Shining a light on MOOSE

Are these popular big game animals disappearing from parts of Montana? FWP research biologists search for better ways to track population trends while learning what causes the large, long-legged forest dwellers to die.

BY TOM DICKSON

Every year during his three decades as the area wildlife biologist in Thompson Falls, Bruce Sterling has faced a moose management dilemma. "On one hand, I wonder if I'm issuing more hunting licenses than the moose population can support," he says. "On the other, if the population can withstand a higher harvest and I don't issue enough licenses, I'm denying hunters the hunting opportunity of a lifetime."

Sterling isn't alone. Across Montana's moose range, wildlife managers hampered by sparse data struggle to manage the large, charismatic game animals. Most frustrating is not knowing how moose populations are "trending," or increasing or decreasing in size. Without that data, biologists can't know with certainty to what extent they should decrease or increase hunting harvest from year to year, according to Justin Gude, head of FWP wildlife research. What's more, says Gude, "if they don't know which factors are driving populations, whether it's predators or habitat succession or something else, they have a tough time knowing how to respond when moose numbers start dropping."

MOOSE UNDER THE RADAR

For decades moose management in Montana ambled along much like moose themselves—slowly, quietly, and largely out of view. *Alces alces* is a popular animal. A sighting can be the highlight of a vacationer's summer, and hunters compete for scarce moose tags. Each year roughly 25,000 hunters apply for the 500 to 1,000 moose hunting licenses that FWP provides. Yet abundant elk and deer attract far more attention from hunters, wildlife watchers, and FWP biologists. In 2010, hunters shot 25,000 elk and 95,000 white-tailed and mule deer combined. The moose harvest was just 292.

Moose emerged into the spotlight in the mid-1990s, when hunters and landowners began reporting fewer of the animals in parts of western Montana. At the same time, hunter harvest success rates began declining, and successful hunters spent more days afield to kill their moose. Then came the drought and high temperatures of the 2000s.

Moose require cold, wet climates, making much of Montana too warm and dry for their survival. During the drought years, summer

FAMILY TROUBLES? In the 1990s moose observations were down, as were hunter harvest rates. Then came the drought years. Hunters and FWP wildlife biologists began to wonder: Were Montana's moose in decline?

SUMIO HARADA

and winter temperatures hit record highs while rain and snow were sparse. In another moose state, Minnesota, biologists had begun documenting moose population declines during the drought decade. It seemed logical the same would be true in Montana.

What's more, logging and wildfires had been curtailed. In previous decades those forest disruptions had opened large chunks of canopy to sunlight, boosting growth of the willow shrubs that moose eat in winter. Now those early succession forests were aging. To top it off, wolves, black bears, grizzly bears, and mountain lions were increasing across Montana's moose range. Adding up the anecdotal evidence, it appeared that moose might be in trouble. "The thing is, we didn't know for sure," says Gude. "And if populations were in fact declining, we didn't know why. We needed to find out."

Other moose states and provinces with similar concerns had begun searching for answers. In recent years Minnesota, Ontario, North Dakota, Wyoming, and Utah had evaluated the status and management of their moose populations and begun field research to learn more. Now it was Montana's turn.

Tom Dickson is editor of Montana Outdoors.

CENTRAL CLEARINGHOUSE

FWP's first step was to consolidate the department's moose information. Because no FWP biologist was dedicated solely to moose, information was scattered among more than a dozen area offices. Data resided in typed reports, computer files, and even hand-written field books half a century old. To do the legwork, Gude hired Ty Smucker, a research associate at Montana State University's (MSU) Ecology Department. Smucker's job was to interview state and federal biologists in Montana's moose range and pore over survey information, harvest reports, and other data. The goal was to identify knowledge gaps hampering moose conservation and management.

Most biologists told Smucker that moose populations in their area appeared to be either stable or decreasing. Declines were particularly alarming in the Gallatin and Big Hole Valleys, historically moose strongholds. Smucker found some exceptions. Gary Olson, wildlife biologist in Conrad, reported seeing more moose along the Rocky Mountain Front in recent years than at any time during his 34 years working there. And Ryan Rauscher, wildlife biologist in Glasgow, was seeing growing numbers of moose in the state's northeastern region, likely migrants from Saskatchewan.

Statewide harvest data that Smucker compiled told a grimmer story. The number of FWP-issued moose permits statewide dropped 40 percent from 1995 to 2010, from 769 to 463. Success rates also dropped, from an average of 85 percent in the 1990s to less than 70 percent in 2009. And

REGAL RACK Montana's Shiras moose is the smallest of the four moose subspecies. Alaskan moose may weigh 25 percent more and sport much larger antlers. Even so, Shiras moose remain a coveted trophy in Montana for both hunters and wildlife watchers.

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MONTANA'S SHIRAS MOOSE

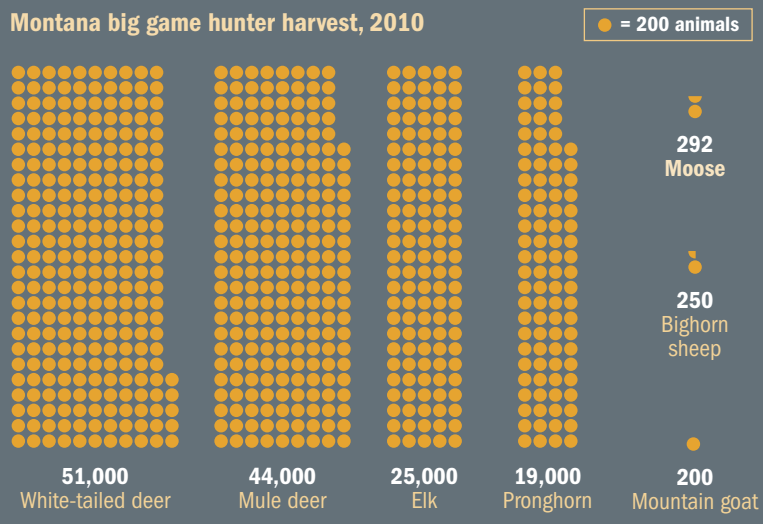
RIGHT: Though popular, moose comprise only a tiny portion of Montana's big game harvest each year. As a result, moose management for years took a backseat to elk and deer.

BELOW LEFT: Over the past 25 years, moose hunters have been less successful even while putting in more effort.

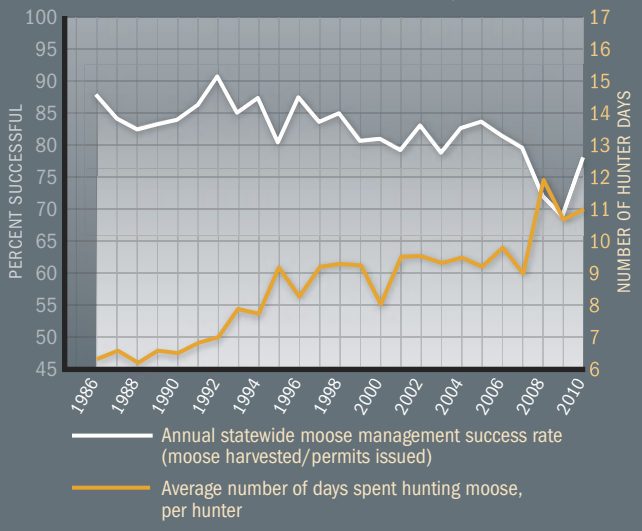
BELOW RIGHT: Though some moose hunting is available throughout much of Montana, almost all harvest is west of the Continental Divide.

BOTTOM: Though moose harvest peaks and valleys over the past half-century are not uncommon, declines since the mid-1990s have worried biologists, hunters, and others who like to see the large, long-legged animals.

Montana big game hunter harvest, 2010

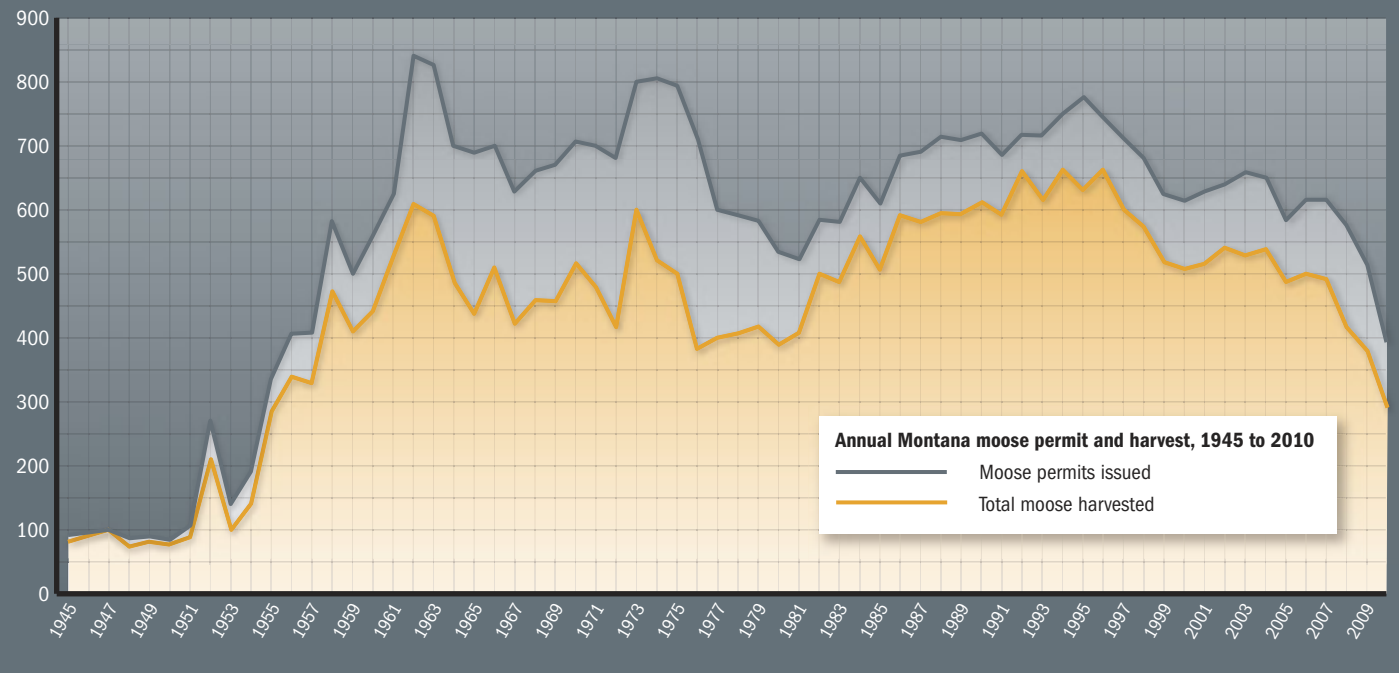


Moose success rate and hunter effort, 1986–2010



Moose permits by region, 2010

Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7
155 permits	45 permits	236 permits	13 permits	10 permits	2 permits	0 permits
33%	10%	51%	3%	2%	<1%	



successful hunters required more days to bag a moose than in previous years, from an average of 6.5 days in the late 1980s to about 10 in the first decade of the 2000s.

Whether these figures reflected a declining statewide population was open to debate. In most of the state's moose range, biologists say they can only guess at local population numbers and trends. "And when there's doubt, biologists have to be very conservative with the harvest quotas they set," says Gude.

For an animal that can weigh 1,000 pounds and stand 6 feet at the shoulder, a moose is surprisingly hard to spot, even from the air. Moose stay in thick timber, which is cooler in summer and warmer in winter and where their dark coats render them nearly invisible. Moose are best viewed from the air, during winter, but even then they emerge into open areas infrequently.

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Total Montana moose harvest in 2010

Smucker found that in most of Montana, biologists have done at least some aerial moose monitoring. Unfortunately, the results often have limited value for estimating population trends. The most consistent helicopter and airplane surveys occur in the Cabinet, Purcell, and Yaak areas in the northwest and the upper Big Hole Valley and Gravelly Complex (Ruby River and Centennial Valleys) in the southwest. "Most other survey work was spotty—done at widely varying times of year, or in small areas, or without information on snowpack or other factors that influence moose concentrations in winter," Smucker says.

After analyzing the findings, Smucker, Gude, and MSU ecology professor Bob Garrott concluded that in order for FWP to set harvest quotas with more confidence and respond to population declines, the agency needs two things: additional and more-reliable information on long-term moose population trends; and a better understanding of how predation, habitat, disease, parasites, and climate affect moose populations. An FWP research project starting this year is designed to provide that information.

FINDING BETTER WAYS

Ideally, each biologist in moose range could request a piloted helicopter at a moment's notice when viewing conditions were optimal. But aerial survey work is costly, time consuming, and hard to predict. A goal of the new study is to find less expensive ways of estimating population trends.

FWP biologists currently use hunter harvest information, gathered each fall at check stations and in winter from phone surveys. Yet no one is sure how the information corresponds to moose population trends. "Just because only 60 percent of moose hunters in a hunting district were successful doesn't necessarily mean there weren't many moose there," explains Vanna Boccadori, FWP wildlife biologist in Butte. "It could be that hunting conditions were particularly bad that year, or that trophy hunters were passing on smaller bulls."

The new study will compare harvest data over the past several decades to aerial surveys in portions of southwestern and northwestern Montana that have long-term survey data. Researchers will see if harvest success increases in years when biologists spotted more moose from the air during the previous winter. And, if so, are the two rates of increase similar? If the moose researchers can detect a strong statistical correlation, then biologists who don't do aerial surveys could make better use of hunter harvest data to estimate population trends.

Another way to determine population trends may be to track observations of moose by elk and deer hunters. Researchers in the new study will compare hunter observations with aerial population surveys to see how well the two match up. "If there's a strong correlation, that could be real helpful, because with hunters you have a lot of accurate eyeballs out there," says Sterling, the Thompson Falls biologist.

Researchers will also examine how accurately aerial surveys reflect actual moose numbers on the ground in various habitat types. "When I'm flying, I assume I'm seeing at least the majority of the moose population down there," says Boccadori. "But I'm not certain, so we need to test that assumption."

Researchers will also look at the feasibility of surveying moose in "trend areas" that could reflect larger populations. And they will determine if tracking survival rates of moose cows and calves can provide insight into population trends. "The bottom line for the monitoring portion of the study is to find ways for us to get accurate moose population trend estimates without spending extra money," says Gude.

The study's other half will look at factors driving moose survival. Over the next three years, FWP's new soon-to-be-hired moose research biologist and other FWP staff will capture and radio-collar 30 cow moose in each of three study areas—the East Cabinets south of Libby, the Beaverhead Mountains of the upper Big Hole, and the Rocky Mountain Front from western Teton County northeast to the Sweet Grass Hills. They will then monitor the fate of those moose during the next seven years. "If we don't know what drives moose survival and recruitment [the percentage of young that survive one year], then we don't know how to respond if numbers are declining," says Gude. "Do we increase predator harvest? Work with landowners and federal agencies to improve moose habitat? Decrease hunter harvest? We can't do everything, and some things are much harder and more expensive than others. We need to know if they are worth doing."

LINKING HARVEST TO POPULATIONS Does an increase in hunter harvest indicate a growing moose population? FWP biologists aren't sure. A new study should help answer the question.

HEADING FOR SAFETY One goal of a new multiyear FWP study is to learn what causes moose to die. Inadequate habitat? Predators? Parasites? Other factors? "We can't help moose if we don't know what's driving survival rates," says one biologist.

LEFT TO RIGHT: PAT MUNDAY; JOE MCDONALD

Researchers' other goals for the ambitious ten-year study:

- Learn how various habitats affect moose survival. Researchers will analyze fecal pellets to learn what plants moose are eating. To track the nutritional quality of those foods, they will use ultrasound equipment to measure body fat in captured moose and monitor the percentage of cow moose that give birth to twins.
- Find out to what extent parasites such as brain worms (carried by white-tailed deer), arterial worms (carried by mule deer), liver flukes, and winter ticks are killing moose.
- Examine how heat affects moose, which become stressed at temperatures above 23 degrees Fahrenheit in winter and 59 degrees in summer.
- Learn if bears are killing a higher proportion of newborn moose along the Rocky Mountain Front and East Cabinets, where bear numbers are higher, than in the upper Big Hole.
- Determine whether predation by wolves is higher in the East Cabinets, which consistently has a higher number of wolves than the other two study areas.

If researchers can secure additional funding, they will also try to determine the cause of moose calf mortality. In each of the three study areas, researchers will capture and radio-collar 30 newly born moose and track the animals over the following year to learn the cause of any deaths.

Gude says the research team will share their findings with biologists throughout the study period. "This entire project is driven by management needs," he says.

For Sterling, the information won't come a moment too soon. "Right now, I have very limited data on the number of moose out there," he says. "What we need is a better comfort factor when we're setting quotas. That's what we want, and that's what hunters want."