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WHAT'S BUGGING OUR MOOSE?

A THREE-YEAR STUDY IS UNDERWAY TO ASSESS THE TOLL THAT WINTER TICK IS TAKING ON NEW HAMPSHIRE'S MOOSE

BY KRISTINE **RINES**

New Hampshire Moose Study Roundup

Perched inside the pursuing helicopter, one of the wildlife capture crew members locates a moose for collaring and launches a net.

When the moose is caught in the net, one of the "muggers" jumps into action, undertaking the dangerous job of restraining the animal.

The cold was a problem. A big problem. After months of careful planning and preparation, weather was the one thing we couldn't control, and it was threatening to unravel all of our hard work.

Bitter cold had descended on New Hampshire's North Country, and it wasn't likely to be leaving anytime soon. The sub-freezing temperatures were wreaking havoc on the work at hand – collaring moose to try to get a handle on what is causing moose cows to be less productive and moose calves more likely to perish during their first year of life.

First Signs of Trouble

In the late 1990s, the moose population was at its peak in New Hampshire. About 7,400 animals lived in the Granite State. However, biologists were beginning to wonder why there weren't more. The population in the north seemed to be stagnant. Browse levels were good, but moose weren't responding. Could something be wrong? Plans were made to begin a five-year mortality and habitat study. Biologists had their suspicions that a small tick could be to blame, but without collaring and tracking moose, there was no sure way to tell if this parasite was the culprit.

The results of this study, conducted from 2001–2006, were conclusive and damning. Winter ticks were confirmed to be the primary cause of mortality for New Hampshire's northern moose. The life cycle of this tick species is very different from the "wood" or "dog" tick that we are most familiar with. Eggs are laid on the ground in June and hatch in August/September. Larval ticks climb vegetation and hunt or "quest" for a host as a group, interlocking their legs, so if one tick grabs onto a host, they all are able to clamber on board. They continue to quest until freezing temperatures or permanent snow cover kills the questing larvae.

Larvae that have latched onto a moose have found a safe haven for the winter. Here, they will take three blood meals and moult from larvae to nymph to adult, taking their last blood meal in March and April. These ticks will get on any warm-blooded host, but most hosts immediately remove and kill the majority of ticks by grooming. Moose, which did not evolve with these parasites, lack this grooming instinct. That's bad news for moose.

More Moose, More Ticks

The number of winter ticks in the environment is influenced by two things: weather and moose density. Put simply, the more moose you have, the more winter ticks there are. Based on our research in New Hampshire, winter ticks are rare when moose densities are around .10 moose/square mile. With more moose on the landscape (around .25 moose/square mile), we start to see higher levels of these ticks on moose. In general, moose densities are at, or above, this higher level from Concord north, with densities increasing as you go north, to a maximum of 2.23 moose/square mile north of Route 26.

Weather plays a big part in the tick life cycle. If you have weather that does not favor ticks, you can have very high moose densities and not have a tick problem. But the right kind of weather can cause tick loads on moose to explode. Ticks thrive in a fall weather pattern that is warm and snow-free, allowing ticks to quest (search for a host) for a long time. If this is followed by an early spring that melts snow from the ground in March and April, lots of female ticks will fall to bare ground and live to lay eggs. (If they drop onto snow,

The moose is then subdued with straps and sedated, so that biological data can be collected.

Before being released, each moose is fitted with a tracking collar and ear tags for monitoring and identification.

they die.) This weather happens from time to time in much of North America, causing occasional winter tick-caused mortality events. What we found in the 2001–2005 period was that this weather pattern is becoming the norm in New Hampshire. As a result, our moose are carrying heavy tick loads almost every year, resulting in increased mortality and lower body weights, with an associated drop in birth rates.

To further complicate the picture, in the southern part of the state, where moose densities are low and winter ticks are not as abundant, another parasite is causing high mortality in moose – brainworm. This parasite is carried by white-tailed deer; the more deer you have, the more brainworm. Brainworm causes no harm to deer, but when moose ingest the larvae, it migrates to their nervous system with devastating effect. Most moose infected with brainworm will die. In many North American moose jurisdictions that have deer densities above 10-13 deer/square mile, moose eventually decline to very low levels or die off completely. Deer densities are within or well above these levels from central New Hampshire south and also in the Connecticut River Valley.

Unfortunately, we have two parasites that can reduce our moose population. One, the winter tick, has the most impact in the north, the other, brainworm, has the greatest impact in the south.

Taking to the Air

Armed with new mortality rates from the earlier study, biologists felt that setting reduced moose hunt permit numbers would offset the increase in mortality caused by winter tick. This worked for a short time, but then we started to see further reductions in the moose population. By 2013, it had fallen to about 4,500 animals. Some of this decline was intended, as there had been more moose on the landscape in some areas than the public desired. But not all the decline could be attributed to management. Could the tick problem be worsening? There was only one way to find out, and so in January of 2014, as part of a study funded by federal Wildlife Restoration dollars, we hired a wildlife capture company out of Clovis, New Mexico, to capture and collar 45 moose this year and 45 more in 2015. But the cold wasn't making it easy.

Temperatures were frigid as the crew arrived and immediately set to work. In order to collar the moose, a crew of four flew at treetop level in an open helicopter. It gets pretty breezy and cold flying around with no doors! The extreme cold caused the stock of the dart gun to shatter on the first firing. Another stock was affixed, and it, too, shattered. Then the net in the net gun froze solid and wouldn't deploy. The helicopter fuel lines froze, necessitating an emergency landing. Two of the animal handlers, known as "muggers," developed frostbite. But the work went on.

In New Hampshire, winter tick is becoming a chronic problem leading to reduced productivity and chronic increased mortality.

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A young bull moose displays the tell-tale signs of being afflicted with a winter tick infestation, having lost almost half its coat.

In all, 43 moose – 21 cows and 22 calves – were collared in seven days of unrelenting cold last February. This spring, 15 of those animals died because of winter tick – fourteen of the calves and one adult cow. That translates to a mortality rate of 64% for calves and 5% for adult cows. This is within the range of winter tick mortality found in the first study, but as weather can dramatically alter the number of ticks, and hence the number of moose mortalities, it will take several more years of research before we know the range of current mortality rates.

Monitoring what happens to the collared moose is the realm of Henry Jones, a graduate student at the University of New Hampshire, which is partnering with Fish and Game in the study. Jones lives in Berlin when not at UNH attending classes. His job is to monitor the collared moose daily; locate dead moose and perform a necropsy as soon as a mortality signal is heard; check on collared cows and get visual proof of calving success and number of calves born; and keep visual track of these young calves to determine mortality rates. Then Jones has to analyze all the data and compare it to other studies and statistics.

It will also take several years of data to understand fully what is happening with productivity, but data from the first year suggests a decline in both pregnancy and twinning rates and a reduction in the sighting of calves at heel. This, coupled with an increase in young calf mortality, suggests that in New Hampshire, winter tick, instead of being an occasional source of increased mortality (as it has been in the past), is becoming a chronic problem leading to reduced productivity and chronic increased mortality.

Maine is currently conducting a similar study with GPS-collared moose, to assess the impact of winter tick on its 70,000-animal moose herd. We will be sharing and comparing information as these studies continue.

What Lies Ahead?

Winter tick is not a problem in the southern part of the state, because moose density (and therefore tick density) is very low. In the south, brainworm may be the cause of the moose population failing to grow. As long as deer densities remain high (above 10-13/square mile) in that part of the state, moose may stay at very low levels or continue to gradually decline. As moose continue to hold on in Massachusetts, they may hang on in southern New Hampshire as well, but only time will tell.

So, what does this mean for the future of moose in New Hampshire? If only our crystal ball were more clear. As winters get shorter in the Granite State, it becomes easier for white-tailed deer to survive, so our deer herd is growing. Shorter winters also cause an increase in winter ticks. Will moose be able to survive with high tick loads and increasing incidence of brainworm? We simply don't know.

We are faced with a changing climate, which, in turn, is changing the species composition of our wild world. Will we care enough to address the factors that are causing climate change? If we do not, we must be prepared for a New Hampshire with far fewer moose, shrimp and purple finch, to name a few species that are currently in decline. Their future lies in the hands of all of us.

Kristine Rines has been the New Hampshire Fish and Game Department's Moose Project Leader for 28 years.

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Take Action to Combat Climate Change

America must be a global leader in taking swift, significant action to promote policies that reduce carbon pollution – the underlying cause of climate change affecting our wildlife. Strategies are also needed to enhance ecosystem resilience and reduce our climate vulnerabilities.

Efforts to confront the climate crisis must include setting strong standards to limit carbon pollution from power plants and promoting a rapid transition to clean, responsibly sited renewable energy sources. For more information: visit ***nwf.org/moose***, call 603-731-0054 or email eorff@aol.com.

– Eric Orff, National Wildlife Federation N.H. Wildlife Biologist