Minnesota's Moose: Ghosts of the Northern Forest?

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Source: BioScience, 59(10):824-828.
Published By: American Institute of Biological Sciences
URL: http://www.bioone.org/doi/full/10.1525/bio.2009.59.10.3

Minnesota's Moose: Ghosts of the Northern Forest?

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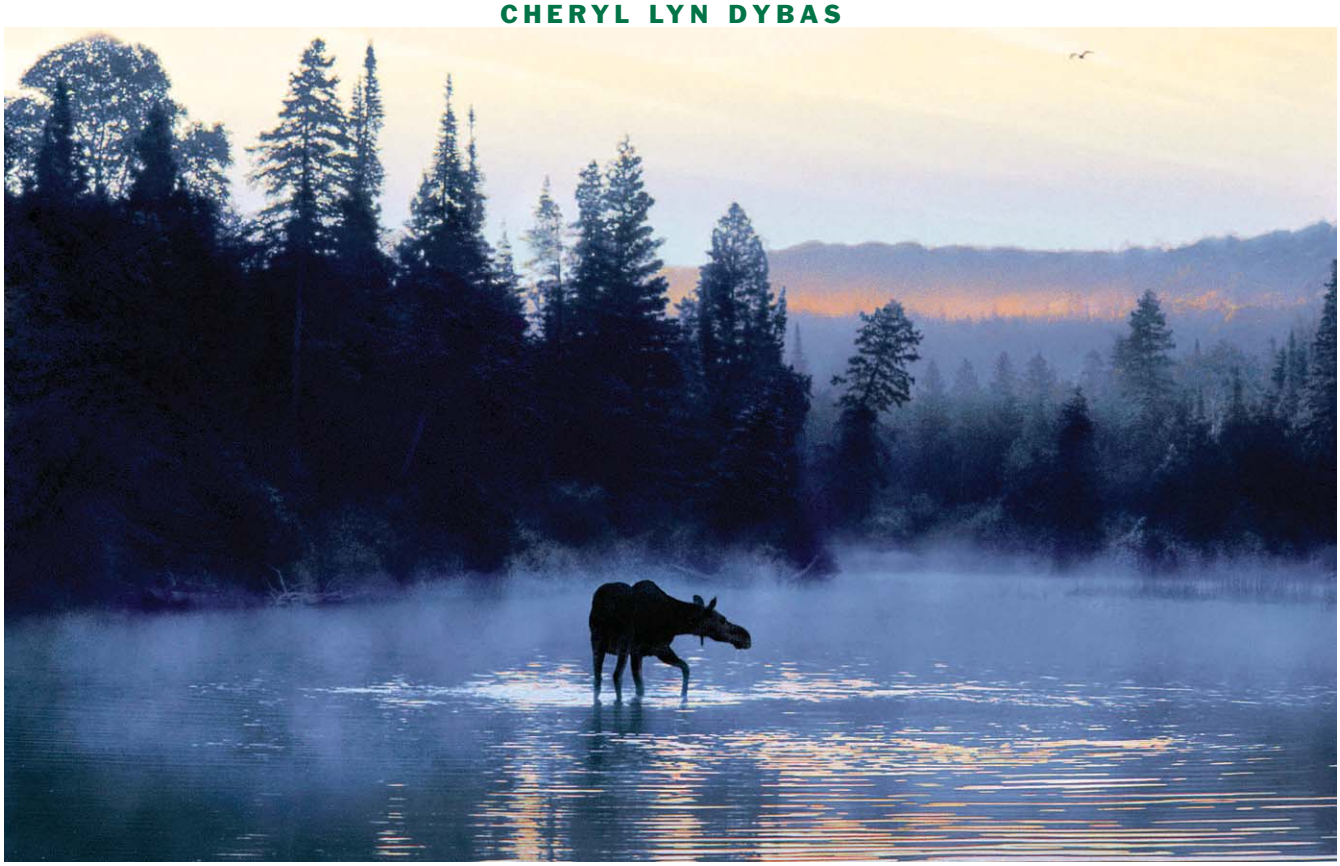


During a time the Ojibwe call the freezing-over-of-the-Earth moon—early winter—a moose makes her way through tendrils of fog on one of thousands of lakes and ponds in the North Woods. Photograph: Jim Brandenburg/Minden Pictures.

When the buffalo went away the hearts of my people fell to the ground, and they could not lift them up again.

—Chief Plenty Coups, Crow Tribe

Someday the moose, too, may be gone. Then all we'll have left is stories to tell.

—Norman Deschampe, Chairman, Minnesota Tribe of Lake Superior Chippewa/Ojibwe, Grand Portage Band

Gii-wen (Ojibwe for "so the story is told"), moose once vanished from the land. According to Ojibwe legend, an owl flew north and chanced upon the herd grazing on balsam fir trees. The moose were thriving, without humans. The Ojibwe, on the other hand, couldn't live without the moose.

Whither go the moose, so go the Ojibwe, says Norman Deschampe, chairman of the Minnesota Tribe of Lake Superior Chippewa/Ojibwe, Grand Portage Band. "Moose are at the center of our culture. Without them, we will cease to be Ojibwe. We've hunted moose since

BioScience 59: 824–828. ISSN 0006-3568, electronic ISSN 1525-3244. doi:10.1525/bio.2009.59.10.3

The glint of wisdom in his eye, "Old Man Moose," as the photographer refers to him, embodies the Ojibwe tradition of the seven generations: decisionmakers today should consider seven generations hence. Photograph: Jim Brandenburg/Minden Pictures.

chemaywe'ya, the way-back time, for subsistence. One moose can feed a family for several seasons." Now, says Deschampe, the Grand Portage Band can't locate enough moose to fulfill its allotted hunting permits. "We need to find out why this is happening."

On a February day in northern Minnesota, biologist Seth Moore and his assistants, Roger ("Poe") Deschampe Jr. and Jim Dahl, are hunting for moose, armed not with guns but with kits for collecting samples of moose sign. They work for the Grand Portage Band, on the tribe's reservation along Lake Superior's North Shore.

The researchers skitter along the ice-crusted backcountry Partridge Falls trail on snowmobiles, or "sleds," to Minnesotans. They're searching for a glimpse of what's fast becoming the state's most elusive animal. Once an icon of the northern wilderness, moose in and around Grand Portage are now rarely seen. "We're looking for tracks in the snow, scat left behind, broken branches of aspen and willow trees and other moose browse and hoping we see something," shouts Moore over the whine of the sleds' engines. "Moose were abundant here years ago. Now the odds of seeing even one aren't great."

Weakening winters

Black ice cloaks the road to Grand Portage, five miles from the Canadian border. The previous night, freezing rain cut a swath across Minnesota, knocking down trees and power lines. And therein lies a clue to the disappearance of the moose. In February, precipitation in northern Minnesota should be snow, not rain or even freezing rain. A midwinter thaw has settled over the land, lingering far past its time. "The crust covering everything," says Moore, "is the result of a too-warm winter."

Kabibona'kan, Winter Maker, is losing his power. The weather typical of November, with its "freezing-over-of-the-Earth moon," as the Ojibwe say, comes later and later; that of March, the maple sugar moon, arrives earlier. "We're seeing more days with temperatures at or above the freezing mark," says Moore. Moose become stressed at summer temperatures above 15 degrees Celsius (°C) and winter temperatures above –7°C. This particular day, the thermometer reads 1°C.

Partridge Falls trail "should be a moose magnet," says Dahl, with its many low-growing trees that moose love to nibble. He zooms along the trail. It leads to a cliff above the Pigeon River with views of Canada. The biologists suddenly skid their sleds to a halt, nearly running over a shadow of an indentation in the snow. "Hey, fresh tracks!" yells Moore through his helmet. "A moose might be around." Snowmobiles are switched off and helmets removed. For almost an hour, Moore carefully scours the trail, walking around every snowbank in an effort to spot a sign. "Nothing," he finally concedes, "at least not here."

Helmets back on and sleds revved, riders sprint ahead. They track moose along the trails of Rengo Road, Chevan's Road, and Cowboy Loop, logging nearly 100 miles though remote, ice-glazed US–Canada borderlands, but they see no moose that day.

As recently as 1990, Norman Deschampe says, "I could take you into the woods and find you a moose pretty easily. In 2009, we could go 200 miles, and I'd have to say, 'I hope I can show you one.'"

Moose along Minnesota's Arrowhead Trail/Cook County Road 16 revel in the area's abundant lakes and bogs. From November through March, they share the frozen road with snowmobilers. The moose in this photo is just off Arrowhead Trail near a marsh linking South Fowl Lake and McFarland Lake. Photograph: © Travis Novitsky (http://www.travisnovitsky.com)

Moose (*Alces alces*) live only in the northern areas of North America, Europe, and Eurasia, in boreal forests and wetlands—places with cold climates. Minnesota is at the southern edge of their range. "We think of moose as central to the identity of the boreal forest," says Ron Moen, a wildlife biologist at the University of Minnesota Natural Resources Research Institute in Duluth. Moen is taking part in moose studies in Grand Portage and in Voyageurs National Park, near International Falls, Minnesota. "The same is true from an ecological perspective. The largest herbivore in the north woods, a moose takes about three million bites of shrubs and trees and eats three metric tons of leaves and twigs each year. Moose in turn are important prey for carnivores like wolves."

Minnesota's northern forest might be called the moose-deer-caribou-beaver-wolf ecosystem. All play—or played—an important role. Before 1880, the main herbivores here were moose, woodland caribou, and beaver. "White-tailed deer were present but apparently rare," wrote Miron Heinselman in *The Boundary Waters Wilderness Ecosystem*. "With the beginning of European settlement and large-scale logging in 1890, the mix of large herbivores [and the vegetation they eat] began a series of shifts that continues to this day."

Those changes included the loss of the woodland caribou, or reindeer. Caribou disappeared from northern Minnesota in the early 20th century, victims of overhunting and disease. Some of their last haunts were the counties near Grand Portage. Now caribou are found only in Canada, where also they're in retreat. A warming climate may keep them there: More freezing rain in Minnesota winters would make it difficult for caribou to dig through snow to reach their main food source, lichens.

With caribou gone, moose reign over Minnesota's northern forests. Bulls may weigh more than 500 kilograms and cows 400 kilograms. They spend summer days in inland lakes and bogs eating aquatic plants like pondweed and water lilies. In winter, they chew on the buds and twigs of willow, aspen, red dogwood, and balsam fir. The animal's Ojibwe name, *mooz,* means "twig eater."

What will happen if the boreal ecosystem gets so warm that spruce, fir, and aspen give way to maple, elm, and other trees now found hundreds of miles south? Like white spruce and balsam fir, moose may simply die out in Minnesota. "Moose also may be a bellwether for other boreal species like lynx," Moore says.

Moose numbers decline

Two moose populations roam Minnesota's woods: one in the northwestern part of the state, its numbers in freefall even with the hunting season closed for more than a decade, and the other in the northeastern region. According to Mike Schrage, a biologist with the Fond du Lac Band of the Ojibwe, although the northeast herd currently seems stable at about 7500 moose, it too may be on the decline. "Fewer young moose born into the population, lack of hunter success, and high adult mortality are all cause for concern."

On hot days in summer and winter, moose pant more often, move slowly, and change their feeding patterns, resulting in poor nutrition and a susceptibility to disease-causing parasites, says Rolf Peterson, a biologist at Michigan Technological University who studies moose and wolves. Peterson chairs Minnesota's Moose Advisory Committee, which issued a report in August 2009 on the future of the state's moose. "If it weren't for climate change, the situation wouldn't be what it is," he says. "Global warming is a long-term threat to moose in Minnesota, but we don't know the extent of that change over the next 50 years. Under worst-case scenarios, the threat is serious."

By 2001 there was an early warning. The decline in northwestern Minnesota moose, whose numbers dropped more than 95 percent in little more than a decade, "was clearly linked to a rise in temperature," Peterson says. "Twenty years ago, the northwest herd numbered about 4000. But by the early 2000s, there were barely 100."

With the warming came greater numbers of parasites such as winter ticks and liver flukes. Winter ticks survive better when they drop off moose onto bare ground instead of onto snow, says Peterson. "When snow melts early in spring, tick populations explode. Moose can be

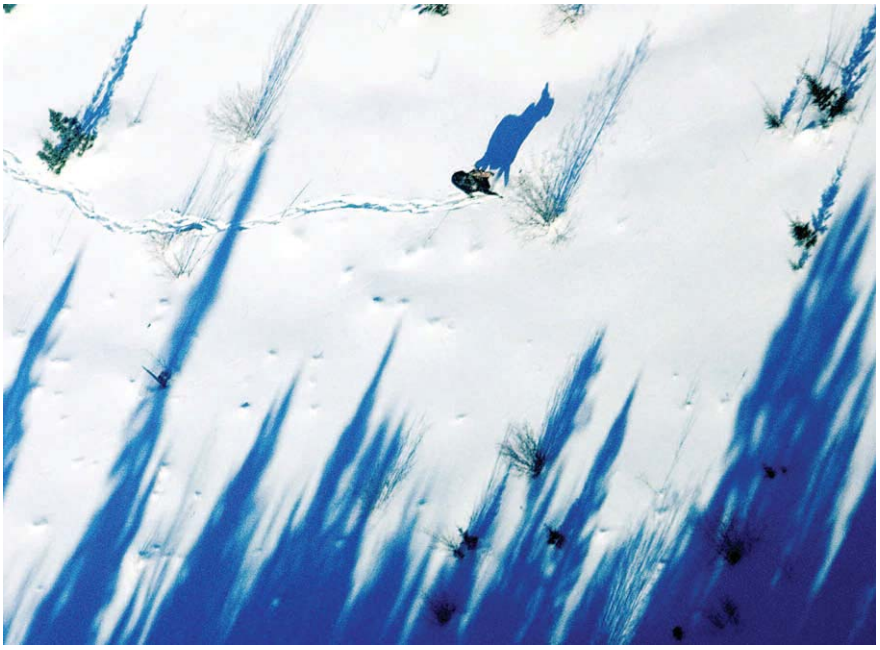
so infested with ticks that they lose a lot of blood."

Moose are extremely susceptible to another parasite, brainworm. These parasites live in the brains of white-tailed deer, now abundant in Minnesota's warming climate. Brainworm larvae are shed into deer feces, and from there the larvae are consumed by land snails. Brainworm develops through several larval stages in the snails, finally infecting other species that inadvertently eat the snails. Land snails live on the surfaces of browse plants favored by deer and moose. "Deer appear to have no ill effects," says Peterson, "but it's another story for moose. They suffer from neurological disease, acting oddly and having trouble standing and moving around, and may quickly die. In some areas, brainworm causes numerous moose deaths."

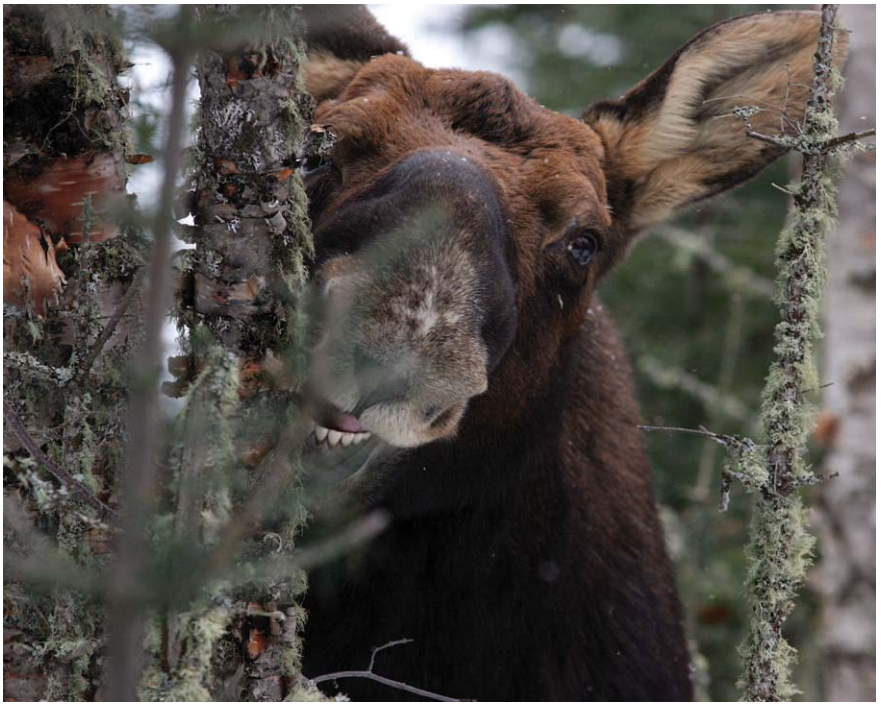
In Grand Portage, a strong population decline in recent years indicates that the mortality rate for moose there may be higher than that reported from other areas. Moore, Moen, and Andrew Edwards, of the 1854 Treaty Authority, which manages off-reservation hunting, fishing, and gathering rights of the Lake Superior Chippewa in territory ceded under the 1854 treaty, are looking into why.

They hope to identify habitats used by moose throughout the year, especially at times when heat stress may be occurring. Moose will be outfitted with collars with GPS (global positioning system) units that collect data at frequent intervals, allowing the scientists to track the animals to precise locations. "We expect that moose will reduce activity on warmer days and forage at night when it's cooler," says Moore. "We'd like to know which habitats moose use when temperatures are similar to those predicted for a warmer future." He, Moen, and Edwards believe that on hot days, moose may be taking to the waters—the edges of wet bogs lined with shade trees.

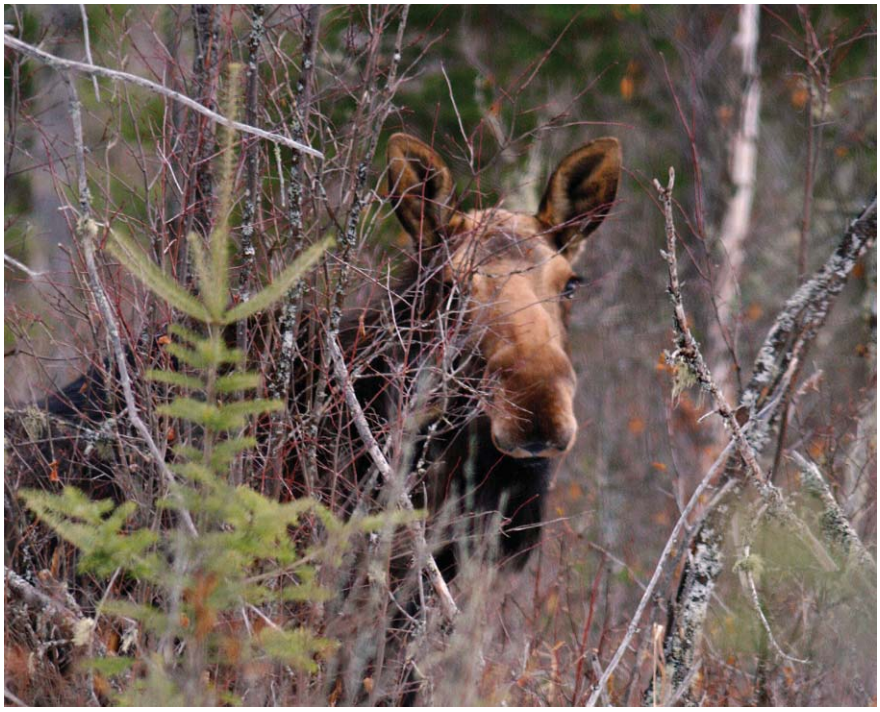
Their study builds on previous research in northeastern Minnesota by biologists at the Minnesota Department of Natural Resources (DNR), Fond du Lac Band of the Ojibwe, 1854 Treaty Authority, and Minnesota Zoo. In that effort, between 2002 and 2005, 116



*Early morning shadows paint an interesting pattern in this aerial image of a moose cow trudging through the snow in northern Minnesota's Superior National Forest. Biologists have found that it's easiest to conduct moose surveys in winter; the dark animals stand out against a snow-white background. Photograph courtesy of Clint Austin/*Duluth News Tribune.



The word "moose" comes from the Ojibwe word for twig eater. This twig eater is dining in a grove of firs shrouded in mosslike old man's beard, a gray-green lichen that can grow to 20 centimeters long where the air is clean. Photograph: George Desort.



Moose linger between two worlds: a past existence in a colder time, and today's warming planet. Vegetation in northern Minnesota is changing from boreal forest to deciduous forest to, perhaps someday, open prairie. The future of the moose hangs in the balance. Photograph: © Travis Novitsky (http://www.travisnovitsky.com).

moose were captured, fitted with radio collars, and monitored using telemetry. By 1 March 2008, 85 of the moose had died, most likely a result of warmer temperatures.

To continue tracking the radio-collared moose into February, the DNR employs pilots such as Al Buchert, who fly small Cessna 185 planes outfitted with GPS receivers. On a sunny February afternoon, Buchert and observers climb into cramped Cessna seats at the Eveleth, Minnesota, airfield. Eveleth was once a crossroads for moose.

Buchert monitors radio-collared moose, pine martens, wolves, lynx, and fishers by tuning into different frequencies. "It takes a pretty strong stomach to fly in tight circles just above tree line," Buchert warns before the Cessna lifts off. A short distance above white-tipped fir tree after fir tree, what soon may be ghosts in the Minnesota forest materialize: moose. Three, in fact. As the plane banks north toward Ely, moose numbers 4203, 5183, and 4714 crackle through the headset. In minutes they're in view. "Where we've seen three, though, we should have seen 30," Buchert says.

Far below are the 5000 frozen lakes in Buchert's assigned territory. Near Ellen Lake, Buchert spots a moose cow and calf lying together under a balsam fir. Their ears twitch back and forth in heightened awareness. "These moose will stay in the shadows until dusk," says Buchert. "At almost 2°C, it's way too warm for them to be out in broad daylight." He rolls the plane nearly on its side and off to a new heading. "We don't want to flush them from their cover," Buchert says. "It may be February, but they need all the 'air-conditioning' they can get."

Visit these Web sites for more information:

www.dnr.state.mn.us/fish_wildlife/wildlife/mac/index.html

www.nrri.umn.edu/moose/research/grandportage.html

www.1854treatyauthority.org/wildlife/mooseresearchproject.htm

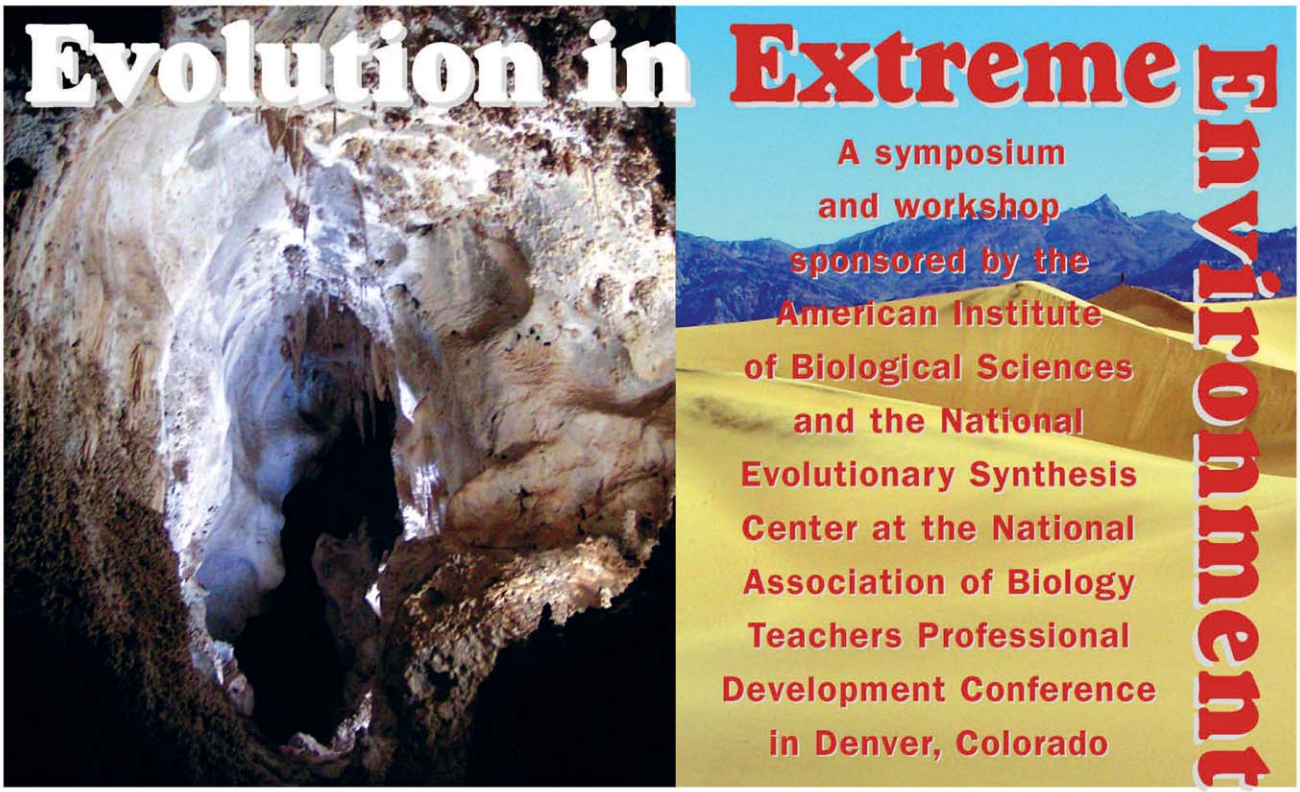
Thinking seven generations ahead

It's much the same in the lands of the Grand Portage Ojibwe. Each winter the tribe conducts an annual moose survey with helicopter flights over the reservation. "The Grand Portage moose population appears to have dropped some 64 percent since 2005," says Curt Gagnon, Grand Portage Trust Lands administrator. "There's a clear declining trend of about 2 percent annually for the years 1990 to 2007. We need to start thinking about long-term solutions for saving our *mooz*. The way of the Ojibwe is to consider seven generations ahead."

The tribe is developing renewable energy sources for its own use and to sell to larger utilities. "Wind farms, small-scale hydropower facilities, and new geothermal and biomass energy projects are on the horizon," Gagnon says. "We're moving forward as fast as we can. We know the time to act is now. If we don't, by seven generations from now—or sooner—the northern forest, and the moose with it, will be gone like the caribou."

Roger Deschampe Sr., Poe's father, shares what's become a rare food for the tribe: a moose-meat burger. "With each passing autumn, when *mooz* call for a mate, the sound grows more faint," says Deschampe, "like a fading heartbeat you can hardly hear."

Cheryl Lyn Dybas (cldybas@nasw.org) is a biologist and science journalist who specializes in the environment and health.



Friday, 13 November 2009

American Institute of Biological Sciences

NABT National Association of Biology Teachers

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Symposium 8:30 a.m. to 12:30 p.m.

Human Evolution and Adaptation to High Altitude
Cynthia M. Beall, Anthropology Department, Case Western Reserve University, Cleveland, Ohio

Life in the Deep Sea: Only the Fragile Survive
Steven Haddock, Monterey Bay Aquarium Research Institute, Moss Landing, California

Cavefish: Evolution in the Dark
William R. Jeffery, Department of Biology, University of Maryland, College Park

Arctic Winter Sea Ice: A Biological Museum or Evolutionary Playground?
Jody W. Deming, School of Oceanography and UW Astrobiology Program, University of Washington, Seattle

Workshop 2:00 p.m. to 5:00 p.m.

Plant Desiccation Tolerance: Evolutionary Biology Teaching Workshop
Kirsten Fisher, California State University; Anna Thanukos, Museum of Paleontology, University of California, Berkeley; and Kristin Jenkins, National Evolutionary Synthesis Center

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