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A 50-Year Study Tracks the Bloody Balance between Isle Royale's Largest Mammals

“Moose kill!”

by Andrew Sorensen



Wolves from the Middle Pack are on the move at dawn. Wolves walk an average of 30 miles a day looking for food.

Candy Peterson's voice rings out and we converge on her location. Underneath a large pine, a bone-white moose skull stares out at us. It rests upon a bed of hair, as if something had picked up the moose and shaken every hair from it. The hair is black and covers the layer of spruce needles beneath it.

“Did the wolves leave the skull as a warning?” I look to legendary researcher Rolf Peterson, only half kidding. There is not another single bone in the vicinity.

“Moose like to back up against trees to protect their flank when they make their stand,” Rolf says.

In khaki shirt and pants, he looks much like a British explorer. “Starving moose will also take shelter under conifer trees to get out of the snow. If they are too weak they never come out again. It's a good place to look,” Rolf says and then he is off searching again.

An hour later we have the bones Rolf needs, the skull strapped to the outside of a backpack, the other bones stacked in a pile. Rolf consults his maps and begins marching again. He never gets lost: in eight days spent off-trail, I witnessed him backtrack twice and no more than 20 yards. The rest of us spread out, with Candy ranging the farthest afield.

Two days prior, I had stood on the bow as the *Voyageur II* ferry carved white spray toward Isle Royale. The water temperature of Lake Superior read 39 degrees. Looking at the vast rolling waters, it is hard to believe moose and wolves crossed the 20-some miles, but they did.

It is believed that in the early 20th century, moose probably swam the 20-some miles from Minnesota or Canada to find a 45-mile salad bar without predators. (There also is speculation that people transplanted Minnesota moose to the island.)

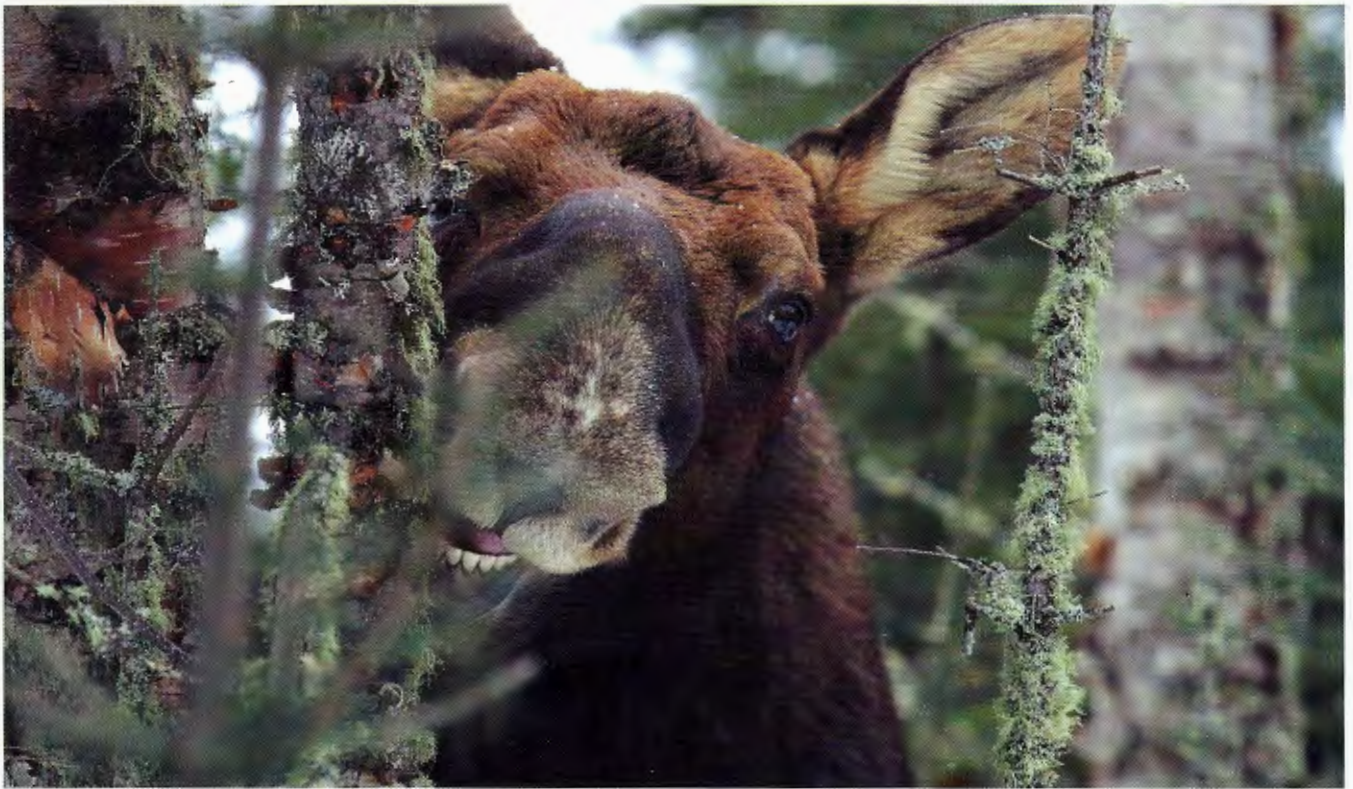
In 1929 biologist Adolph Murie reported seeing 30 moose cooling in a single lake in one day. He estimated as many as 3,000 moose and predicted catastrophe. By 1935 fewer than 500 starving moose remained. This extreme, boom-bust cycle continued for nearly 50 years until the wolves arrived.

In the late 1940s in an unusually cold Isle Royale winter, a pair of wolves, looking for territory, dared crossing miles of ice bridges and found their own private meat locker. In turn, scientists would find their own nourishment: the greatest laboratory of predator vs. prey in the world.

Fifty years later Isle Royale is getting ready to celebrate the longest, large animal study in

Pendulum





GEORGE DESORT

Researcher Rolf Peterson once said, "Those who love trees, love wolves." Without wolves to cull the moose, these world's largest members of the deer family would devastate some tree species on Isle Royale. Wolves are not the only "predators" of moose. On Isle Royale, blood-sucking ticks (bottom) feed only on moose and drive them to rub off critical hair during winter's cold. A tick weighs 1 millionth the weight of a moose.



ROLF PETERSON

the world. Longer than Jane Goodall's chimps or Dian Fossey's gorillas, the study started with the advent of the hula hoop.

For 38 of those 50 years, Rolf and Candy have been a part of this work. Rolf came here as a graduate assistant in 1970 and never left. Candy raised their two boys in an old fisherman's cabin where moose are just as likely neighbors as people. Rolf retired from teaching at Michigan Technological University in 2006 so he and Candy could devote themselves to the research project full time. Rolf spends eight months a year on the island (Candy opts out of winter study), but they do not accept a salary.

"Our lifestyle," says Candy, "does not require a lot of money."

"The money is better spent keeping gas in the plane," Rolf adds.

Their newfound freedom enabled them to lead the Earthwatch expedition onto which I have signed. Every year volunteers from around the country come to spend eight days off-trail looking for moose bones. Club Med it is not, but the volunteers don't seem to mind. During the last 20 years,

Earthwatch expeditions have found most of the moose skeletons.

Rolf has the largest collection of moose bones in the world, taken from more than 4,250 moose. The collection spans 60 years and scientists have learned a lot from them.

For instance, Isle Royale moose have a high rate of arthritis and scientists are studying their bones for clues into human prevention and cures.

According to Rolf, moose and wolves act as biological time capsules that have recorded the radioactive fallout from the Cold War and the rise of carbon dioxide in the atmosphere as we burn fossil fuels.

"Wolves track this better than tree rings. They eat the moose and capture the carbon ... over the last 50 years you get a perfect mirror of the rise of carbon dioxide in the atmosphere."

The research has also proven we can make a difference. The Clean Air Act legislation of 1970 brought about a 60 percent decline in mercury in moose teeth and a similar reduction in lead.

Back on the trail, Rolf leads us up a steep ridge that ends on a sheer cliff. The view is spectacular — a mosaic of trees leading to blue waters topped with frothy whitecaps all the way to the cliffs of Canada in the distance. Rolf talks of flying over this particular cliff to find a moose that had fallen

to certain death only to have his back hoof catch in the V of a tree growing out of the cliff.

"The tree caught him just before the ground."

"Did he live?" I ask, like an idiot.

Rolf shakes his head.

"Wolves heard him bawling and found him quickly. They ate him right where he hung."

This island and this 50-year study is, after all, really the repeated stories of life and death and life.

Rolf recounts the story of an old pair of wolves that had a litter of pups, but starved to death the following winter. The pups would have died, too, except unusual winter conditions – moose falling from north shore cliffs – gave them an advantage. During the next two months, several moose fell to their deaths, allowing the pups to survive into summer and adulthood.

I can't help but think of a gruesome version of a roadrunner and coyote cartoon.

Moose and wolves tangle in standard ways, too, and nowhere has it been more documented than Isle Royale. In 1963, two legendary researchers, Durward Allen and David Mech, published in *National Geographic* the first photos of a large wolf pack hunting a moose. It made the obscure project famous and turned Allen and Mech into rock stars of the research world.

The notoriety enabled the project to go on.

"The more we learned, the more we realized how little we understood," Rolf says, explaining that the longer study allows review of findings. "Most studies last five or less years. ... Thirty years ago we thought we knew the answers, but now we know we don't understand a system as simple as Isle Royale."

Rolf's former student, John Vucetich, who now co-leads the project and fills Rolf's old position at the university, agrees. "If we had stopped at five years or 10, many of our basic assumptions would have been wrong."

Rolf cites a 1980-82 wolf crash as an example. In 1980 a record 50 wolves in five packs reigned on the island. "Wolves were eating a moose a day."

Food became scarce, wolf wars broke out, as did starvation and disease. By the spring of 1982, only 14 wolves remained. Their low numbers combined with inbreeding spawned dire predictions from scientists. (All Isle Royale wolves descend from the original pair. They often have extra



ANDREW SORENSEN



ANDREW SORENSEN



KONNIE LEMAY

Rolf Peterson (top) and Candy Peterson (middle) have participated in the study for 38 of its 50 years. Many summers they live in this small cabin on the island and even raised their sons here. Candy's memoir, *A View from the Wolf's Eye*, is to be published in 2008 by the Isle Royale Natural History Association.



ROLF PETERSON

Isle Royale

The Death & Life of an Isle Royale Wolf

"To become an Alpha is nothing less than heroic and most wolves end up dead trying."

– John Vucetich, co-leader of the Wolf-Moose study

Running for her life, the lone wolf flees into the cold waters of Lake Superior where she is surrounded by 11 wolves from Middle Pack.

She stands on a submerged rock, cowering as three wolves charge into the shallows and lunge for her. She fights all three wolves at once, the enamel of her fangs clashing with theirs. The young female is forced back into neck-deep water while the attackers return to the shore to dry off by rolling in the snow. The cycle continues; wolves split off in threes and fours and wade out to savage her throughout the day. In the end she is surrounded by all 11 wolves. They tear her to pieces and leave her for dead.

She lies motionless in her own blood as another member of Middle Pack arrives on the scene. This wolf is a male who has been looking for a mate for some time. Because he left on good terms, he is allowed back in the pack when life as a lone wolf gets too tough.

The dying wolf is a "disperser" like him, and she is in heat. The Middle Pack wolf nudges her until she rises and hobbles 50 meters into the forest where she will lay all night as her wounds stabilize. Five days later, the pair is a half-mile from the attack site and the male wolf alternates between licking her many wounds while trying to court her.

Scientist Rolf Peterson observes this animal soap opera from a red Piper Super Cub airplane and asks longtime pilot Don Glaser to land. He is able to locate her bloody bed and collect samples that will enable him to follow her journey using DNA if she survives.

With her new mate, the young female carves out a small territory. Chippewa Harbor Pack is born with her litter that spring. Rolf knows it is her because he collects wolf scat, lots of it. From the air Rolf searches for moose kills and visits every kill he can get to by snowshoe or



ROLF PETERSON

A lone wolf crosses the ice during an Isle Royale winter.

landing the plane in a nearby inland lake. At the kill site he collects samples from the abundant wolf scat surrounding the carcass. The DNA from the blood he collected from the female's bloody bed matches the scat he finds at Chippewa's kill site.

The pair will lead Chippewa Harbor Pack for eight long years. She goes on to produce the second most pups ever recorded on the island. Then, in 2006, the moose become scarce and East Pack starts showing signs of war.

In the winter of 2006, with food scarce, the alpha male of Chippewa Harbor Pack is at a moose kill near the territorial border of East Pack. "A mile away East Pack detects the kill and changes directions. ... This is a bold move because they don't know how many Chippewa Pack wolves will be there yet they are confident," John Vucetich says. The East Pack alpha male charges in. He ignores the subordinates, like pawns in a chess match, and attacks Chippewa's alpha male. East Pack succeeds in killing the alpha and claiming the kill.

"Within days the, now-old Chippewa female is courted by a new male and she manages another litter of pups that spring. Moose continue to decline and East Pack's raids increase. In 2007 the old female, who as a young wolf survived 11 Middle Pack wolves to create her own pack, succumbs to East Pack in another border skirmish.

The cycle continues.

and misshapen vertebrae among other signs of inbreeding.)

"But the wolves held on and then came back ... 20 years later they still show genetic variation despite our predictions."

If you look at 50 years of moose-wolf populations on Isle Royale, you find some patterns, but, according to Rolf, "it is the big external drivers – disease, climate change – that show up and knock everything off track."

The next big driver seems to have already hit the island. Moose number 350,

an all-time low; the average is 1,000. Above 38 degrees, moose start getting hot. They lie down or cool in ponds when they need to be eating at least 10 hours a day. They end up going into winter with less fat to burn and succumb to starvation.

Ticks are another problem. The warmer climate enables more ticks to survive and infest the moose. A hundred thousand ticks have been estimated on some dead moose. They cause moose to rub off most of their hair in winter when they need protection from the cold and making them susceptible to starvation.

“The moose keep bumping along, limited by the heat, which puts the wolf at such a low level they are vulnerable to extinction,” Rolf says.

The wolves dropped from 31 in 2006 to 21 in 2007, but Rolf sees a continued decline. On average, “one wolf needs about 30 moose to survive,” Rolf says. Doing the math: 350 moose would support around 12 wolves.

“Wolves are in for a fall. How far is anyone’s guess.”

As extraordinary as the moose decline is, so is the change in wolf behavior. After 50 years of avoiding people on the island, the wolves have become bold, fearless.

The topic of fearless wolves comes up the first night of our expedition. Candy tells of when her boys were young and left to play alone on the beach while she hiked Mt. Ojibway to locate wolves using radio-collar telemetry.

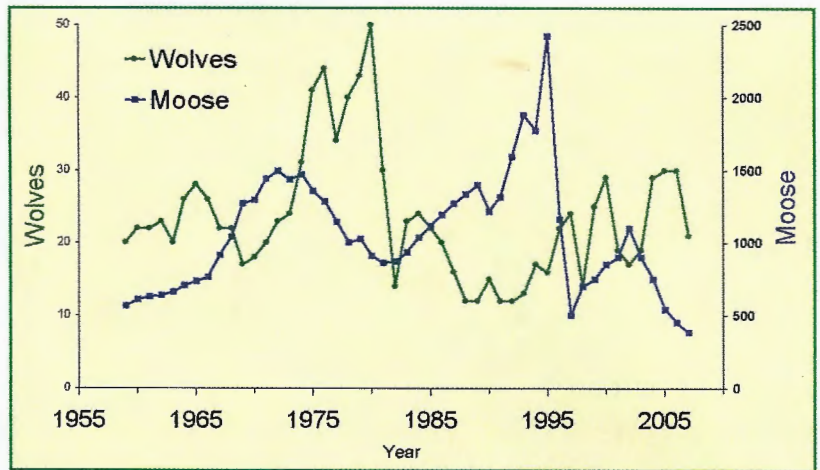
“I picked up a signal from a wolf on the beach, close to where my kids played. For a moment I was afraid for my boys, but afterwards I remember feeling bad for thinking so lowly of the wolf. But now, I would never leave kids alone with these wolves.”

Rolf agrees. “It used to be a few visitors a year would see a wolf. Now if I give a lecture and ask who has seen a wolf, 15 to 20 people raise their hand.”

In 2006, a kayaker set up camp on a beach. As he slept, encased in a sleeping bag, a wolf came by and, according to Rolf, sampled the kayaker’s face with a nip that didn’t break the skin, but left an impression (of teeth and of wolf encounters.) The kayaker scooted into his bag and wasn’t bothered further.

Both Rolf and Candy agreed it is remarkable that the wolves have remained afraid of humans for as long as they have. (In the eight days off-trail, we saw many logs with wolf claw marks but no wolves.) Upon our return to Windigo campground and visitor center, two separate wolves were spotted patrolling the campgrounds during the day, showing little fear of humans.

With all the bad news coming out of Isle Royale recently, you would think Rolf and Candy would be full of doom and gloom. They are not.



ROLF PETERSON

“You need to look at things from a mountain’s point of view,” Candy tells me before disappearing into a swamp, happy to be looking for bones.

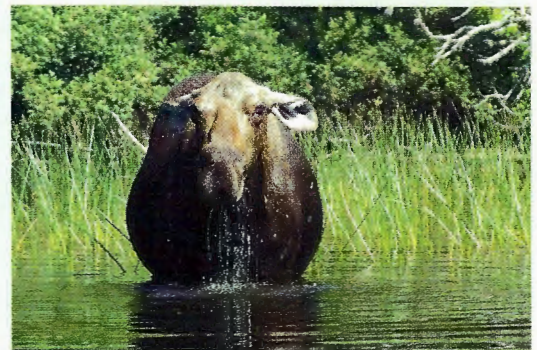
As I catch up with Rolf, he echoes her thoughts. “More likely the wolves and moose will continue to surprise (us).”

As he marches through thin trails, he talks of writing another book about the island; starting 8,000 years ago when Isle Royale was just a rock in the womb of a retreating glacier and continuing to the present. (His book *The Wolves of Isle Royale: A Broken Balance* was recently rereleased by the University of Michigan Press.) Then he stops and looks around. Candy has ranged too far afield again; she the explorer, Rolf ever the navigator.

He cups his hands and calls to her until she answers and then he is off, marching through the boreal forest as I struggle to keep up. They are a tireless and hopeful pair, and I can’t help but to think they are not winding down but just getting started.



Andrew Sorensen, who is working on a fictional novel relating to wolves and people, says that he learned this from his time at “Camp Isle Royale.” It is possible to experience heatstroke and hypothermia on consecutive days in May and ignore Rolf and Candy’s packing list at your own peril.



ROLF PETERSON



ROLF PETERSON

The average life-span of an Isle Royale moose, if it survives the first year, is 10 years. Most wolves that survive to adulthood live three to four years while the alpha males and females live six to nine years. Wolves tend to curl up for a nap after a meal. Find fascinating details about wolves, moose and other Isle Royale animals ... and about the wolf-moose study at isleroyalewolf.org.