. Average weights for bighorn males and females are comparable to those of the whitetail or mule deer. The overall dimensions of bighorns (height at the shoulder, overall length) are also similar between bighorns and deer.

Adult bighorn males normally stand from 2.5 to 3.5 feet at the shoulder, with a head-to-tail body length ranging from 5.2 to 6.1 feet. Males commonly weigh from 130 to 275 pounds. Females are substantially smaller, with normal weights varying from 80 to 150 pounds. Adult mass among bighorns is usually determined by habitat quality. Sheep with access to increased amounts of nutritious forage maximize body weight, while those in marginal habitat obtain smaller sizes as adults. An exceptionally large male weighing 301 pounds was once surveyed by biologists in Jasper National Park in Alberta, Canada.

Nomenclature for gender in bighorn sheep follows that of domestic sheep. Adult males are called “rams”; females are referred to as “ewes.” Newborns or young of the year are known as “lambs.”

Identifying subspecies of bighorn sheep based on physical characteristics is nearly impossible. These Rocky Mountain rams are of similar age but show different coat colors and horn shapes.

Horns and Horn Development

Perhaps the most remarkable and distinguishing feature of the bighorn sheep is the massive curling horns carried by an adult ram. The horns may weigh up to 30 pounds or slightly more sometimes exceeding 10 percent of the animal's total weight. On the average, bighorn sheep horns increase in mass as one travels from south to north within their range. In the 1990s a number of rams were harvested by hunters in western Montana with horns measuring over 1 inches in circumference at the base of the horn near the skull. Measured from the base of th horn where it touches the skull around the outside curl, bighorn rams have been recorded wi horns measuring over 49 inches in length.

The horns of bighorns are actually composed of keratin fibers, similar to the horns adornin other animals such as mountain goats, impala, bison, ibex, and some strains of domestic cattle. Keratin is the material also found in hair, hooves, and human fingernails. The horns of bighorn sheep form around bony projections on the top of a ram's skull known as "horn cores." Horns on bighorn sheep begin growing shortly after birth, and by its first birthday a bighorn ram may have horns that are 5 to 8 inches in length.

Each year another horn sheath grows from the horn core. The new sheath develops inside the previous horn sheath, expanding it and forcing it farther away from the horn core, which increases both the length and the circumference of the horn. A ram's horn is thus a succession of horn sheaths stacked one inside of the next, similar to a bunch of empty ice-cream cones or paper cups placed one inside another. What is viewed on the outside of the horn is only the exposed portion of each horn sheath.

Horns on bighorn sheep grow from the time the animal is born. Within a few months the horns on this lamb photographed in Badlands National Park, South Dakota, will be visible. SHUTTERSTOCK

The annual development of a ram's horns creates a dark indentation where each new horn sheath begins to develop. These indentations create discernible growth rings, or annuli, that can be used to estimate a ram's age. Problems arise in this aging method for several reasons. First, rams may break off the entire sheath grown in the first year of life (sometimes known as "lamb tips") when fighting or rubbing their horns against trees. In extreme cases rams may lose up to three years of horn growth when the ends of the horns splinter in battle. Horns damaged in such a way are said to be "broomed." In such cases the total of the annuli is less than the ram's actual age.

Another aging problem arises in relation to the annuli found between the ram's first and second year. On many sheep this growth ring is less distinct than those found between successive horn sheaths. Additionally, some animals develop false growth rings. The horns of all bighorn sheep are rippled and indented in appearance. Extreme indentations are sometimes very difficult to distinguish from true annuli.

The length of a bighorn ram's horn increases most rapidly in the first years of life. Horns may lengthen at a rate of 6 inches per year for the first four years of life. Once a ram reache nine years of age, its horns seldom add more than 2 inches of length from the base per year

Development of the smaller horns found on ewes follows the same biological pattern as th massive horns carried by rams. Annuli on ewe horns are harder to distinguish due to their smaller size. Unlike the horns of rams that may be broomed fighting, the horns of ewes generally remain intact.

The horns of bighorn sheep develop dark lines know as annuli. Each line represents one year of growth. SHUTTERSTOCK

CHAPTER 2 Range and Habitat

North American Range—Historic

The occupied range of bighorn sheep has contracted dramatically since European settlers arrived in North America. Bighorn sheep, like elk, are now most strongly associated with the Rocky Mountains. However, unlike elk that once roamed over much of what is now the contiguous United States, the historic range of bighorn sheep was always confined to the western half of the continent. The reason for this is quite simple: Bighorns are animals of the open country. They do not live in dense forests. The eastern woodlands of the continent have thus never been home to bighorns.

Historically bighorn sheep occupied suitable habit as far south as the southern reaches of Baja California and northwestern Mexico. In the United States, a line drawn from the “Big Bend” of the Rio Grande in Texas northward to the intersection of the eastern border of Saskatchewan and North Dakota roughly approximates the eastern edge of the bighorn’s historic range. They occupied mountainous areas jutting northward into Canada along the Rocky Mountains, primarily in southwestern Alberta and southeastern British Columbia. On the western side, the original range of bighorn sheep did not extend into the dense coastal forests of Washington, Oregon, and California. Bighorns ranged in drier, more open habitats in the interior mountains of these states.

Although bighorn sheep are sometimes called “mountain monarchs,” such a nickname tends to overlook the fact that historically the animals were creatures of the prairies as well a the mountains. Bighorn sheep were found in plains habitats in areas where steep slopes or cliffs gave them escape cover from predators. These places were often found along eroded river corridors, such as the breaks along the Missouri River, where Lewis and Clark first encountered bighorn sheep on their westward trek to the Pacific Ocean. Indigenous bands of bighorns tracked the soils of western North and South Dakota and western Nebraska, although most contemporary Americans do not conceive of them in such habitats.

Bighorn sheep faced the same perils from European homesteaders as other large ungulates and predators. They were killed for meat and for sport, the large, impressive horns of the rams considered a desirable trophy by hunters, including the great conservationist and president, Theodore Roosevelt. The meat of bighorn sheep has a delicate flavor, motivating early hunters to target them for their taste.

Hunting took a dramatic toll on bighorn sheep numbers in the later decades of the nineteenth century and early twentieth century, but other factors whittled their numbers as well. Domestic cattle and other livestock grazed on pastures in the foothills of the Rocky Mountains, leaving little for the mouths of bighorn sheep during the winter, sheep that often migrated to the mountaintops during the summer but passed the winter in the lowlands.

Bighorn sheep were historically found in some habitats on the plains. This ram was photographed in the breaks along the Missouri River in eastern Montana.

Competition for forage wasn't the greatest threat facing bighorn sheep from the newly arrived livestock of homesteaders. Diseases and parasites carried by domestic sheep are easily transmitted to bighorns. Lacking the immunity domestic sheep had developed during their centuries of domestication, bighorn populations in many areas were decimated by diseases from domestic livestock. To this day, disease transmission from domestic to wild sheep is one of the greatest perils to bighorn populations, and on numerous bighorn ranges wildlife managers have worked diligently to keep wild sheep separated from their domestic ki

How many bighorn sheep inhabited North America before the historic collapse in their population? No one knows for sure. In 1929, in his book titled *Lives of Game Animals*, Ernes Thompson Seton estimated there were 4 million bighorn sheep in North America prior to thei decimation, 2 million in the contiguous United States and another 2 million in Canada. Seton's estimate has been widely accepted, although other biologists argue that the bighorn sheep population in North America has never climbed beyond 500,000 animals. However, eyewitness accounts from early explorers with a reputation for competence and accuracy point to abundance in many habitats.

Osborne Russell, a fur trapper, kept a journal while rambling through the Rocky Mountains from 1834 to 1843. He frequently notes that he and his companions, or the American Indians that they encountered, hunted bighorn sheep. He describes bighorns in terms of abundance numerous places in his journals, and while in the mountains of northwestern Wyoming wrote