FORECAST FOR NH WILDLIFE

Suppose you could resurrect a long-ago-deceased New Hampshire North Country resident, someone who had a good knowledge and understanding of the outdoors. After a hike through the old stomping grounds, I wonder what he or she might say? Here's a guess:

"What are those strange big black birds soaring over the treetops? Turkey vultures, you say? They sure have a funny-looking head! Who brought in all these cardinals, mockingbirds, doves and wild turkeys? And I sure don't care for these ticks and poison ivy! What happened to the moose, marten and snowshoe hares? What the heck have you people been doing?"

The same thing – noticeable change – was emphasized for me last summer, when, representing the National Wildlife Federation, I spoke to the New Hampshire Hunter and Aquatic Education instructors at their annual recognition event. These are the men and women who teach our young hunters and anglers a safe and sane approach to the woods and about fish and aquatic habitats. I asked those at the session to write out their own observations of changes in nature where they live. The responses affirmed my own strong sense of change in the way our planet is functioning: people noted seeing different birds, odd behaviors, more ticks, more storms, higher temperatures and the list goes on. There are still some folks who doubt that these changes are caused by humans and our "greenhouse gas emissions," but what's really important is the changes we're seeing on the ground and what they mean for us.

Last January, I was canoeing on a bay in Lake Champlain. That's right: *canoeing* in January. At about the same time, a friend of mine was watching Canada geese make a noisy pass over his house, just

CHANGE

by Eric Nuse with Steve Wright

30 miles from the Canadian border; they should have been long gone by then. You can't help but wonder, is all this a fluke or part of a human-caused global warming trend? If it is a trend, what does it mean for our wildlife in New England and New Hampshire? Is there anything we as conservationists can do to slow it down or adapt to the changes?

Coping with Change

Shortly after I canoed on my favorite ice-fishing spot, the Intergovernmental Panel on Climate Change issued a landmark report. This panel, made up of the majority of the world's top climate scientists, stated that the world's average temperature has risen 1.3° F (slightly more in New Hampshire) in the last 100 years. In the U.S., 20 of the hottest years on record have been within the last 25 years.

Things are expected to heat up even more in years to come. New Hampshire's Wildlife Action Plan tells us that regional climate change models predict a 6-10° F increase in the next century in New England, which would make our climate comparable to parts of the southeastern U.S. No wonder hunters, anglers and naturalists are reporting the northern spread of turkeys, cardinals and turkey vultures, along with less-welcome species like poison ivy, opossums and ticks.

The impacts of climate change will likely be the most severe for habitats with narrow temperature and water level regimes, according to the Wildlife Action Plan; these include alpine, high and low elevation spruce-fir forests, coastal islands, vernal pools and aquatic habitats. Wildlife that rely on these habitats will be most at risk. Alpine butterflies like the White Mountain Arctic and the White Mountain fritillary may be the first to disappear, as they live at the highest elevations in habitat that doesn't exist anywhere nearby.

A

B

C

Of course not every species will be threatened. But no ecosystem can sustain the breadth of changes likely to result from climate change without harm to many of its living creatures. Let's take a look at what some of the impacts of climate change are likely to be for New Hampshire's wildlife.

Trouble for Brook Trout

Brook trout need cold, clean water and are indicators of good water quality, so they are an important bellwether for the impact of climate change. In 2005, the Eastern Brook Trout Joint Venture, of which New Hampshire is a participating member, reported the overall decline in brook trout habitats across their native eastern U.S. range. New Hampshire is no stranger to the decline. Only 7% of the surveyed watersheds supporting historic brook trout habitat in the state remain intact.

Right now, the leading factor hurting New Hampshire's native trout is sedimentation associated with runoff from roads. As streams become shallower, water temperatures can rise. Brook trout become stressed when temperatures approach 70 degrees F. If temperatures exceed that and a thermal refuge is not available, they are unable to survive. Stressful conditions like acidification, presence of invasive species and low amounts of dissolved oxygen make rising water temperatures even more lethal for trout.

New Hampshire is home to 40% of the world's Bicknell's thrush (below). This songbird's high-elevation spruce-fir habitat is one of the most at risk from climate change.

Game Animals at Risk

Today, moose can be found in all ten counties in New Hampshire, but this may not always be the case if the mercury keeps rising. Moose are perfectly adapted for cold weather living, but in warm temperatures they can become heat-stressed and increasingly vulnerable to parasites. A recent study in northern New Hampshire documented winter ticks as being a leading factor of moose mortality. Large infestations literally suck the animal dry. "Tick mortality in moose is worse after an early spring followed by a warm, dry fall, so it seems likely that a warming trend will increase tick-induced mortality," says Kristine Rines, moose project leader for N.H. Fish and Game.

A disturbing lesson may be learned from what's happened to the moose population in northwestern Minnesota. In just 25 years, the moose population there has dropped from 4,000 to 237. The causes: marginal habitat, coupled with increased stress caused by higher fall and winter temperatures. Dennis Murrey, a researcher from Trent University in Ontario, Canada, says, "A variety of factors may be contributing to the decline, but ultimately I think the real driving force is the climate."

New Hampshire's current estimated population of moose is 7,000. If temperatures continue to rise, moose can survive where it's cooler, in the mountains or up north. But the mountains are only so high – and New Hampshire only goes so far north.

Disappearing Songbirds

Northern breeding warblers are shifting their ranges northward – perhaps by several hundred miles, according to the N.H. Carbon Coalition. The group

D

E

also predicts that the breeding range of the State Bird, the purple finch, could shift out of the state. At the very least, the number of nesting finches is likely to be reduced in the coming century. American pipits, which live at high elevations, and northern three-toed woodpeckers, already scarce in northern woods, may be unable to find suitable habitat.

The situation could be dire for some cold-weather songbird species like Bicknell's thrush. These little birds are a globally rare species, and fully 40% of the world's population of this species live in New Hampshire's high-elevation spruce-fir forests. When our high-elevation forests start changing composition and declining because of climate change, Bicknell's thrushes will have to find new habitat…or they will disappear forever.

Species of Conservation Concern

According to the New Hampshire Wildlife Action Plan, "Climate change will affect every species and habitat of conservation concern in New Hampshire." This includes direct impacts, like a northward shift of species such as snowshoe hare and bog lemmings. Marbled salamanders occur now only in the southern towns in the state. With increased temperatures, their population may actually increase – if the vernal pools they require do not dry up. Northern species, such as mink frogs, may disappear from New Hampshire as it warms, forcing them further north, where they may or may not be able to find suitable habitat.

Warming trends will allow invasive species and pathogens, such as hemlock woody adelgid and West Nile Virus, to spread north – potentially endangering forest habitat, as well as increasing health risks to humans as conditions improve for mosquito survival and breeding. Reduction in snow depth will hurt our pine marten population, possibly within the next decade.

The Wildlife Action Plan indicates the likelihood that a greater number of fierce coastal storms may batter coastal ecosystems, disrupting dunes, salt marshes and estuaries, bringing additional stress to species living there. Nesting piping plovers, saltmarsh sparrows and terns are especially vulnerable to storms and rising sea levels.

Tree species that thrive in cold weather – spruce, fir, aspen and sugar maple, for example – can't just get up and migrate, leaving us to wonder what impacts a continuing warming trend could have on our beautiful, productive forests; the wildlife that depend on them; and important industries that they drive, including tourism, logging and maple syrup production.

In principle, it all comes down to one of the basics of wildlife management: change the habitat and you change the animals. We're already seeing the changes, so what now?

Call to Action

Some folks have thrown up their hands in frustration. They say, "It's too big, too complex, we don't know enough." But as one N.H. Hunter Education instructor told us, "Even if we aren't the primary cause, the steps we should take are still the right thing to do. Conserving non-renewable natural resources for our children is smart, not wasting energy is smart and saves money, and reducing emissions of airborne pollution like acid rain and mercury will directly benefit our health."

History tells us that we can make a difference if we work at it. Thirty years ago, a number of New Hampshire's rivers were in trouble. For many years, they had flowed as open sewers, carrying industrial pollution and untreated wastes from cities and towns. After the passage of the Clean Water Act in the 1970s, water quality in these rivers began to steadily improve. Today our rivers are running clear and clean – the Merrimack is now clean enough to support brook trout.

In the mid-1800s, the U.S. faced a similarly daunting problem – wildlife populations devastated by human actions. Leaders like Theodore Roosevelt, Gifford Pinchot, George Bird Grinnell, Aldo Leopold, Ding Darling and FDR – hunters and anglers all – saw that humans had caused wildlife depletion and habitat destruction on a massive scale. They believed the damage could be reversed.

Reverse it we did, and now the North American wildlife story is the envy of the world. New Hampshire went from a remnant population of deer to sustainable

A Moose are perfectly adapted for extreme cold, but have a tough time handling heat.

B The only endangered amphibian in the state, the marbled salamander is at the northern edge of its range in N.H.; its numbers could increase with warming temperatures.

C Alpine butterflies like New Hampshire's White Mountain fritillary are highly susceptible to climatic and atmospheric changes.

D The southern spruce-fir breeding habitiat of New Hampshire's State Bird, the purple finch, could disappear if current trends continue.

E Brook trout need cold clean water to survive; native brook trout habitat is declining across the eastern U.S.

PHOTO CREDITS: *MOOSE* ©JOHN R. FORD; *MARBLED SALAMANDER* ©LLOYD GAMBLE; *WHITE MOUNTAIN FRITILLARY* ©KENT McFARLAND VERMONT CENTER FOR ECOSTUDIES; *PURPLE FINCH* ©CHARLES H. WILLEY; BROOK TROUT ©ERIC ENGBRETSON

The question for our age is, what can we do to minimize the negative impacts of climate change?

harvest of more than 10,000 deer per year. Beavers are in every brook – and a lot of backyard ponds; turkeys are everywhere; and moose are a living symbol of New Hampshire's Great North Woods.

Hunters and anglers led this transformation. They were the conservationists; they did what it took to bring our wildlife back. The question for our age is, what can we do to minimize the negative impacts of climate change?

We already have the technology to reduce greenhouse gas emissions in lots of ways – by improving energy efficiency, making vehicle mileage and emissions a priority, designing buildings to reduce energy loss and investing in renewable energy sources. Even simple things like recycling and using a clothesline instead of a dryer can make a difference.

The National Wildlife Federation and hundreds of local, regional and national groups propose that we – all of us – get started conserving energy today. You'd be amazed at how much this could help. If we act now to reduce emissions by just 2% per year, we can cut greenhouse pollution by two-thirds in just 50 years! I've discovered that if I slow down my truck down on the Interstate from 65 to 55 mph, I save over 2% in fuel. Change a few light bulbs to the new compact fluorescents, turn them off quicker, and I am way over my 2% for the year!

If you'd like to take action to reduce your impact on the environment – check this out. The U.S. Environmental Protection Agency has a calculator on its website (***www.epa.gov/climatechange***) where you can figure your so-called "carbon footprint." It will show areas where you can easily improve your energy efficiency, and save money to boot.

National action is critical too. At press time, several bills are moving their way through Congress. How can you help? Learn all you can about the issue, listen to the candidates running for office, and support people and organizations trying to make a difference. And make your voice heard by contacting your congressperson.

In the short term, it seems our wildlife is in for increased stress from a changing environment. Beyond reducing our own energy use, the more we can do individually and collectively to improve habitat, eradicate invasive species, reduce all forms of pollution – the better our wildlife will be able to adapt. The New Hampshire Fish and Game Department's efforts to implement the strategies in the Wildlife Action Plan are a critical part of being prepared for the changes we may face.

Sportsmen and women have been saving wildlife and habitat for more than a century – our efforts are needed now more than ever, and we need to answer the call.

Eric Nuse is a former Vermont Game Warden and a graduate of the University of Maine in Wildlife Management. He currently heads a consultancy working nationally on hunting, trapping and wildlife matters. Nuse also serves on the board of Orion the Hunter's Institute (www.huntright.org).

Steve Wright is the regional representative of the National Wildlife Federation; former Director of Vermont Fish and Wildlife; and past President of Sterling College in Vermont.

New Hampshire's landscapes and wildlife habitat will change as trees like spruce and sugar maples, which thrive in cold weather, become less common in the state.

© NHFG PHOTO

CLIMATE CHANGE RESOURCES

For more information and action steps, visit:

- Intergovernmental Panel on Climate Change
  www.ipcc.ch
- The National Wildlife Federation
  www.nwf.org
- N.H. Citizens for Responsible Energy Policy
  www.carboncoalition.org
- Clean Air-Cool Planet
  www.cleanair-coolplanet.org
- Select Committee on Energy Independence and Global Warming
  globalwarming.house.gov
- N.H. Wildlife Action Plan
  www.WildNH.com
- Association of Fish & Wildlife Agencies
  www.fishwildlife.org/agency_science_climate.html

© NASA EARTH OBSERVATORY