

Why are moose populations declining?

Poor habitat, disease, parasites, predation and more are all playing a role.



Doug Sobey

By **Steve Kilpatrick**, *Habitat Biologist, Wyoming Game and Fish Department*

Moose are relative newcomers to the state of Wyoming. The journals of early explorers indicate moose were rare here prior to 1850. However, by 1916 it was estimated that there were 2,000 moose in western Wyoming. In addition to natural dispersion throughout the western part of the state, managers transplanted moose to the Bighorn Mountains in the late 1940s and early 1950s. Moose were also transplanted from the Jackson area to North Park and the Upper Laramie River in Colorado from 1979 to 1987. Moose from the Colorado transplant expanded their range back into the Snowy Range west of Laramie, Wyo., where a thriving population now exists.

The first Wyoming moose hunting season occurred in 1915, with the issuance of 19 licenses. Today, the Wyoming Game and Fish Department manages the state's moose resource on a Herd Unit concept. Herd Units are defined by a distinct geographic area where immigration and emigration of moose between the units is considered to be minimal (less than 10 percent). Population objectives are established for each Herd Unit and are based on ecological and social constraints within each unit. The state's 10 Herd Units are further divided into hunt areas where harvest strategies are developed to address specific management issues within specific portions of each unit.

The overall Wyoming moose population has generally declined during the past 10 to 15 years (see table at right).

The number of licenses issued to hunters was fairly consistent from 1980 through 2003, ranging from a high of 1,919 licenses in 1990 to 1,147 in 2003. Since 2003, managers have generally reduced the

number of licenses available to hunters due to population declines in most Herd Units. Exceptions are the units that received relatively recent transplants – the Bighorn and Snowy Range herds.

The Jackson Herd Unit appeared to be the one experiencing the most precipitous decline in numbers. It started experiencing a population decline in the early to mid-1990s, as evidenced by the decrease in aerial trend counts and animals harvested. The population continued to fluctuate after the early 1990s, and by 2007, populations appeared to be what they were in the late 1970s, and calf ratios were the lowest they had been in the previous 30 years.

In 2005, the Wyoming Game and Fish Department teamed up with the University of Wyoming Cooperative Wildlife and Fisheries Unit to address the declining moose population in the Jackson Herd Unit. Previous researchers indicated there might be habitat issues within the unit, and it was thought that predation by bears and wolves could be a factor as well. Researchers and managers identified three main research objectives for a study of the Jackson Moose Herd Unit using GPS and VHF radio collars:

- 1) Investigate moose seasonal movements and habitat selection;
- 2) Evaluate their physical condition and nutritional status;
- 3) Estimate reproductive parameters, calf survival, adult female and male survival and the rate of population growth.

The first phase of this research project was completed in 2008, and the major findings are summarized in the box at right. Game and Fish and others have initiated a second phase to the research project that is investigating habitat conditions, nutritional quality of browse, adult cow survival, pregnancy, parturition and calf survival, moose diets and predation parameters. This phase should be completed this year.



While the Jackson herd has seen the steepest decline, all other Herd Units in western Wyoming have also experienced declining populations. Located in the west central portion of the state, the Sublette Moose Herd Unit – the largest moose herd in Wyoming and possibly the lower 48 states – is a good example. The number of harvested moose in that unit decreased almost 40 percent – from 712 in 1990 to 270 in 2008. The Sublette unit receives very limited predation from two relatively new and effective predators, wolves and grizzly bears. And even though this moose population appears to have stabilized in recent years, it appears that something in addition to or besides predation is affecting moose populations in many Herd Units. Moreover, all western Wyoming Moose Herd Units show signs of declining populations during similar timeframes, the early 1990s and/or early 2000s. This indicates something region-wide may be affecting moose populations. Possibly the drought from 2000 to 2008 had an effect.

Moose Population Trends for the Herd Units closest to Jackson				
Population estimate vs. population objective by year				
Herd Unit	1980	1988	1998	2008
Targhee	130/NA	300/130	761/750	612/750
Jackson	2,200/NA	2,350/2,200	3,077/3,600	970/3,600
Sublette	2,502/NA	5,790/5,500	5,700/5,500	4,768/5,500

Findings: 2005-08 study of Jackson Moose Herd

- The nutritional quality of available forage may be the most important determinant in limiting population growth.
- Drought and climate change relating to forage quantity and quality may also be contributing to population declines.
- Moose generally seek nutritious forage resulting from wild and prescribed fires. However, the large-scale fires of 1988 may have removed thermal cover (conifers), resulting in additional thermal summer stress and animals entering the winter in reduced physical condition. (Research shows that temperatures above 57°F stress moose.)
- Measures of physiological health of adult female moose indicated they were in moderate physical condition and appeared to have deficiencies of several important nutrients. Consequently, they may be more susceptible to environmental stressors, resulting in increased mortality and decreased reproductive performance.
- Diseases and parasites did not appear to be impacting moose. (This was prior to the Wyoming Game and Fish Department’s sampling efforts for carotid artery worm.)
- Low reproductive potential and decreased spring survival of adult female moose indicated habitat may be the primary limiting factor.
- Although the potential effects of predation cannot be discounted as a contributing factor, calf and adult survival rates indicated that predation was relatively low.

Minnesota has concluded that the loss of an entire moose herd of 4,000 in the northwestern portion of that state is due to factors associated with climate change. The Green and Bear River drainages have fallen below the 113-year precipitation average for the past 11 years. Similar situations exist for the Snake and Wind River drainages in Wyoming. But if drought or climate change is the culprit, why are the Snowy Range and Bighorn Herd Units, which have stable-to-increasing moose populations, not affected?

What about parasites? Moose in western Wyoming are often seen with a heavy infestation of winter ticks. Winter tick (*Dermacentor Albipictus*) infestations are thought to be a contributing factor to population declines, especially when associated with other stress factors, such as poor winter forage and severe winters. Infestations can exceed 100,000 ticks per animal. Likewise, the relatively frequent occurrence of carotid artery worms (*Elaeophora schneideri*) prompted the Wyoming Game and Fish Department to initiate a sampling effort in 2009 that continues today. More than 200 moose samples have been acquired so far from hunter kills, vehicle collisions and other mortalities. Carotid artery worms were found in approximately 50 percent of the moose sampled. It is not known how this parasite affects moose, other than it can cause blindness and impaired circulation to the brain and head area. Specific impacts to moose have not yet been well researched and documented.

The first phase of the Jackson study indicted that habitat issues are most likely contributing to the decline of moose in that herd. Other habitat factors besides extensive removal of summer thermal cover caused by large-scale fires include the lack of fire within important winter ranges. Fire suppression has resulted in advanced succession stages and the conversion of many nutritional mountain shrubs and aspen to conifers on winter ranges. Aspen, a highly preferred browse plant for moose, has experienced a decline of approximately 50 percent in Wyoming. Many western states and Canadian provinces use mechanical and prescribed fires to set back succession and promote more palatable and nutritious browse species for moose and other wild ungulates. The Wyoming Game and Department is also actively pursuing similar habitat enhancements with the U.S. Forest Service, Bureau of Land Management and private landowners. Conservation easements designed to preserve and enhance moose habitat on private lands are also being pursued.

In summary, the potential reasons for declines in many of the Wyoming moose herds is most likely a combination of complex habitat and nutrition factors (micro nutrients, over-browsing, old-age plants, habitat fragmentation, fire suppression, etc.), diseases, parasites, predation, climate change and competition with other ungulates for forage. Some factors may play a more important role within certain areas than others. Factors may also have varying effects over time. For example, over-browsing and parasites may be the initial cause of a population decline, while a simultaneous increase in predators, carotid artery worms and winter ticks may continue to keep the population suppressed.

The Wyoming Game and Fish Department continues to partner with the University of Wyoming, industry and private organizations to further investigate moose declines. Visit the department’s website for the Moose Working Group’s page: <http://gf.state.wy.us/wildlife/Moose/index.asp>, which offers a wealth of links to additional information on moose from recent research, workshops and conferences. ■

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