

BIOLOGISTS EXPLORE

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THE

terries of Moose

BY KAT BAGLEY

Moose have become an emblem of New Hampshire, appearing on license plates, bumper stickers, keychains and coffee mugs. Tourist companies advertise sightseeing in “Moose Alley,” hiking on Moose Mountain, or fishing Moose River. Our local celebrity species, they provide hours of outdoor entertainment to hunters and wildlife watchers. With a current population of about 6,500, who could imagine that during the late nineteenth and early twentieth centuries, the moose population in New Hampshire was estimated at fewer than 50?

To protect this important resource, the New Hampshire Fish and Game Department, in partnership with the University of New Hampshire, recently completed a five-year comprehensive study of moose mortality, reproductive rate, and survival and habitat factors to more fully understand the myths and mysteries surrounding these famous New Hampshire residents.

A New Hampshire Legacy

Moose have been a major part of our state’s culture for hundreds of years. The first European settlers to live in what is now New Hampshire harvested them so excessively that by 1898, only 13 moose remained. An increase in agriculture during the nineteenth century destroyed suitable moose habitat and hindered the possibility of the population’s recovery. With its majestic symbol disappearing, the state passed legislation in 1901 prohibiting the hunting of moose, and it remained that way until the 1980s.

Management and habitat conservation strategies over the past 20 years have helped moose numbers increase dramatically. The abandonment of farms and the land’s return to natural growth has opened up new available habitat. Hunting, started in 1988 with 75 permits issued for a three-day hunt in the North Country, now helps to control both population dynamics and

adult sex ratios (the number of males to females). Each year, biologists track information about moose from deer hunter observation reports, data on moose-vehicle collisions and measurements taken from hunter-killed moose. To gather more information on moose habitat use and rates and causes of mortality, Fish and Game and UNH biologists started their most recent collaborative study in 2001.

Moose Round-up

Like modern-day cowboys swooping in with helicopters and nets, members of the Hawkins and Powers Wildlife Capture Team from Wyoming were brought in to capture individual moose during the 2001, 2002 and 2003 winters in Coos County. During the capture, biologists attached VHF radio collars and eartags to each moose, and monitored the heart rate, temperature and respiration to ensure individuals were in good health when released. Researchers also collared nine moose with Global Positioning Systems (GPS) to identify fine-scale seasonal movements and habitat use. A total of 92 moose were successfully released as part of the study. “We only tagged females and calves because they have the most impact on the growth of the population. Overall, it has given us some great information,” says N.H. Fish and Game’s Moose Project Leader, Kristine Rines.

Since the project’s start in 2001, researchers have been carefully tracking moose on foot, by plane and with satellites to determine habitat preferences and seasonal movement. To help effectively manage the moose population, biologists studied reproductive rates, mortality rates and causes, and habitat use and home range size. “We conducted the study because we wanted to know what percentage of moose we were losing to what causes and what habitats might influence these rates,” says Rines.

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Habitats and Home Ranges

A healthy, sustainable habitat is critical for moose, the largest mammal in New England, as it is for all wildlife. Moose eat 1.0 to 3.5% of their body weight every day. The average adult moose in New Hampshire weighs 855 pounds, so depending on the season, these moose are required to eat between 8.5 and 26.5 pounds of browse per day! Moose also have a low tolerance for heat. In the winter, temperatures above 23° F

Researchers collar a cow moose as part of a study by N.H. Fish and Game and UNH. She will be released unharmed after vital signs are measured.

can make them pant; summer temperatures higher than 57° F can cause heat stress. Without a habitat that provides an ample food supply and shade for warm weather, moose in New Hampshire are at risk.

Because of these biological requirements, researchers placed a heavy importance on studying seasonal habitat preferences and home ranges using data collected with VHF radio and GPS equipment. What they found is that New Hampshire moose tend to have home range sizes that correspond with the availability of food and timing of reproductive behavior. During the summer and fall, when food is abundant and adults are mating, moose have a broad feeding pattern and larger home ranges. They prefer habitats that provide cover from the sun; close to young regrowing hardwoods; and supplied with readily available aquatic resources — and they are attracted to nearby roadside salt-licks (from road treatments). In the winter and spring, when food is

limited and cows are pregnant or giving birth, moose don't range as far, staying in habitats with high concentrations of forage and protective cover for calves.

“If you look out the window, you'll probably see good moose habitat,” says Rines in her New Hampton office. “They are typically generalists, which makes life a lot easier for them.” Current forest management practices tend to provide excellent options for moose. For example, small-scale timber harvesting is beneficial because it helps to keep both young and mature forest growth available. On the other hand, large-scale clear-cutting, urban development and — surprising to some — large tracts of even-aged habitat are all detrimental to moose.

A Growing Population

Moose breed during New Hampshire's scenic autumn months. With a series of cries from females, plus fighting and antler-locking by males, the “rut” is a wild time for moose populations. Cows have a gestation period of approximately 225 days and give birth during spring. Questioning the reproductive success and population growth rate of New Hampshire moose, biologists tracked the pregnancy rates for female adults and yearlings during the five-year study. They found that roughly 78% of tagged cows were pregnant each winter, and 85% of these successfully produced young in the spring. Only 20% of female yearlings became pregnant annually, and 30% of these are successful. Interestingly, New Hampshire had a good twinning rate of 11%. Researchers also found that a high majority of the reproducing females calved in consecutive years. The consistently high pregnancy rate and the high neonatal survival rate suggest an extremely healthy and



productive population supported by good habitat.

One particular area of the study focused on neonatal (calves less than 6 months old) habitat characteristics. Newborn calves have limited mobility for 1-2 weeks after birth. Biologists discovered that neonatal sites are frequently within mature spruce/fir or mixed forest habitats. Neonatal sites are not significantly different from adult habitat preferences overall, but some characteristics — such as tree and vegetation densities — may help reduce predation, therefore increasing the likelihood that calves will survive.

Neonatal calves are also much less susceptible to “winter tick” outbreaks because of the time of year they are born (late May to early June). Winter ticks are parasites that attach themselves to large mammals like deer and moose in the fall, so older calves, still in their vulnerable first year of life, take the brunt of the ticks’ heavy toll. This might explain the mortality trend showing neonatal calves having a much lower mortality rate, 23%, than older calves 6 months to a year old, which have an average mortality rate of 51%. Adults have mortality rates between 8 and 15%.

Why Are They Dying?

Of all the collared moose, 39% died during the course of the five-year study. The major causes of mortality included hunting, moose-vehicle collisions, and winter tick. Hunting caused 18% of the deaths. Moose-vehicle collisions made up 26% of mortalities, with half of these happening in May and June and more than half of them occurring near roadside salt-licks resulting from years of winter road management.

Winter tick caused the highest mortality rate of 41%, and almost 90% of these victims were younger than one year. The ticks’ feeding actions severely aggravate moose, which will try and scrape them off, usually rubbing away thick winter hair and leaving skin exposed and raw in the process. In an average year, most moose will host about 35,000 ticks, but in a heavy tick year, moose can become infested with up to 160,000 ticks per moose — about 50 ticks per square inch of hide. During the 2001/2002 winter season, a major tick epizootic killed a large portion of calves and yearlings, upwards of 84%, greatly affecting the population growth and raising concern about future outbreaks. Early dry springs followed by warm dry fall weather favors ticks. Because of this concern, biologists plan to monitor tick rates annually.

Saving a State Symbol

Despite winter tick outbreaks threatening the survival of young moose, New Hampshire’s moose population is thriving.

“There is a tendency to believe that now that



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An average of 1 person and 250 moose are killed on New Hampshire roads each year as a result of moose-vehicle collisions. Drivers can minimize risk by staying alert and slowing down.

we have this research, we know everything there is to know. But we are dramatically changing the environment every day, and will need to watch our wildlife carefully,” said Rines. “Moose are vulnerable to environmental changes, such as temperature increases and our rapacious land development practices, so it is important that we continue research and monitoring efforts.”

Moose are an integral part of our heritage, and the conclusion of this five-year study is representative of N.H. Fish and Game’s dedication to future conservation efforts for moose. The research will have a positive impact far beyond its benefits for the moose population, says Rines, “because moose use such a wide array of habitats, by protecting them, you are protecting the habitats of many other species as well.”

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