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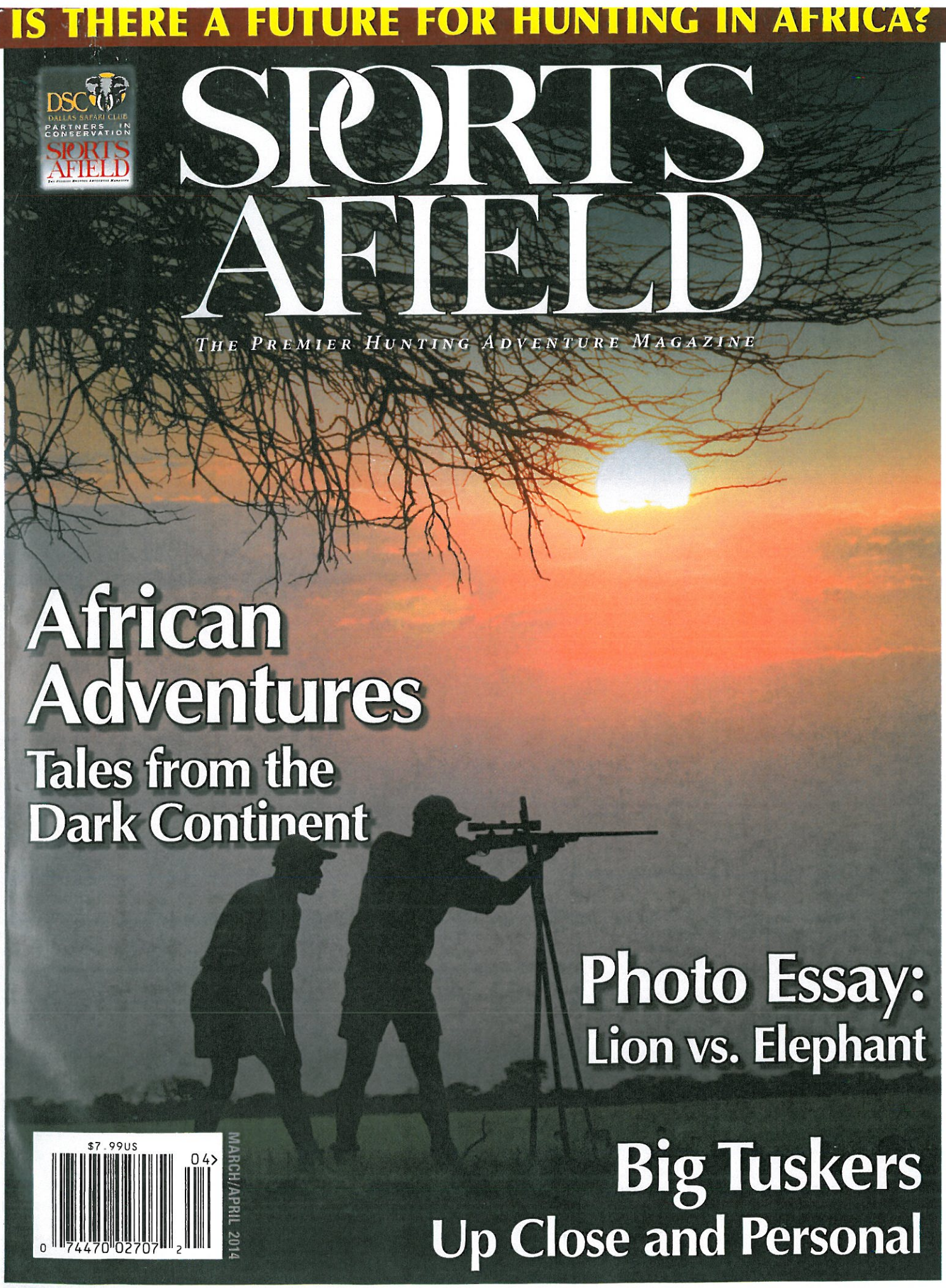

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THE MOOSE MYSTERY

Some say climate change is causing moose to decline throughout their range, but there's no actual evidence to support this.

VIC SCHENDEL

Predation, disease, and climate have always been involved in some complicated choreography of ongoing change in wildlife abundance, including that of the moose.

Moose are the largest living species of the deer family and are found throughout the northern mixed deciduous and boreal forests. Their range extends across North America and in Eurasia (where they are referred to as elk) from Scandinavia to Siberia. Their North American name is believed to be derived from the Algonquin word for "twig eater."

With adult bulls standing six feet and more at the shoulder, sometimes weighing in excess of 1,800 pounds, and carrying antlers more than six feet across, the moose is an extraordinary game animal pursued with passion by meat and trophy hunters alike. Providing more than four hundred pounds of quality meat, the giant deer helped sustain Native Americans for thousands of years, awed the early European explorers of this continent, and helped to provision the Hudson Bay trading posts throughout their long and bleak winters of isolation.

Fundamentally a creature of the northern climes, moose with their large bodies, long legs, and superb winter coats are highly adapted to regions of cold temperatures and deep seasonal snows. Indeed, this cold adaptation could be an impending liability. Unexpectedly warm winter or summer temperatures, if prolonged, can stress moose, while their overall range is significantly limited, southward, by warm temperatures. Unlike the caribou, with which they frequently overlap, moose are adapted to early successional habitat stages. In other words, they are animal "pioneers" that can benefit from landscape change and disturbance by fire, logging, or flooding.

As a result, moose have often benefited from human activities and in North America today remain, despite human population expansion, abundant and widely distributed in Alaska and Canada. In the Lower 48, they are found in Colorado and northward in the Rocky Mountain states as well as in northern New England and Minnesota. Their overall population in North America is estimated at 1 million animals or more. So, it would appear that for hunters and the public who just want to see moose, there is really nothing to worry about.

Yet, in various regions of North America, in a geographic pattern hard to explain—in British Columbia, Minnesota, Montana, New Hampshire, Wyoming—and in parts of Sweden, moose are declining; in some cases, at extraordinary rates. If there is an obvious pattern at all, it seems that moose populations on the southern edge of the species' range are being most affected while those farther to the north are not. However, because no single specific cause has been identified across the various regions, wildlife scientists and managers have struggled to find an ultimate driver for these observed declines. What could possibly affect moose populations over such a wide region, and why primarily in the warmest, most southern parts of their distribution?

Many scientists on record appear to favor climate change as the most likely influence. But how realistic a hypothesis is this and, if correct, what does it forecast for moose and other big game populations, and for the North American hunting tradition widely recognized as responsible for their rescue and recovery in the late nineteenth and twentieth cen-

About DSC

An independent organization since 1982, DSC has become an international leader in conserving wildlife and wilderness lands, educating youth and the general public, and promoting and protecting the rights and interests of hunters worldwide. Get involved at www.biggame.org.

turies? Does this pattern, if true, predict significant changes in other big-game populations and will this become one more challenge for those of us committed to keeping hunting and our North American Conservation Model alive? Is this moose decline really a bellwether of things to come? And, more insidiously, will the climate change issue be co-opted by protectionist or anti-hunting groups to argue for tighter hunting restrictions? Is this not already the case with polar bears? Are they the tip of a hunting iceberg?

For all these reasons, it is critical that we understand the current moose decline and not jump to conclusions before the scientific evidence warrants them. In my personal view, we are not there yet. While major research efforts ongoing in British Columbia, New Hampshire, and Minnesota will hopefully lead us there, to date no one has proven a direct link to climate change. Certainly, though, some of the factors implicated in the declines could be related to the recent warming trend observed in the Lower 48 states, where seven of the top ten warmest years on record have occurred since 1998 and where 2012 was the warmest year on record.

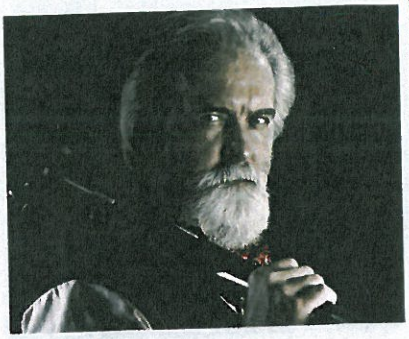
For example, the winter tick phenomenon implicated in moose declines in New Hampshire especially, and the brain worm and liver fluke parasites reported as possible culprits in Minnesota, certainly could be related to warmer conditions. During warmer winters, more eggs of winter ticks survive and the subsequent tick infestations on a single moose can reach incredible numbers of 100,000 or more. The constant blood feeding and biting irritation leads to anemia, secondary skin infections and starvation in heavily infected moose. It also results in thermal imbalance for moose as they try to rid themselves of the parasites by rubbing against trees, leading to extensive hair loss over large areas of their bodies. This leaves them vulnerable to cold spring rains and hot summer or cold fall temperatures. Such animals appear a ghostlike gray in color, gaunt and disturbing in their altered appearance and behavior.

Warmer temperatures and moisture are thought to worsen the infections caused by both brain worm disease and liver flukes. Brain worm disease is caused by a roundworm which harmlessly infects white-tailed deer but can cause paralysis and death in moose. Liver flukes, when transmitted from deer, can lead to liver damage and significant mortality in moose. Of course, milder winters can also increase the abundance of white-tailed deer themselves and more whitetails also means more liver flukes and more brain worm parasites to eventually reach moose through increased populations of snails and slugs.

Here, as with winter ticks, the effect of increasing temperature is not having an impact on the moose directly but indirectly, through enhancing other negative factors in the moose environment. Here is where the climate change debate becomes most interesting and most problematic. How can we ever disentangle the many impacts a changing climate may have on wildlife when the one certainty of natural systems is that a change in any one factor leads to cascading effects throughout? While this scientific challenge is real and will take time to unravel, we must guard against any tendency to explain away the uncertainties in wildlife ecology by simply referring to some great and all-inclusive force such as climate change. After all, what doesn't climate affect? Simply restating in scientific articles or newspaper columns the possible impacts a changing climate may have on moose or any other wildlife species does not furnish evidence, let alone proof of an actual cause and effect relationship. Yet, I sense this is exactly what may be happening: Repeat something often enough and people start to think it is real.

The changes that we are seeing in moose populations are real and, for the record, I believe climate change is real; but I also know that changes in climate and animal populations are not new and that moose populations—and caribou and lemmings for that matter—have experienced drastic changes in numbers for eons. Predation, disease, and climate have always been involved in some complicated choreography of ongoing change in wildlife abundance, as indeed has the abundance of the animals themselves through overbrowsing and habitat destruction. Certainly, as every wildlife researcher and lifelong outdoorsman knows, it is not change itself that is the unique phenomenon we must be wary of, but rather whether the pace and/or direction of change has now moved so far beyond the norms that we must conclude something unique is happening.

One thing is for certain, the declines in moose are already having effects on hunting and the overall "moose economy" in affected states. Meanwhile, the search for a cause of this decline is consuming millions of scarce dollars in research. If the climate change phenomenon is shown to be the driver of such change, we need to seriously reflect on how many species over vast areas of this continent will feel the impact and where this road leads for hunting in North America.



Shane Mahoney

Born and raised in Newfoundland, Shane Mahoney is a biologist, writer, hunter, angler, internationally known lecturer on environmental and resource conservation issues, and an expert on the North American Conservation Model.