

MOOSE IN SOUTHERN NEW ENGLAND

SCIENCE BLASTS



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The distribution of the North American moose (*Alces alces*) has undergone some dramatic changes in the northern United States in the last two to three decades. The core of the geographic range of the species in North America is across boreal Canada and into Alaska, but moose dip well into southern New England, the northern Great Lakes, and down the Rocky Mountains into Utah, Wyoming, and Colorado. In the Northeast, moose were present historically as far south as Pennsylvania and New Jersey before colonial times, but land clearing and unregulated hunting pushed the population well into the north. As forest cover returned to southern New England (SNE) and effective game laws became the law of the land, moose started to make their way back south until, in the 1980s and 1990s, a population was established and is now breeding in Massachusetts and Connecticut.

The Massachusetts Cooperative Fish and Wildlife Research Unit, along with the Massachusetts Division of Fisheries and Wildlife, and Department of Conservation and Recreation, have been studying moose in Massachusetts for the past 10 years. According to Dr. Steve DeStefano, Unit Leader, and Postdoctoral Associate Dave Wattles, the moose population increased exponentially from the 1980s until the mid-2000s, and then likely declined to a lower carrying capacity where it has remained relatively stable. The story has been different

elsewhere, though, particularly in Minnesota. For decades, the upper Great Lakes region of the Midwest, centered on Minnesota, has been a stronghold for moose. In the past few years, however, numbers of moose have plummeted in Minnesota, to the point where hunting seasons have been closed and the abundant and iconic image of the Northwoods has become a species of concern. Researchers believe that climate change, particularly increasing temperatures have interacted with brain worm (*Parelaphostrongylus tenuis*) and other diseases to negatively impact moose survival. In addition to these factors, wolves (*Canis lupus*), in areas where they are abundant, are thought to be playing an increasing role in suppressing moose numbers.

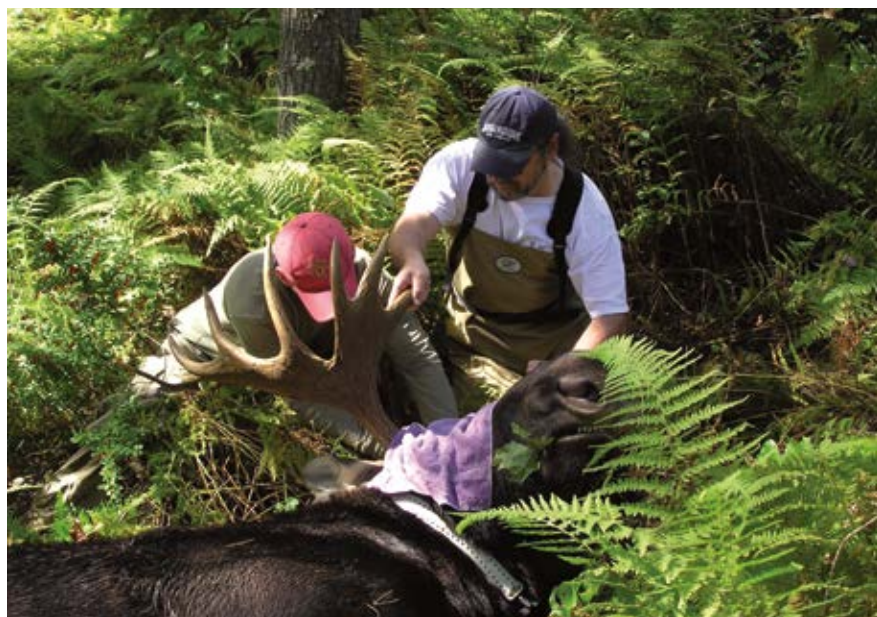
So what can the moose population in southern New England tell us about moose elsewhere, and why does this population at the extreme southern edge of its range, where it is clearly warmer and the habitat is decidedly different from the boreal forest, appear to be holding its own? Co-op Unit research indicates four key components that appear to work synergistically to keep the moose population relatively stable, for now.

Drs. Dave Wattles and Steve DeStefano of the Massachusetts Cooperative Fish and Wildlife Research Unit attach a GPS collar to a bull moose in west-central Massachusetts.

The first is habitat: Animals on the edge of their range are typically not in prime habitat that usually exists near the center of their geographic range. The mixed deciduous-coniferous forests of southern New England may thus not be the best habitat for moose, but they do provide food and shelter. More importantly, however, may be the interspersed cover types. The disturbances that set back succession and encourage the growth of young woody vegetation that forms the majority of the moose's diet are very small scale and scattered on the landscape. Closed canopy forest and wooded wetlands are important shelters for moose during hot weather, especially in the warmer climate of SNE. This creates a mosaic of interspersed areas of food and thermal shelter, where moose can easily move into various patches depending on their needs, the ambient temperature, and the time of day.

The second key component is behavior: The movement data collected on moose fitted with GPS collars shows a clear pattern of habitat use based on ambient temperature. When it is hot, moose can be found in the canopied forest or wetlands, which are measurably cooler than out in the open. Feeding in open, young forest—which is so important in providing food—takes place when temperatures are lower, like at night or during times of day when it is cooler.

Third is density: The moose population in SNE will probably never be very high, but it is that relatively low density of individuals (about 0.14/km² [0.35/mi²] versus



0.03-5/km² [$<0.1-14/mi^2$] range-wide) that reduces the threat of winter ticks (*Dermacentor albipictus*) and diseases. Parasites and diseases are density-dependent phenomena. That is, generally the denser a population, the greater impact parasites and diseases can have. Winter ticks and diseases such as brain worm are indeed present in SNE, but currently the impact of these maladies is likely relatively low because of the low density of moose.

Lastly, are predators: There are two serious predators of moose in North America: wolves and grizzly bears (*Ursus arctos*). There are obviously no grizzly bears in the Northeast, and wolves have been absent from SNE for some time. Black bears (*Ursus americanus*) and coyotes (*Canis latrans*) likely take some moose calves but the incidence is probably low. Without major predators, not only are moose free from a major source of mortality, but they are also not being moved around and pushed out of either foraging patches or thermal shelter at inopportune times. This undoubtedly saves energy and likely improves the chance of survival, especially in a region with a warm (for moose) climate. Wolves provide many important ecological functions and are integral parts of natural communities; their absence in SNE creates a different set of circumstances for local ungulate populations.

The thermal environment of SNE is no doubt a challenge for a species like moose, which are so well adapted to extreme cold. However, a combination of ecological and demographic factors has allowed moose to not only re-establish their place in the region but may actually be keeping their population relatively healthy and stable. Moose populations constantly

change, for a variety of reasons, and it would not be unexpected to see some of those changes in SNE over the next few decades. As such, the Unit and its cooperators will continue to monitor population abundance and demographic parameters, like cow-to-calf ratios, occurrence of twin calves, bull-to-cow ratios, and other measures of population performance.

Legal hunting seasons for moose became re-established in Maine in 1980, New Hampshire in the late 1980s, and in Vermont in the early 1990s. Legal hunting for moose in Massachusetts would require an act by the state legislature, and the political obstacles may prevent this from ever occurring; but a limited, permit-based hunt, driven by scientific population

data may be an effective means to sustain the population at a level where density-dependent mortality factors will not trigger a decline and concerns regarding moose-vehicle collisions and regarding forestry could be addressed. ■

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