



THE BIGHORN'S ROCKY RECOVERY

After a catastrophic decline in the early 1900s, Montana's bighorn sheep population has grown into one of the nation's largest. But habitat loss, highway fatalities, and deadly disease could send numbers tumbling again.

BY TOM DICKSON

During several weeks in late 2009, Craig Jourdonnais shot dozens of bighorn sheep. It was something he wouldn't wish on anyone.

"That was gut-wrenching work," says the Fish, Wildlife & Parks Bitterroot Valley wildlife biologist. "Some nights I'd come home to my wife and say, 'I can't keep doing this.'"

Jourdonnais and other agency workers culled 80 dying Rocky Mountain bighorn sheep from the East Fork Bitterroot herd in the upper Bitterroot Valley. Biologists hoped to stop the spread of a pneumonia epidemic racing through the population by removing visibly sick animals—lethargic sheep with drooping heads and hacking coughs. Once bighorns contract pneumonia, they often perish within a few weeks. Veterinary scientists have yet to develop a vaccine to prevent the disease in wild sheep or medications that cure sick individuals. "It was a brash move, something this agency had never done," says Jourdonnais. "But there were no other options, and we had strong support from the local sportsmen's community to do this."

Deadly disease isn't the only threat to the majestic bighorn, valued for its thick, curled horns and symbolic of rugged mountain wilderness. Wild sheep have to survive in shrinking range that is being overtaken by noxious weeds, conifers, and new mountain resorts and subdivisions. And they must avoid speeding cars and trucks, which have killed hundreds of sheep drawn to highways by compounds used in deicing solutions.

It's a wonder Montana has any bighorn sheep left.

Yet the high-country ungulates survive and even thrive in many areas. Numbers have grown substantially since the 1940s, when most herds documented by early ex-

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plorers had disappeared. Today Montana is home to roughly 5,250 bighorn sheep in 45 populations from the Idaho border east to the Missouri River Breaks. Over the past decade, Montana has become famous for producing big rams and now claims nearly half the Rocky Mountain bighorns entered in the Boone and Crockett Club records.

Unfortunately, these achievements may be short lived. If Montana's bighorns are to continue thriving, they will need to overcome obstacles even steeper than the mountainsides where they live.

A moth-eaten bighorn sheep mount stands in the Montana Bar in Miles City—a prairie town hundreds of miles from the mountains most people would consider wild sheep habitat. Before European settlement, bighorns were common here and in much of the state's eastern region. Members of the Lewis and Clark Expedition frequently saw bighorns along the Missouri and Yellowstone Rivers. Wildlife biologists estimate that at one time more than 100,000 wild sheep may have lived throughout the western mountains and eastern badlands of what is now Montana.



CRAIG JOURDONNAIS/FWP

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Like many big game species, wild sheep fared poorly after settlers arrived. Market hunters killed bighorns and sold them to meat vendors, while pioneers shot the animals for food. Cattle pushed wild sheep out of their winter range along mountain foothills. But it was the introduction of domestic sheep—and with them new diseases such as scabies (mange)—that nearly doomed what Theodore Roosevelt called "one of the noblest beasts." Disease killed wild sheep outright or made them too weak to escape predators or survive Montana's harsh winters. By the end of the 19th century, bighorn numbers statewide were tumbling like boulders down a mountain. The Montana legislature responded by setting hunting seasons and limits and even closing the season entirely starting in 1915. But it was too late.

In 1916 a hunter illegally killed the last of the Montana badlands wild sheep, once considered a separate species known as Audubon's bighorn, along the Missouri River Breaks northwest of Jordan. Over the next two decades, bighorns in the state's largest remaining herd along the Rocky Mountain Front repeatedly died off in large

numbers. By 1941 a report from the Department of Fish and Game, as it was known then, glumly noted that Montana's bighorn sheep population at the time had reached "a low ebb both in density and distribution." Biologists today believe numbers statewide dropped below 1,000.

That same year Montana began work to recover the state's dwindling bighorn population. With funding from the new federal Pittman-Robertson Act, which levied a tax on firearms and ammunition to raise money for wildlife management, Fish and Game began studying and monitoring wild sheep herds. Biologists also trapped bighorns from strongholds on and near what is today the Sun River Wildlife Management Area, carting the animals to historical habitats. Over the next decade, state wildlife workers reestablished new populations in the Gates of the Mountains, West Fork of the Gallatin, Missouri River Breaks, and other sites. By 1950, the statewide population had grown to 1,200 bighorn sheep in 16 populations. Three years later, Montana allowed limited ram hunting for the first time in 38 years.

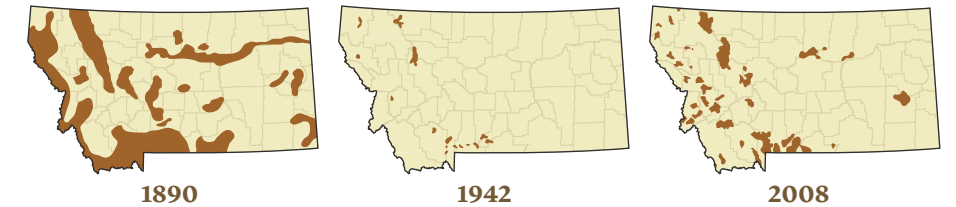
Since trap-and-transplants began, wildlife biologists—and, starting in the 1980s, hiring crews from New Zealand who fire nets over the animals from helicopters—have captured and released more than 2,000 sheep. FWP continues the practice as a way to control herds outgrowing their available habitat, establish new herds in suitable vacant habitat, and augment existing herds.

Expanding bighorn populations beyond where they are today won't be easy. Among the obstacles is the steady loss of suitable range. Bighorns require a combination of four habitat elements: ample wild grasses and forbs, reliable water sources, wide visibility so they can see cougars and other predators, and steep, bare slopes nearby for escaping danger. Not just any mountain can support the minimum of 125 sheep that biologists say is required to maintain a healthy herd.

Threatening this limited bighorn habitat are noxious weeds, such as spotted knapweed, which crowd out bunchgrasses and other native forage. Another problem is conifers encroaching on open grasslands.

Bighorn sheep distribution in Montana

Before European settlement wild sheep ranged widely across Montana, from the Bitterroot Range east to the Missouri and Yellowstone River Breaks. By the 1940s disease and displacement by livestock had reduced the population to just a few strongholds. Since then, FWP has restored bighorns in many historical habitats. Today Montana is home to 45 herds, 40 with huntable populations.



SOURCE: FWP



JIM MULLIGAN PHOTO COLLECTION

A NEW HOME
Starting in the 1940s, state wildlife workers began capturing bighorn sheep from strongholds along the upper Sun River and transporting the animals by truck to historical habitats. By 1950, when this photo was taken, the statewide population had grown to 1,200 wild sheep in 16 populations. Nowadays trapping is done by contracted New Zealand helicopter crews, who use netguns to capture the animals.



TERRY LONNER/FWP

Facing page: FWP workers carry out the grim task of removing tissue from diseased wild sheep culled from the East Fork Bitterroot herd in late 2009.

Historically contained by frequent low-intensity wildfires sparked by lightning, trees have filled in parklands over the past century. For instance, wildfire suppression in the Kootenai Falls bighorn sheep range during the past century has allowed Douglas firs and ponderosa pines to shade out sun-dependent bunchgrasses and prevent wild

sheep from seeing stealthy predators. Some solutions to habitat loss can do more harm than good. Though prescribed burning keeps conifers from encroaching on open areas, the fires spur the growth of some noxious weed species. And an increasingly popular way to control weeds—using sheep and goats trained to eat the plants—increases

opportunities for the domestic animals to commingle with wild sheep.

Then there's the problem of human encroachment. New resorts and subdivisions displace wild sheep from historical range and fragment their habitat with access roads. As western Montana's highway traffic grows, so does the number of bighorns ending up as roadkill. In January 2010, despite large warning signs, a truck plowed into a herd on Montana Highway 1 near Anaconda, killing eight wild sheep. In northwestern Montana, more than 400 bighorns from the Thompson Falls herd have died from car and train collisions since 1985.

Another threat to bighorns is deadly disease. A 2010 study by researchers at the University of Washington proved that *Mannheimia haemolytica* can be transmitted from domestic sheep to bighorns even when a fence separates the animals. The bacteria, carried by but harmless to domestic sheep, is one of the pathogens that cause pneumonia in bighorns.

The findings validate what biologists have seen for decades as once-robust bighorn herds often succumb to disease after mingling with domestic flocks. Infected ewes that don't die outright produce diseased lambs that perish soon after weaning, causing diminished populations to stagnate for years. In 2009 nearly 90 percent of a 220-bighorn herd in the Elkhorns died from pneumonia. Tom Carlsen, FWP biologist in Townsend and



FATAL CRAVING A desire for chemical compounds in deicing solution draws bighorns to highways. Despite warning signs, sheep fatalities are common in some areas.

Facing page: Able to leap livestock fences, bighorns often contract disease by mingling with domestic sheep. Says one FWP biologist, "A ram during the rut is a highly effective vector for pneumonia."



author of the state's new bighorn conservation plan (see sidebar, page 15), says bacteria causing the disease likely came from a handful of sheep allowed to run loose on Bureau of Land Management (BLM) property and adjacent private land. "The sheep producer in the valley had a grazing allotment with the BLM and was doing a good job keeping his animals separate from the bighorns," Carlsen says. "But then someone moved in on a small patented mining

claim and brought in a few sheep and goats that he let roam all over. Sure enough, the bighorns got sick, and within a year we'd lost almost the entire herd."

Global competition and the growth of synthetic fabrics have depressed markets for Montana sheep, reducing numbers from a high of 5 million in 1910 to 300,000 today. But the number of hobby farms that bring tame sheep and goats dangerously close to bighorn range appears to be increasing as subdivisions and ranchettes pop up in mountain foothills. Jim Weatherly, president of the Montana Wild Sheep Foundation, has met with several hobby farmers to explain the risk their animals pose to bighorns. "Most of the time they don't know about the threat and are real concerned," he says.

Many large-scale sheep producers use guard dogs and herders to keep their flocks separate from bighorn herds. But some wool growers lease grazing allotments on national forests and BLM land, where their domestic herds can mingle with bighorns. That troubles sportsmen like Jim Bailey of Belgrade, a retired University of Colorado wildlife biology professor and board member of the Gallatin Wildlife Association. "We think there should be more wild sheep in this region in

places like the Snowcrest-Gravelly Range," he says. "But because a grazing company drives domestic sheep up there each spring, much of that area continues to be unsuitable for bighorns."

Adding to the problem is the bighorn's highly sociable nature. Sheep often stay close together and regularly touch muzzles, spreading bacteria. During the fall mating season, young male bighorns range for miles in search of breeding ewes—wild or tame. After mixing with domestics, a randy ram may head back to his herd like a bighorn Typhoid Mary. "A ram during the rut is a highly effective vector for pneumonia," says Carlsen. Unfortunately, the way FWP manages bighorn herds creates even more potential disease disseminators. By restricting sheep harvest, the department produces not only record-book rams but also herds with abundant male sheep of breeding age.

Another concern, says Bailey, is the loss of genetic diversity in dozens of small, isolated bighorn herds, many of them founded with just a few individual sheep. "Wildlife need a diverse gene pool to draw from for natural selection," he says. "Inbreeding within small herds reduces genetic variation, which in turn may increase the animals'

susceptibility to diseases." Keeping wild and domestic sheep apart is FWP's top priority for managing bighorns. To reduce the number of dispersing males, FWP keeps some bighorn herds at lower densities than the habitat would support. The department generally recommends against transplanting wild sheep any closer to domestic herds than 14 miles—the minimum distance that studies have shown is needed to prevent mingling. FWP wildlife managers have urged the BLM and U.S. Forest Service to stop issuing new grazing allotments where domestic sheep could mix with wild herds. And they've met with both hobby farmers and major sheep producers. Biologists explain the potential disease threats and discuss measures that reduce commingling, such as installing double fencing on small pens or swapping federal grazing leases for those not on wild sheep range.

"FWP has been real willing to work with us, and we want to encourage our members to cooperate with FWP," says John Helle, a third-generation sheep producer in Dillon and past president of the Montana Woolgrowers Association. "There are management practices that can reduce the threat of disease, like using guard dogs and herders to keep bighorns away from domestic sheep, so they both can use the same range." Another way woolgrowers can reduce disease risk, says Helle, is to develop grazing plans that provide "seasonal separation" so range can be shared by both domestic and wild sheep. One example is to graze domestics on bighorn winter range only in summer, when

Bighorns in Montana TIMELINE

- **Pre-European Settlement:** Biologists estimate that up to 100,000 bighorns may have lived in Montana.
- **1805:** Lewis and Clark see their first bighorns near the Missouri River.
- **1889:** Montana establishes a bighorn sheep hunting season.
- **1907:** Bighorn bag limit is reduced from eight sheep to one.
- **1910:** Domestic sheep production peaks at five million animals.
- **1915:** Bighorn sheep hunting is closed indefinitely statewide.
- **1922:** Canada supplies Montana with 12 bighorns from Banff National Park.
- **1937:** Pittman-Robertson Act passes, provides federal funds for state conservation work.
- **1941:** Bighorn sheep population reaches "a low ebb both in density and distribution," states a Department of Fish and Game report. The agency begins a bighorn sheep research and management program.
- **1941–50:** Wildlife biologists establish several new populations of bighorns through trap-and-transplant.
- **1940s:** Domestic sheep production begins to decline because of foreign competition.
- **1950:** Biologists estimate the state bighorn population at 1,200.
- **1953:** Montana reopens bighorn hunting season for the first time in 38 years.
- **1984:** Largest die-off on record, 400 sheep, along the Rocky Mountain Front. Another 250 die at the Beartooth WMA.
- **1990s:** Major die-offs in the Highlands, Tendoy, Lost Creek, and other herds, totaling more than 1,400 sheep.
- **2010:** FWP approves first statewide comprehensive bighorn sheep conservation plan. Major die-offs kill a total of 640 wild sheep in the East Fork Bitterroot, Bonner, Upper and Lower Rock Creek, and Anaconda herds.

Top: Captain William Clark's 1805 sketch of a bighorn sheep

TOP TO BOTTOM: VICTOR SCHEDEL; EHREN WELLS

PHOTOS THIS PAGE: PAUL N. QUENEAU

Raising management money

With only about 5,250 bighorn sheep in Montana, FWP can allow hunters to harvest no more than a few hundred rams and ewes each fall. That limits hunting license revenue necessary for monitoring populations and transplanting bighorns to augment existing herds. To generate more wild sheep management money, the Montana legislature authorized auctioning one bighorn license each year and awarding another through the SuperTag lottery. Since 1984 the auction, conducted each spring by the national Wild Sheep Foundation, has generated \$3.7 million (winning bids average \$170,000). The money also helps purchase habitat and hunting lands, such as the Blue-Eyed Nellie Wildlife Management Area near Anaconda, recently expanded from 6 to 460 acres.

The bighorn sheep SuperTag lottery—chances for which cost \$5 each—has brought in more than \$500,000 for game law enforcement and hunter access since starting in 2006.

MONTANA: home of the biggest bighorns

Before 1974 only ten bighorns with the combination of horn circumference and length totaling 200 points—a size hunters consider phenomenal—had ever been recorded. Most were from Alberta and British Columbia, and none were from Montana. That has changed.

Over the past four decades, sheep populations throughout the Rocky Mountains have grown, producing more big rams regionwide. And since 2006, Montana has produced more 200-plus-point rams than any other state or province. Montana also now claims nearly half the rams in the Boone and Crockett record book that meet the minimum score of 180.

Many of Montana's big sheep have been taken in the Missouri Breaks. Though by no means fertile, the badlands' soils are more productive than those in the flinty high country where most Rocky Mountain bighorns live. This produces more nutritious and abundant grasses and forbs that foster greater horn growth.

Another reason Montana has become Big Horn Country is that FWP issues relatively fewer hunting permits than other states do. This limits hunting opportunity but allows more rams time to grow bigger horns—and to pass their trophy-horn genes on to future generations of rams. Montana hunters appear satisfied with the trade-off. State regulations continue to receive strong public support.



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wild sheep are at higher elevations.

Though acknowledging that domestic herds transmit pneumonia-causing bacteria to bighorns, Helle isn't convinced tame sheep are entirely to blame for die-offs. "Some bighorns get pneumonia even with no apparent mingling with domestic sheep," he says. "And some herds have mixed with domestic sheep for years without problems. We wonder if there might be other issues such as stress or viruses that contribute to the problem."

Helle hopes FWP can find ways to make wild herds more resistant to disease. "We think there needs to be more work on making bighorn herds immune so that when there is contact—and that's inevitable no matter how hard we try to keep them apart—

they are better able to survive." FWP officials say wildlife veterinary scientists throughout the West have long sought to learn why bighorns are more susceptible to disease and continue searching for ways to make herds less vulnerable.

Until then, keeping domestic sheep away from their wild cousins—and bighorns away from tame flocks—appears to be the best solution. If that fails and infection occurs, biologists are left with only two unsavory options: Let the disease run its course, or remove infected individuals to improve the odds that the rest may stay healthy.

Jourdonnais, the Bitterroot biologist, says the agonizing work of culling sick bighorns from the East Bitterroot herd appears to have worked—at least for now.

Lamb survival last summer was much higher than among herds where biologists could not prevent pneumonia from spreading. Yet in the Upper and Lower Rock Creek herds, where in early 2010 biologists culled 47 infected sheep in an attempt to halt the spread, the disease was already too far advanced. Lamb survival last spring was near zero. By the end of 2010, pneumonia in five western Montana herds killed 640 wild sheep—more than 10 percent of the state's entire bighorn population. "The toughest thing about bighorn management," says Jourdonnais, "is that you work for years with hunters, private landowners, and other agencies to recover these herds and keep wild sheep alive and then, wham, disease gets in there and wrecks all that work

A new plan for wild sheep

In 2010 FWP issued Montana's first comprehensive strategy for conserving bighorn sheep. The 300-plus-page plan recounts the history of wild sheep, explains how biologists and hunters rebuilt populations, and identifies major threats to existing herds.

Funded in part by the Montana Wild Sheep Foundation (MWSF), the strategy outlines how FWP will conduct management activities such as monitoring herd health and evaluating the condition of bighorn sheep habitat. "It also gives new biologists protocols for trapping and transplanting bighorns and a process for identifying suitable transplanting sites," says Jim Weatherly, MWSF president.

Tom Carlsen, FWP biologist in Townsend and the plan's author, says the document shows the public how FWP has managed bighorns in the past and plans to manage them in the future. "People want to know how we conduct surveys and issue licenses, and we want to be accountable," he says.

Included in the plan are formulas for determining the percentage of rams and ewes that should be harvested in order to grow, maintain, or shrink populations as needed. And the document recommends observing herds more closely to detect sick animals and regularly capturing wild sheep to test blood and tissue for disease. "It's like with humans: The earlier you can detect a disease, the easier it may be to contain its spread," says Carlsen.

The plan calls for biologists to meet more frequently with sheep producers to agree on when domestic herds should be allowed on bighorn range and what to do when wild and tame sheep mix.

Some hunting groups criticized the plan for recommending that FWP not reestablish bighorns in habitat closer than 14 miles from domestic sheep and goat herds. They say the policy keeps vacant too much prime habitat that would otherwise support bighorns. Hunting groups such as the Safari Club and the Gallatin Wildlife Association also dislike a new policy in the plan stating that, unless the rancher agrees, FWP will not ask federal land managers to rescind grazing leases that put domestic sheep into bighorn range.

Department officials point out that allotments affect only a few of the state's 45 bighorn herds. And they defend efforts to work with the sheep industry, which supports the plan. "We don't think bighorn sheep management can be effective over the long term without collaborating closely with domestic sheep producers," says Quentin Kujala, chief of the FWP Wildlife Management Section.

The "Montana Bighorn Sheep Conservation Strategy," which includes the management history and plans for each of the state's bighorn hunting districts, is available on-line at fwp.mt.gov.

DONALD M. JONES