FALL 2018

Field Notes

VERMONT CENTER FOR ECOSTUDIES | *Uniting People and Science for Conservation*

ECOLOGICAL EFFECTS OF
Emerald Ash Borer

With widespread documented infestations of EAB, it seems clear that this introduced pest is here to stay, and our ash trees are probably not.

BY STEVE FACCIO

Conservation ecologists tend to be an optimistic bunch—we have to be in order to stay motivated amidst mounting threats to biodiversity. A good example is the recent discovery in 2018 of Emerald Ash Borer (EAB) in Vermont, Maine, and Rhode Island. Intellectually, I knew that this introduced Asian beetle—which kills all species of ash (*Fraxinus* spp.) trees—would turn up in Vermont, especially since there were populations in adjacent New York, New Hampshire, Massachusetts, and Quebec. Still, I held out hope that maybe, just maybe, quarantines and bans on transporting firewood would spare this little corner of New England. It was not to be, and now with documented infestations of EAB in all but two states and Canadian provinces east of the Great Plains, it seems clear that the pest is here to stay, and our ash trees are probably not.

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Perhaps the most surprising outcome of ash decline may be its potential effect on Wood Frogs.

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The Vermont Center for Ecostudies (VCE) is a nonprofit organization whose mission is to advance the conservation of wildlife across the Americas through research, monitoring, and citizen engagement. With a reach extending from Canada and northern New England through the Caribbean and South America, our work unites people and science for conservation.

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VERMONT CENTER FOR ECOSTUDIES
PO Box 420
Norwich, VT 05055
(802) 649-1431

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VCE VIEW

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The Maine island of Monhegan is a magical place. Twelve nautical miles from the mainland, its arresting sheer cliffs, dense spruce woods, impassable bayberry thickets—even its uniquely charming, quirky village—are magnets for wayward migrant birds. And, for birders. VCE recently led our third-annual trip to this iconic East Coast birding mecca. Sure, we had vagrant Dickcissels and Clay-colored Sparrows, Cape May Warblers and Baltimore Orioles galore, Merlins and Peregrines at every turn. Monhegan never disappoints. But, for all of us, the island's avian highlights were trumped by its intimate, if curious, human dimension. While we soaked up the melting pot of humanity that is life among Monhegan residents, we especially reveled in our own brand—transient though it may have been—of fellowship, exuberance, humor, sharing, and communication.

In recent months, I have been struck by how deeply woven communication is into VCE's fabric. In fact, it is a core tenet of our forthcoming 5-year strategic plan. The reasons are self-evident, of course, but one intangible quality stands out to me: I believe communication is what creates, fosters, and sustains the connections that are VCE's essence. We unite (read, connect) people and science. We engage people to observe, learn, contribute, care, and act. Without communicating our science widely and effectively, including the passion and commitment that underlie it, our mission falls short. By deepening human connections with our natural world, we mobilize action to steward it.

Monhegan is just one vehicle through which VCE communicates our science. There are many. Mentoring young conservationists on Mt. Mansfield or in Cuba; our monthly Suds & Science gatherings and Outdoor Radio episodes; our nearly 50 peer-reviewed scientific publications during the past five years; our active stream of web site, blog, and other social media communiqués. Add to those our commitment to make all of VCE's data sets and publications openly accessible. The list goes on, but the point is clear—communication lies at the heart of VCE's mission.

Make no mistake that VCE's undisputed stake in the ground remains our high-caliber science. That is our core currency. However, our 5-year strategic plan unabashedly emphasizes the role of communication in VCE's conservation portfolio. We enjoy it, we do it well, and we will strive to be ever more impactful. In this time of Earth's tenuous vulnerability, we must all tell the stories that will inspire fellow citizens to enjoy and cherish our natural world. VCE embraces that communication challenge. FN

Chris Rimmer
EXECUTIVE DIRECTOR

Prime Suspects

An International Avian Mystery. | BY ROSALIND RENFREW

In an era of international espionage and cyber-attacks, unlocking mysteries of nature through scientific inquiry may at first seem mundane. But like a skilled detective, research delves far beneath the superficial to expose buried clues that trace the history, movements, and interrelationships of organisms, often in surprising ways.

Take the extraordinary case of the Bobolink: a migratory songbird tied to grasslands of the U.S. and Canada in summer, the species has been indicted as a prime suspect in transmission of avian malaria to endemic birds of the Galapagos.

One look at a map of Bobolink migration (see accompanying map) suggests that this makes no sense. The major fall migration route of Bobolinks takes them through the middle of South America en route to their wintering grounds, with a few scattered reports along California's coast. But a small number—from where, nobody knows—fly over the Pacific instead and touch down briefly on the Galapagos Islands. First documentation of this occurrence came from none other than Charles Darwin himself in 1835, and to this day the Bobolink remains the only songbird known to migrate through the islands.

Birds carry their own form of malaria, distinct from that of humans but with equally severe impacts. As with forms affecting humans, this blood parasite is spread between avian hosts by mosquitos. It can be innocuous to some bird species but lethal to others. In the Galapagos,

The major fall migration route takes them through the middle of South America en route to their wintering grounds. But a small number fly over the Pacific and touch down briefly on the Galapagos Islands.

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there are four lineages of malaria that infect the islands' native birds. Research led by Dr. Patricia Parker at the University of Missouri found that three of the four lineages did not originate on the islands, and were most likely transported there by non-native birds.

After Dr. Parker's lab made this intriguing discovery, VCE and collaborators set out to collect blood samples from Bobolinks across their breeding range. Sure enough, two lineages found in Galapagos birds were also found in Bobolink blood samples. Blood samples collected from co-occurring bird species on both breeding and wintering grounds suggest that one of the lineages is acquired on breeding grounds in North America, while the other originates from South America wintering grounds. Although these results made for a compelling explanation as to how parasites may have arrived on the Galapagos Islands, the evidence was circumstantial. There was no smoking gun.

My colleague Noah Perlut of the University of New England and I decided to go directly to the source: we would attempt to find, capture, and test the very Bobolinks that migrated through the Galapagos. If the birds tested positive for these malaria lineages, we'd have our rock-solid evidence.

We embraced the "Darwin within," and embarked on our Bobolink-in-a-haystack mission, with echoes of our colleagues' laughter still fresh in our minds. Despite a shoestring budget that allotted only 12 days to find and capture

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From left: Mistie Boule, Jason Loomis, Sarah Carline, Karen Bourque, Alex Wells, Nathaniel Sharp.

New Faces at VCE

Staff Updates | BY SUSAN HINDINGER

2018 brought many changes to VCE's cast of characters. We recently welcomed these exceptional new people to our fold:

Karen Bourque joined the staff in April as VCE's first-ever Director of Communications. Karen brings an exquisite combination of scientific literacy (she has a bachelor's degree in astrophysics), writing flair (and a master's in professional writing), a keen interest in the natural world, and infectious enthusiasm for VCE's work.

Sarah Carline is a familiar face in the VCE office, where she has been a long-time volunteer and seasonal biologist—and within Vermont's birding community, where she is one of the state's top 100 eBirders. A biologist by training, Sarah joined the permanent staff in May, now serving as our Development Coordinator and Office Manager, and will continue leading our multi-year Whip-poor-will survey.

Mistie Boule came to VCE in June as our new Business Manager. Mistie is a CPA with vast experience in both public and private accounting. A native Vermonter, she is a passionate outdoorswoman and spends her free time skiing, running, hiking, and camping. (We'll make a birder out of her yet!)

Jason Loomis started at VCE in September as our Full Stack Developer. With a degree in physics and two decades of experience in software development, Jason's diverse interests have also led him to spend several years as a shipwright (working with wooden boats in Maine), and running a construction company specializing in timber frame and energy-efficient housing.

In August, we bid a sad good-bye to Liza Morse (our intrepid first ECO Americorps member) and our two summer interns, Alex Kulungian and Tara Rodkey. In turn, we welcomed two new Americorps members, Nathaniel Sharp and Alex Wells, who will be with us through August 2019 (and Liza is continuing on with VCE as a temporary Social Media Specialist). FN

A Common Loon surveys its surroundings from a nest raft in Goshen

Loon Update

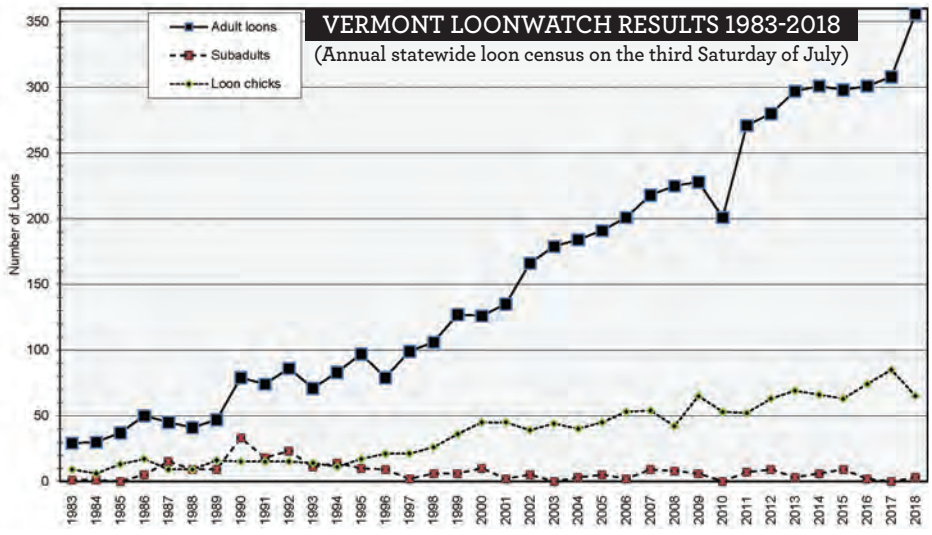
While it was another record-setting year for LoonWatch, an unusually high percentage of loon pairs took a "year off" from nesting. | BY ERIC HANSON

Still aglow from last year's record-setting LoonWatch tally of 308 adult loons, this year's volunteers may be surprised to learn that they outdid themselves once again, and counted a whopping 356 adults on LoonWatch Day 2018! For the previous five years, results from this annual, one-day statewide survey revealed an adult loon population holding steady at 297-308 individuals (see accompanying graph). We have to wonder—what's behind this year's big increase?

One reason could be that 10 additional lakes were surveyed in 2018, bringing the total number of surveyed lakes to 174. Another could be that this year's LoonWatch (July 21) featured a gorgeous, sunny, and relatively calm day, which made for ideal survey conditions. In years past we've experienced windy conditions and even thunderstorms during the survey, likely resulting in undercounted loons. Our final—and preferred—explanation is that there are simply more loons.

In terms of statewide breeding loon numbers, after 2017's record-setting 97 nesting pairs and 92 surviving chicks, productivity took a downturn in 2018, although we recorded a very healthy 91 nesting attempts and 74 chicks surviving through August. Interestingly, an unusually high percentage of loon pairs took a "year off" from nesting, with 27 of 118 pairs (23%) that have nested in recent years never attempting to breed. This may have been in part due to competition from extraterritorial loons, but some pairs simply chose "marginal" lakes that lacked adequate nest sites. Overall, Vermont loon pairs experienced 25 failed nests, while the 66 successful pairs hatched 97 chicks.

See the VCE blog "Field Update: Loon Wins and Losses" for details on rescues and mortalities in 2018. FN



2018 Highlights

➤**New nesting pairs:** Old Marsh Pond (Fairhaven)—produced one chick and is the first reported nest in far western Vermont; Lake Parker (Glover)—failed nest; also in Glover, two new nest sites on private ponds; Clyde Reservoir (Derby) and Lowell Lake (Londonderry)—we observed nest building on both, but neither pair laid eggs (we think they were practicing).

➤**"Fish Line Loon" update:** As of this writing, Nicki Steel and Lake Raponda residents continue to watch a loon that has been tangled in fishing line since June 2. This bird is eating and preening, with enough energy (and spunk) to have evaded our three capture attempts. We will monitor the situation very closely as winter sets in, and take further action if necessary.

➤**Team rescue effort:** For me, a highlight of 2018 was capturing a loon that had landed on a Northeast Kingdom pond too small for take-off, aided by my 20-year-old son Anders and his high school friend, Jacob Morse. Jacob is the most skilled electric motor boat driver I've ever known, while Anders did a fantastic job of spot-lighting and handling the loon after capture. After dip-netting the bird, we attached color-coded leg bands and released it on Caspian Lake, a few miles up the road. What better activity for twenty-somethings in rural Vermont on a summer night than a little "loon catchin'," then sharing the experience with their friends on Snapchat!

ECOLOGICAL EFFECTS OF EMERALD ASH BORER

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We've seen this before on a smaller scale when American Chestnut and American Elm both succumbed to introduced species (ironically, the widespread mortality of American Elm led to an increase in White Ash in many eastern forests). The difference this time is that we're talking about an entire genus of trees, not a single species. Indeed, across North America there are 16 native ash species, five of which were recently listed as "Critically Endangered" on the International Union for Conservation of Nature's Red List of Threatened Species; and a sixth was listed as "Endangered" specifically due to the impacts of EAB, now considered the most destructive forest pest ever seen in North America.

From an ecological perspective, what can we expect as—over the next generation or so—the Northeast completely loses its White, Green, and Black Ash trees? We know that ash contributes significantly to nutrient cycling in hardwood forests, and provides important sources of food and habitat for a wide variety of insects, birds, and mammals. We also know that following the demise of American Chestnut, five species of chestnut-dependent moths went extinct. Clearly, the effects of EAB will go deeper than the dead trees we will inevitably see when we venture into our forests.

A 2016 study published in *American Entomologist* listed a total of 100 invertebrate species that specialize in feeding on North American ash trees. Of those, 34 are moths, five of which are considered at "very high risk" of extinction because they feed exclusively on ash. Perhaps the most imperiled of the lot is the Canadian Sphinx Moth, which is inextricably linked to Black Ash, widely considered to be the preferred host of EAB. Unfortunately, Black Ash is extremely vulnerable since it apparently takes fewer EAB larvae to kill one than similarly sized trees of other ash species.

In addition, 77 of these 100 invertebrate species are considered at "high risk" of becoming endangered, and most are made up of beetles, flies, true bugs, and moths. While it's likely that very few of us would notice if the Eastern Ash Bark Beetle, Wooly Ash Aphid, or Grote's Sallow Moth were no longer around, it's important to realize that these are groups of insects that most of our forest-breeding birds rely upon for food; therefore, a loss in insect diversity and/or abundance would probably result in a cascade of secondary ecological effects.

Leaf litter from Green Ash enabled Wood Frog tadpoles to develop faster with increased survival. Consequently, some ecological effects will be determined by what species replace ash.

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WHAT CAN WE EXPECT AS THE NORTHEAST COMPLETELY LOSES ITS ASH TREES? WE KNOW THAT ASH PROVIDES IMPORTANT SOURCES OF FOOD AND HABITAT FOR A WIDE VARIETY OF INSECTS, BIRDS, AND MAMMALS.

CLEARLY, THE EFFECTS WILL GO DEEPER THAN THE DEAD TREES WE WILL INEVITABLY SEE WHEN WE VENTURE INTO THE FOREST.

Another study in the journal *Biological Invasions* noted that there are 30 invertebrate species that feed on ash and just one or two other tree species. As the number of ash trees declines, these species will shift to feeding on their alternate hosts, which may have significant effects on both native trees and ornamental plantings. Imagine, for example, what will happen when the ash seed weevils in a given woodlot shift from feeding on ash to neighborhood lilacs (their alternate host plant).

Perhaps the most surprising outcome of ash decline may be its potential effect on Wood Frogs. In a 2013 study published in *Freshwater Biology*, researchers raised Wood Frog tadpoles in 10 artificial pools, each with a different species of leaf litter. In vernal pools, leaves that drop into the water each autumn form the base of the food chain. Different species of leaves can have varying effects on water chemistry, phytoplankton abundance, and tadpole development. In this case, they found that leaf litter from Green Ash enabled tadpoles to develop faster, grow larger, and survive better than tadpoles exposed to leaves from other plants, including White Oak and Red Maple. This was primarily due to the nutritional quality and lack of tannic acids in ash leaves.

Consequently, some ecological effects will be determined by what species replace ash. In parts of the Midwest where EAB has killed millions of ash trees already, Red Maple is one of the tree species taking its place—bad news for vernal pool species, since Red Maple leaves have high tannin concentrations, with well-known strongly negative effects on water chemistry. In addition, other studies have shown that invasive species, including honeysuckle, Glossy Buckthorn, and Multiflora Rose often take over when ash dies out.

Although the outlook appears grim, I'm holding on to a tiny glimmer of optimism as researchers work to develop ash that are resistant to EAB. The most promising investigations include propagating clones from a small percentage of ash that show natural resistance, and a technique that applies modern genomic technologies that result in trees capable of changing their bark chemistry to resist attack by EAB. FN

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Alexander Dickey Conservation Intern Tara Rodkey

From Desert to Forest:

Lessons from the Vermont Landscape.

BY TARA RODKEY

The still ponds, encircled tightly by forest, and the unrelenting greenness of Vermont were certainly a far cry from home. Growing up by the arid openness of the Sonoran Desert, in Phoenix, I would be hard pressed to think of two more dissimilar landscapes in the U.S. Coming to Vermont as VCE's Alexander Dickey Conservation Intern gave me a lot of firsts: first time hearing the motor-revving call of a ruffed grouse, hidden away in the woods; first encounter with a loon via its forlorn wail, enchanting the dusk; and first time hearing the smack of a beaver's tail on his territory, warning away an unwanted visitor—me.

But beyond feeling like a stranger in a totally new landscape, this internship was also my first time working with birds in the field, or any place for that matter. I was a total rookie, one who would scarcely have been able to point out an American Robin. Yet, on my very first day in late May, I found myself in the midst of VCE's Birdathon, surrounded by veteran birders and conservation scientists in an intensive 24-hour birding marathon. Induction by fire. Both intimidating and exciting, it gave me a taste of what I did not know, of the challenges ahead, and of the characters I would come to meet. Everything was new: an American Bittern slinking in the reeds, clapping its beak together as it gulps air for its strange call, a sound like hearing a tennis ball hit the court from underwater; the brilliant plumage of a Canada Warbler; the raucous chorus of Red-winged Blackbirds and their flurry of riverbank antics; the R2D2 song of a Bobolink, out of sight in a tall hayfield; and our motley group of naturalists running about since three o'clock in the morning, shuttling from spot to spot, chasing down unseen bird calls.

Much more than an introduction to birds, this internship was an immersion into conservation biology and a community of peers and advisors steeped in all aspects of VCE's diverse work. For the first time, I found myself surrounded by professionals engaged in conservation outside the walls of academia. From participating in Mountain Birdwatch and being privy to an extensive network of bird enthusiasts who collectively hike hundreds of miles in June to track montane bird populations across the Northeast, to following loon biologist Eric Hanson through the backroads of Vermont to check a nesting pair on a remote lake, my three-month experience was full of excitement and invaluable insights into the gears that drive this kind of work.

> THE ALEXANDER DICKEY CONSERVATION INTERNSHIP GAVE ME A CHANCE TO BUILD THE SKILLS I NEED TO DO THE WORK I LOVE.

I also met some of the family of Alexander Dickey, the young man in whose memory this internship was created. Through the stories of his grandmother Closey and through the warm open natures of his mother and stepfather Landon and Geoffrey, I felt like I was given a window into who Alex was. I saw him, too, in the forests and lakes, thinking of him as I discovered places that I imagine must have been dear to him, must have moved him.

The Alexander Dickey Conservation Internship gave me a chance to build the skills I need to do the work I love. And it led me to Vermont, bringing me under the enchantment of its woods and misted ponds, in the honor of someone who loved these places deeply. I am leaving with myriad experiences to pull lessons and inspiration from, and surer footing to step forward into a career of exploring and protecting our wild spaces. FN

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UVM summer intern Alex Kulungian (left) and Alexander Dickey Conservation Intern Tara Rodkey (right) stand in front of a "small" road wash out near the Canadian border in Rangeley, Maine, while they contemplate an unplanned 12-mile hike to update photos and descriptions of some of our most inaccessible Mountain Birdwatch sampling locations.

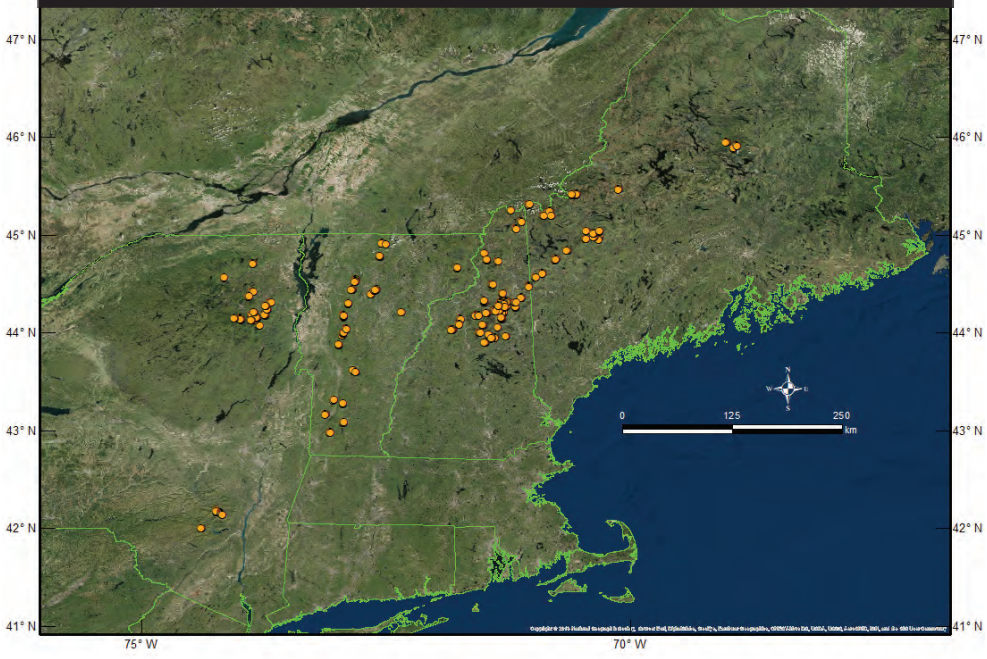
Mountain Birdwatch Evolves

We have strengthened the quality of data that our citizen scientists collect and simultaneously improved their Mountain Birdwatch experience.

BY JASON HILL

Evolutionarily speaking, adaptation is key to the long-term persistence of a species—or a citizen science program—but change is not for the faint of heart. Last year, I took the reins of Mountain Birdwatch, one of our beloved citizen science programs with approximately 200 participants annually (including observers and their assistants), with a critical eye on the program's future. I'm a quantitative ecologist, so by default I view opportunities in terms of statistical parsimony, which means minimizing complexity while maximizing results. I really wanted to find a way to strengthen the quality of the data that our citizen

MOUNTAIN BIRDWATCH SAMPLING POINT LOCATIONS.



scientists collect, while simultaneously improving their experience with Mountain Birdwatch. So, I sat down with VCE biologists John Lloyd and Kent McFarland last autumn to systematically reexamine Mountain Birdwatch procedures and protocols. With the help of two ambitious interns (Alex Kulungian from University of Vermont's Rubenstein School of Environment and Natural Resources, and Alexander Dickey Conservation Intern Tara Rodkey), we charted a course forward that involved garnering feedback from our citizen scientists at every step.

THE KEY TO SURVIVAL IS ADAPTION, AND WE'RE STRENGTHENING MOUNTAIN BIRDWATCH TO LAST WELL INTO THE FUTURE.

© JASON HILL

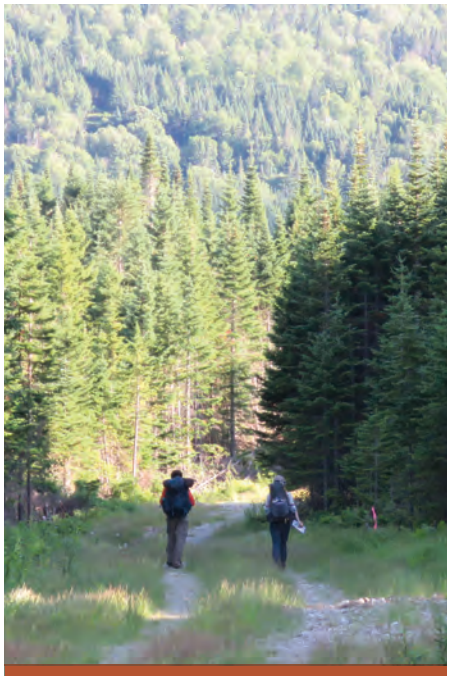
First, we streamlined the protocol (e.g., removing the spruce and fir cone count component) and updated and completely overhauled training materials, route documents, and the website. I received ~40 exuberant emails with lots of exclamation points from current Mountain Birdwatch citizen scientists who were happy to say "good bye" to cone counts. Conducting cone counts was arduous and time consuming, and it turns out that we can get really accurate cone count data from forestry surveys without burdening our volunteers.

Second, we partnered with the Forest Ecosystem Monitoring Cooperative to design and launch a state-of-the-art online data entry platform for our citizen scientists. Third, we permanently retired several routes, and relocated several dozen sampling locations that were adjacent to loud water features that prevented volunteers from counting birds (there's nothing more frustrating than hiking deep into the mountains to count birds, only to end up standing next to a raging stream that prevents you from hearing anything).

Fourth, we entered into collaborations with Maine Department of Inland Fisheries and Wildlife, Maine Appalachian Trail Club, and the Appalachian Mountain Club to harness both the expertise of state biologists and local knowledge of Caretakers and Ridgerunners to conduct Mountain Birdwatch surveys in some of our most remote locations.

Lastly, interns Tara and Alex and dozens of our citizen scientists traveled around northern New England and New York to update photos and descriptions of sampling locations to make it easier for new Mountain Birdwatch volunteers to participate in the future. Check out the new and improved volunteer materials on our website: vtecostudies.org/projects/mountains/mountain-birdwatch.

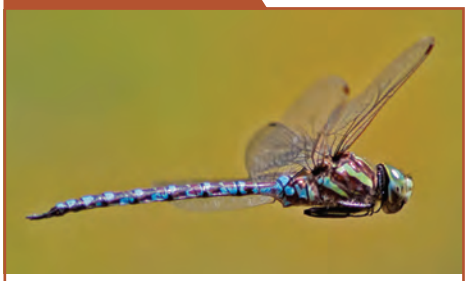
The key to survival is adaption, and we're strengthening Mountain Birdwatch to last well into the future. FN



© JASON HILL

VCE summer interns Alex Kulungian (left) and Tara Rodkey (right) head out to scout survey locations for a Mountain Birdwatch route near the Kennebago Divide, Maine, just south of the Canadian border.

CITIZEN SCIENCE OPPORTUNITIES



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What lives here? Where is it? What's common? What's at risk? What will be? TheVermont Atlas of Life brings more than 150 years of accumulated knowledge of Vermont's biodiversity into currency for science and society. It's a biodiversity warehouse freely available to anyone, anywhere, anytime to explore, learn, and share their observations.

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To learn more about the Vermont Atlas of Life and its projects, visit val.vtecostudies.org

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Elinor Osborn

BY SUSAN HINDINGER

"My parents said my first word was 'bird.' So I guess that's when I got into birding." Elinor Osborn somehow manages a commanding presence with nary a word. She might be the most capable birder in a group, but you won't know it unless you're listening. Hers is a knowledge borne of experience, a quiet confidence without an ounce of hubris. One gets the impression that she has nothing to prove, but so very much to offer.

An accomplished professional photographer, Elinor's knowledge comes from direct observation, followed by careful study. "Photography teaches me a lot because after I photograph something, I have to check out the field guides, web, etc., to find out what it was."

In 1967, Elinor and her husband George bought a house in Penfield, NY adjacent to a 100-acre wetland. "I spent 11 years there on the Penfield Conservation Board learning how wetlands work—how areas downstream flood when wetlands are filled or drained; how wetlands hold back enormous amounts of water in rainy periods and then release it slowly; how they are important habitats for wildlife." She served as a volunteer site monitor for the Genesee Land Trust's part of the wetland, and participated in Scarlet Tanager and Birds in Forested Landscapes projects for the Cornell Lab of Ornithology in the same wetland. She donated photography to the Genesee Land Trust and the local chapter of The Nature Conservancy.

In upstate New York, Elinor worked as a music teacher and George as a trombonist in the Rochester Philharmonic Orchestra. After retiring, she had the good fortune to follow the Trumpeter Swan Migration Project, photographing and writing a children's book about it. Elinor and George started coming to Vermont to ski at the Craftsbury Outdoor Center about 1980, and moved to the area when they retired. Soon after, Elinor began photographing loons and participating in VCE projects.

"Elinor has covered Great Hosmer Pond as an adopt-a-lake volunteer since the late 1990s," says Eric Hanson, VCE's loon biologist. "She and George spent many nights helping me with loon banding efforts and nighttime rescues. They kayaked lakes all over the Northeast Kingdom to monitor loons for VCE."

Before George passed away in 2016, he joined Elinor on some of her adventures. She recalls one night vividly—canoeing in the dark amid lurking stumps, watching Eric spotlight and eventually capture a loon. Back on shore, she watched as Eric banded the loon and collected blood and feather samples. "On the same night on another lake, before another capture, we saw clouds of bats darting and shining silver in the spotlight, just above the water. That loon was entangled in fishing line. While I held the loon's beak just enough to keep it from opening, Eric surgically removed the line, then returned the loon to the water. Then we tumbled into our motel beds at 4am after a wonderful night with loons." These adventures and others led Elinor to write and photograph an article on loon conservation in Vermont for *Vermont Life Magazine* in 2003.

These days, Elinor walks a half mile down the road to check on the nesting loon pair at the south end of Great Hosmer Pond several times a week each summer. Or when she has a chance to kayak, she checks for loon activity on the whole of Great Hosmer Pond as well as Little Hosmer Pond.

In addition to Elinor's meaningful work with Vermont's loons (you will frequently see her loon photos in VCE materials), she has also contributed significantly to *The Second Atlas of Breeding Birds of Vermont*, the Vermont Butterfly Survey, and the Vermont Bumble Bee Atlas. For her many contributions to advancing wildlife conservation as a volunteer citizen scientist, the staff and board of VCE are proud to present Elinor with the 2018 Julie Nicholson Citizen Scientist Award. FN

The Julie Nicholson Citizen Science Award honors Julie Nicholson's extraordinary passion and commitment to birds and wildlife conservation through her many years of tireless work as a citizen scientist. It is presented annually to an individual who exemplifies Julie's dedication to the cause of citizen science and conservation.

BOBOLINKS *continued from page 3*

Bobolinks, the spirit of Darwin indulged us. Amazingly, on the second day we found our first two Bobolinks, and by the end of our brief field season we had captured nine of the 11-15 Bobolinks we laid eyes on. We collected blood samples for analysis before releasing the birds to continue their migratory journey.

The news from Dr. Parker's lab analysis of the samples was not as astonishing as our success at acquiring them: sampled Galapagos Bobolinks hosted two of the same malaria lineages found in birds sampled on breeding grounds, but none had a lineage that matched one of the four found in Galapagos endemic birds. The small sample size limited the probability of capturing a Bobolink that matched—therefore more samples are needed, but that is neither easy nor inexpensive.

And what about that handful of fall Bobolink sightings on the California coast mentioned previously? Where do they breed? Somewhere in the West to be sure, but where specifically, and do they all hail from one location? In other words, is there a unique population that is isolated from the rest of the Bobolink world? This is yet another enigmatic piece of the bigger Bobolink migration puzzle.

Finally, a lingering question to consider in this "whodunnit" are the mosquito vectors. As stated earlier, mosquitos transmit malaria from bird to bird. There are only three mosquito species on the Galapagos: one is native to the archipelago; one was introduced in 1995 and is a known avian malaria vector; and one was also introduced in the 1990s but is less likely to feed on birds. Recent work on the altitudinal distribution of mosquitos in the Galapagos found that the first two mosquito species occur at the same elevation (422–435 m) as the sites where Bobolinks were found.

Nonetheless, despite circumstantial evidence that Bobolinks transmit avian malaria to Galapagos endemics, conclusive evidence remains elusive. FN

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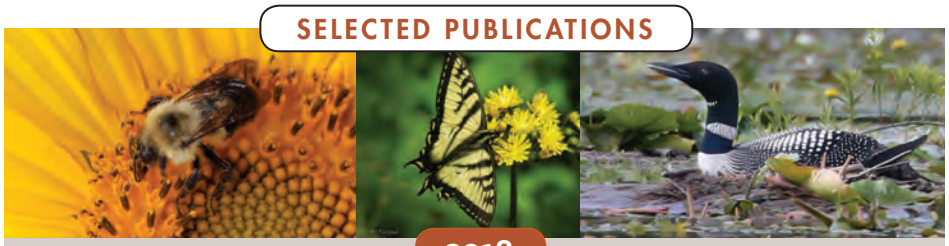

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PO BOX 420
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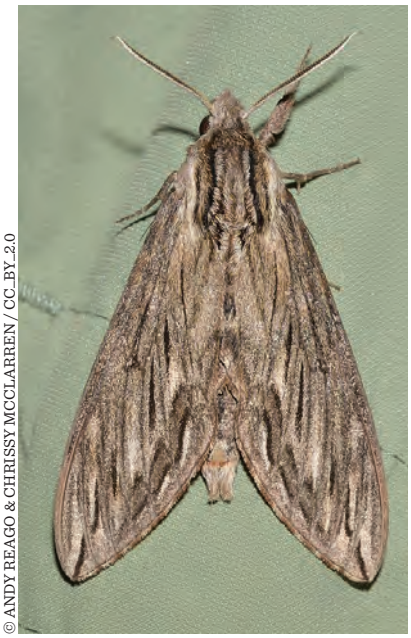
Canadian Sphinx Moth {*Sphinx canadensis*}

Hawk moths are among the fastest flying insects in the world, but they might be in trouble.

BY KENT MCFARLAND



Despite having wingspans nearly 3 ½ inches across, these night-flying moths remain elusive through much of their range.

With long slender wings and bullet-shaped bodies, hawk moths are reminiscent of miniature Peregrine Falcons. And, like falcons, they're built for speed. They are among the fastest flying insects in the world, capable of reaching speeds nearing 35 MPH.

But some hawk moths might be in trouble: as many as nine species may be imperiled if ash trees become functionally eliminated from North America by the introduced Emerald Ash Borer—that's about 8.5% of the entire North America fauna. And Canadian Sphinx Moth may be the most vulnerable of all hawk moth species.

Scientists only recently discovered that Canadian Sphinx Moths are wholly reliant on one species of tree, Black Ash (*Fraxinus nigra*), which is found in forested wetlands. Canadian Sphynx Moth caterpillars successfully feed and grow only on Black Ash leaves—and being limited to a single host plant is not without peril. Black Ash is considered by many to be the most susceptible and vulnerable of North American ash, with its entire range found within the projected area for expanding Emerald Ash Borer distribution.

First discovered in Quebec and named in the late 1800s, the Canadian Sphinx Moth is found where its host plant grows—in Canada from New Brunswick west to Manitoba, and southward to Wisconsin, Missouri and Tennessee.

In Quebec, and likely other areas in the northern part of the species' range, adults can be found flying from mid-June to August, and especially in the first half of July. Females attract potential suitors by emitting a pheromone from the tip of their abdomen. They lay round, pale green eggs in small clusters on Black Ash leaves. The caterpillars hatch in as few as four days, and then eat their way to fourth instar in eight days or less. Amazingly, they then drop to the ground and excavate subterranean chambers, where they pupate and spend the winter. In spring, they wiggle to the surface to eclose, then fly off in search of mates and flower nectar.

Despite having wingspans nearly 3 ½ inches across, these night-flying moths remain elusive through much of their range. And despite having ample habitat throughout the Northeast, they've yet to be found in Vermont, and are rarely encountered in other neighboring states. Are they truly rare, or are they confined to wooded wetlands that are often remote and difficult to navigate at night? Only future targeted surveys will help reveal them, hopefully before it is too late. FN