FALL 2021

Field Notes

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

Under the Hum of the Power Lines

"Ugly" to some, power lines likely provide critical habitat for pollinators in New England. | BY JASON HILL

"Trespassers will be shot on sight." Not exactly a welcoming driveway sign, but those same landowners couldn't have been more supportive of me, "figuring out what's going on with those bumble bees," on their property. Here in New England, most strips of utility rights-of-way (ROW) are small and privately owned, so it effectively takes a community effort to study insect pollinators beneath power lines. In conversations with dozens of landowners this past summer, not a single person turned me away from their property.

In a world with far too many mowed lawns (i.e., ecological deserts) and impervious surfaces, swaths of natural, untamed wildflowers and flowering shrubs provide an increasingly urgent landscape feature for pollinators and other wildlife. Evidence suggests that the abundance and diversity of pollinators is declining worldwide. For example, eastern Monarch (*Danaus plexippus*) numbers have plummeted by more than 80% over the last two decades. Our Vermont Bumble Bee Atlas results also suggest that nearly one-third of Vermont's historically-present bumble bee species are extirpated. *(continued on page 8)*

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FIELD NOTES

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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 community 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.

Field Notes is VCE's biannual newsletter and is free to our constituents.

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VCE VIEW

This past mid-September found me, as it always does, on the Mt. Mansfield ridgeline for VCE's annual wrap-up banding session. As our team processed a stream of tiny kinglets, look-alike thrushes, and "confusing" fall warblers—surrounded by enthused and appreciative fellow staff, board members, friends, and supporters—I had to reflect on our collective good fortune. Few are able to experience such intimate encounters with wild creatures in such a magnificent setting. Fewer still can claim to have done so for 30 consecutive years. VCE's long-term work on Mansfield and our other conservation science projects affords us awesome privilege, and imposes huge responsibility.

To assert that the past 18+ months have tested the mettle of each and every one of us is a gross understatement. We've had to weather the double whammy of COVID-19 and an escalating global ecological crisis. Lifestyles have been dislocated, psyches frayed, and the natural order of our planet disrupted. We've all had to fight the propensity to feel despairing, to question whether our actions can truly move the conservation needle. Yet, against all odds, VCE has rallied, unified, and stepped up. We've doubled-down to elevate and expand our research, and our commitment to long-term outcomes helps ground us in this era of upheaval.

We remain steadfastly hopeful, and resolved. With the need for science-based conservation more urgent than ever, our strategic plan propels us to innovate, diversify, and maintain our signature long-term focus. In 2021, VCE continued to break new ground—documenting Vermont's wild bee fauna, rediscovering lady beetle species thought to be lost, launching a study of pollinators in powerline rights-of-way, and "blitzing" Eastern Meadowlarks all over the state. On Mansfield, we added a crucial arthropod component to our ongoing ecological monitoring, while attaching miniature GPS backpacks to 36 adult Bicknell's Thrushes. Our collaborative "bird-friendly maple" investigations embody both scientific innovation and practical conservation application.

Perhaps it is the inevitable purview of an old-timer to reflect on history as a window into the future, but as I watched our last banded Golden-crowned Kinglet dart back into Mansfield's fir thickets on the first day of autumn, I couldn't help feeling immensely proud of VCE's diverse palette of work. Whether investigating short-term phenomena like late winter movements of Bicknell's Thrush, tracking Vermont loon populations over 40 years, or gearing up for a second statewide Butterfly Atlas in 2023, we're in it for the long haul—and thankful to have you along.

Chris Rimmer
EXECUTIVE DIRECTOR

An Eastern Meadowlark catches the first rays of early morning light.

© NICK TEPPER

Record Meadowlark Numbers Reported

More than 800 Eastern Meadowlark observations were logged in Vermont during 2021. | BY KEVIN TOLAN

Blitzing birders' observations appear to confirm the species' continuing, significant statewide decline.

Like birds, birders inhabit almost every environment. From landfills to boreal forests, lakeshores to mountain tops, when there are birds to see, birders will be there looking. If you drove through agricultural areas in Vermont during the early morning this summer, you may have spotted birders scanning roadside hayfields. A first glance may have suggested they were gazing into empty space, but, in fact, their eyes and ears were likely seeking meadowlarks.

Thanks to the tremendous efforts of over 175 community scientists across the state, more than 800 observations of Eastern Meadowlark were entered into eBird this summer. What's more, the number of observations recorded with a breeding code increased seven-fold, providing invaluable data on nesting activity. Importantly, these observations spanned the entire May–July breeding season, providing key data on which sites remained occupied. Further, our colleagues at New Hampshire Audubon ran a concurrent Meadowlark Blitz this summer, covering most of the state's known historic, and many potential, breeding sites. Together, this information yields a much-needed update of meadowlark status in the Northeast.

As expected, the Champlain Valley remains Vermont's stronghold for meadowlarks, with Bennington also hosting a sizable population. However, meadowlarks were few and far between outside these two areas. Surveyors did document two notable sites outside the state's western regions—one each in Richford and Danville—that weren't previously known. Both sites were delay-mowed this summer, which allowed any potential nests to fledge before hay was harvested.

According to a 2019 report published in *Science*, three in four meadowlarks have disappeared from North America since the 1970s. And Vermont is not immune—the USGS Breeding Bird Survey estimates an 8.7% statewide annual decline of meadowlarks. In the 14 years since the most recent Vermont Breeding Bird Atlas, many meadowlarks have disappeared from the state. While the 2021 Blitz's results aren't directly comparable to Atlas results, a cursory glance appears to confirm the species' continuing, significant statewide decline. With the species' imminent listing as Threatened in Vermont, we will use these data to target conservation of Vermont's remaining meadowlarks, and seek opportunities to reverse the current population trend. Stay tuned for future updates regarding VCE's "EAME Blitz" and what the Vermont conservation community is doing to help these vulnerable grassland specialists. FN

An adult Bicknell's Thrush sports its brand-new GPS tag "backpack."

Solving a Spatial Riddle for Bicknell's Thrush

© MICHAEL SARGENT

Documenting winter movements of Bicknell's Thrush with miniaturized archival GPS tags.

BY CHRIS RIMMER

Even after 30 years of probing the mysteries of Bicknell's Thrush ecology and behavior across the species' annual cycle from Canada to Cuba, many gaps remain in our knowledge. We've learned more than we ever thought possible, but the full puzzle is far from solved. One specific riddle involves apparent late-winter movements of birds from discrete territories established in November and December. Such movements, known as "intratropical migrations (ITMs)," appear to be uncommon overall in migratory songbirds, but are well-documented in the closely related Veery and Swainson's Thrush. Over our years of studying Bicknell's Thrush on Hispaniola and Cuba, VCE has obtained circumstantial—but compelling—evidence of ITMs. Given severe conservation threats to forested habitats on all four Greater Antillean islands where the species overwinters, understanding its full range of non-breeding habitat use is crucial to direct conservation efforts.

To tackle this piece of the annual cycle puzzle, we turned to sophisticated technology, specifically miniaturized archival GPS tags. These tiny "backpacks" can be programmed to record precise data on the location of any bird wearing them. GPS technology has revolutionized studies of full annual cycle movements in migratory birds, as VCE convincingly demonstrated with our recent research on Upland Sandpipers and Eastern Meadowlarks. The drawback of placing these tags on 1-ounce songbirds like a Bicknell's Thrush is that only 50–100 points can be programmed, *and* the tags must be physically recovered to retrieve their precious data. Never a group to shy away from challenges, especially when it comes to Bicknell's Thrush, VCE took the plunge and launched a study on Mt. Mansfield this past summer.

Confident that we could capture up to 40 adult thrushes in a season, we ordered 40 1.1-gram archival GPS tags as a means to investigate ITMs. Our longtime Canadian colleague Yves Aubry joined the fray by ordering 15 tags for birds at a southern Quebec site. Because these apparent

GPS data stand to provide a vital piece of the complex conservation puzzle for this globally vulnerable long-distance migrant.

movements occur in late winter, we concentrated our programming of points (called "fixes") in March, April, and May, adding 2–3 in each month from November–February to pinpoint early and mid-winter territory locations. On June 7, we affixed the first backpack to adult male #234124792. As of our final banding session on September 21, we had affixed 36 tags (26 males, 10 females), while Yves managed to tag 14 males north of the border. Encouragingly, we recaptured nine birds a week or more after affixing their tags, and all were in robust condition; four had even gained weight!

Now comes the hard part: waiting 9–10 months for our 2022 Mansfield season, hoping all birds survive, that their tags function properly, *and* that we recapture them. With annual return rates of approximately 40%, we're optimistic. You can be sure we'll blanket the ridgeline with mist nets next summer! Documenting the existence, patterns, and timing of ITMs—if they occur—stands to provide a vital piece of the complex conservation puzzle for this globally vulnerable long-distance migrant. FN

NEW FACES AT VCE

Mountain Ecology Technician

ABBIE CASTRIOTTA

We're excited to welcome Abbie Castriotta, VCE's new ECO AmeriCorps member! Abbie grew up in western Massachusetts but has called the Upper Valley home for four years. She graduated from Colby-Sawyer College in May 2021 with a B.S. in Environmental Studies and a B.A. in Studio Art. Both fields require careful observation, and she believes that being an artist has made her a better scientist and vice versa. After graduation, she worked for the Smithsonian Migratory Bird Center as part of a research team conducting point counts for Kirtland's Warblers at remote sites in Michigan's Jack Pine forests. Abbie jumped right into her first couple days at VCE atop Mount Mansfield, helping to wrap-up the field season by banding Bicknell's Thrushes as well as other montane species and fall migrants. Welcome, Abbie!

Development Coordinator and Office Manager

KIMBERLY KEMLER

We're pleased to welcome Kimberly Kemler, our new Development Coordinator and Office Manager. An intrepid traveler, Kimberly hails from Florida's Treasure Coast (located along the Atlantic Coast) and comes to us first by way of Japan, where she taught English as a Second Language, and more recently Baltimore, where she earned an MFA in Creative Writing, coordinated after-school programming for a local school, and interned in development and special events. In seeking to build her development career in an organization focused on research and evidence-based solutions, Kimberly has found a good fit here at VCE, not to mention many new opportunities to discover and explore the outdoors. To say she is off and running already is an understatement! FN

A FOND FAREWELL

VCE says good-bye to two integral team members.

VCE reluctantly said good-bye to two integral and talented members of our team this spring. Sarah Carline served VCE for many years as a dedicated volunteer, then a field assistant, then a leader of our Whip-poor-will project, and finally an essential full-time staff member who continued to lead the Whip-poor-will project while she also kept track of thousands of VCE supporters as our Development Coordinator and Office Manager (whew!). An accomplished birder, Sarah could—and did—do it all, still finding time to sleuth out her fair share of birds and butterflies in her spare time.

Karen Bourque defined the role of VCE's Director of Communications, making seemingly easy work of herding the VCE cats to produce polished, professional publications, both digital and print. If you missed our *2019 Annual Report Story Map* (https://storymaps.arcgis.com/stories/7c2c57321d1f4ac1ab785c119a60c21e), take a look—that was Karen's story-telling handiwork. Cheerfully cajoling articles from busy colleagues and pulling off one big project after another—with excellence and on deadline—made Karen a fun and valuable colleague. And, her willingness to contribute beyond her primary duties helped VCE's management team in countless ways. Both these core members of VCE's family raised the bar for those to come, embodying the trend of our staff to innovate and create. We wish them both the best! FN

Eloise Girard, VCE's 2021 seasonal loon biologist, deploys nest warning signs on Green River Reservoir. For the first time in decades, no loons successfully nested on the reservoir.

A Record Year for Vermont's Loons

Loon pairs nested with unprecedented success during the 2021 breeding season.

BY ERIC HANSON

© BARB WOOD

This year marked a record breeding season for Vermont's Common Loon population, with six new nesting pairs and an unprecedented 109 nest attempts. Vermont's loon productivity has exceeded the North American average over the past 25 years, underscoring how dedicated statewide conservation efforts can help species recover. As the season winds to a close, I want to share a few highlights, including new successful nesting pairs and a surprising nest location.

For two established loon pairs, 2021 proved the year their luck turned. One pair has occupied Bruce Pond (Sheffield) for 13 years and had nine nests fail during that time. A second pair on Fairfield Pond (Fairfield) has a similarly disappointing past, with five failed nests over the past nine years. During many years, this pair didn't even attempt to nest. However, both pairs finally experienced success in 2021, each hatching out two chicks. Unfortunately, the Bruce Pond pair lost one chick early on, but the second survived.

This leads us to ask: why the dismal nesting track records? One possibility is that neither pair has been able to spend enough time on its nest. Bruce Pond is tiny, and we've often noticed only a single loon present during surveys, making us suspect that the pair visits nearby Clarks Pond to feed. This multi-lake territoriality means that adults spend much time off their nest, exposing eggs to both elements and predators. On Fairfield Pond, the pair first attempted to nest on an island frequented by swimmers and anglers. We placed a raft nearby, but the adults

Water levels remained stable enough for Vermont's first-ever successful nest on a river.

were still forced off their nest by people. LoonWatch volunteer Dennis Hendy and I tackled this issue several years ago by moving the raft farther away, but the loons didn't follow. This year, we relocated it to a quieter area over a half mile away; thankfully, the pair found it and nested successfully.

Several new pairs took up residency in Vermont this year, including nesting pairs in Rutland County on Glen Lake (Castleton) and Sunset Lake (Hubbarton). Both nests were depredated, but we're hoping the loons discover and use the rafts we will place in 2022. Norton Pond became only Vermont's second lake to host four nesting loon pairs, with the new fourth pair sneaking in a late-July hatch. Volunteers Denis LaPointe and Donna and Ray Wiegand-Bicknell were baffled by the unexpected presence of young chicks before they figured out why! Finally, a new pair hatched a chick on Turtle Pond in Holland—the first since 1981. It's gratifying to see a pond re-occupied after 40 years of conservation efforts.

Last but not least, we experienced a notable first in a season already full of new loon milestones. Wyatt Peterson of the Northwoods Stewardship Center came across an adult loon and chicks on a slow-flowing section of the Clyde River (Charleston) mid-way through the summer. Without any major rains in June, water levels remained stable enough for a successful nest—Vermont's first-ever on a river.

As always, we thank the hundreds of volunteers, game wardens, wildlife rehabbers, hydro-electric operators, donors, and many others for another banner loon year. FN

Eloise on Clyde Pond

© ERIC HANSON

2021 VERMONT COMMON LOON STATS

109 NEST ATTEMPTS

125 CHICKS HATCHED OUT

77 SUCCESSFUL NESTS *(71% successful)*

85 CHICKS SURVIVED THROUGH AUGUST *(68% successful)*

49 NESTING RAFTS PLACED

32 RAFT NESTS *(88% successful)*

34 ISLAND NESTS *(62% successful)*

29 MARSH NESTS *(72% successful)*

14 SHORELINE NESTS *(50% successful)*

56 NESTS WITH WARNING SIGNS

352 VOLUNTEERS

53 NEW VOLUNTEERS

© ERIC HANSON

Goldenrod Soldier Beetle (Chauliognathus pensylvanicus, upper left), Northern Amber Bumble Bee (Bombus borealis, upper right), Tricolored Bumble Bee (Bombus ternarius, lower left), and Monarch caterpillar (lower right).

© JASON HILL

The causes of pollinator declines are complex, but management practices on working lands (e.g., farmlands) are likely a dominant factor. At the same time, early successional landscapes maintained under ROW are increasingly valued as critical pollinator habitat.

A key question is whether power lines equally attract and benefit different groups of insect pollinators. Over the last two years, a local power company and I have been conversing, and we ultimately decided to investigate if mowing and herbicide application (for woody vegetation control) on ROW differentially affect pollinator population dynamics. Unfortunately, weeks before our intended start date, the company unexpectedly withdrew from participation in the study (citing COVID-19 related challenges) and retracted its offer to share data on locations and protocols of mowing and herbicide spraying on ROW during the previous six months.

In my experience as a conservation professional, these challenges are not uncommon when researchers and stakeholders come together at the table, and yet they must be overcome to conduct research that directly informs management strategies. Unable to tackle my original research question, I quickly realigned our project to investigate which flowering plant communities serve as good predictors of Monarchs and bumble bees on ROW.

In July and early August, Pete Kerby-Miller (ECO AmeriCorps), Ani McMannon (VCE Intern), and I surveyed 26 transects weekly, each 200-m long and 5-m wide. We safely netted, identified, and released 579 bumble bees of over nine species. Our results approximate those of the Vermont Bumble Bee Atlas, in terms of which species were relatively abundant in our samples and which species were rare and missing. We captured bees visiting at least 39 flowering plant species, and we also counted tens of thousands of individual blooming plants. Later this winter, I'll statistically compare flower use vs. availability to determine if bumble bees on our ROW preferred specific flowering species.

In early August, we estimated milkweed densities and meticulously (i.e., leaf-by-leaf) searched 731 Common Milkweed (*Asclepias syriaca*) plants on our transects for all Monarch life stages and other milkweed specialists. We'll soon share these data with the International Monarch Monitoring Blitz. We were all surprised at the paucity of Monarch eggs (76) and caterpillars (37), and other milkweed specialists that we found—only two Small Milkweed Bugs (*Lygaeus kalmia*), 14 Milkweed Longhorn Beetles (*Tetraopes tetrophthalmus*), and just one cluster of Milkweed Tussock Moth (*Euchaetes egle*) caterpillars.

The lack of monitoring data for most of these milkweed specialists makes it exceedingly difficult to draw conclusions from just one field season, or to determine if these low densities of milkweed specialists are driven by the same processes that have caused recent, rapid Monarch declines. One way or another, we'll be back out there next summer. If you're a Vermont landowner with ROW, a forward-looking utility company seeking to maximize ecological values of ROW, or someone just interested in pollinators, then we welcome you to reach out and tell us about your experiences with pollinators under power lines. FN

How do you keep rainwater and fir needles from filling up your pitfall trap? Recycled red plastic plates to the rescue!

© JASON HILL

Underground Atop the Mountains

Shedding light on the invertebrates that form the backbone of our montane ecosystems. | BY JASON HILL

© JASON HILL

Giant Conifer Aphid (Genus Cinara) ▲

Out of sight, and out of mind. The next time you pick your way along a rocky hiking trail in the mountains, keep in mind that you are surrounded by wildlife even if you do not see them. The vast majority of these animals will remain hidden from your view, even if you seek them out. I am not referring to Blackpoll Warblers or moose—the charismatic megafauna that many of us hope to glimpse up there. Nope. I am talking about the invertebrates (e.g., spiders, slugs, beetles, segmented worms, and ants) that (along with plants and fungi) form the bulk of the macroscopic consumers and decomposers that sustain and drive our montane ecosystems. The same invertebrates that are likely experiencing precipitous declines worldwide and shifting to higher elevations and latitudes in response to climate change.

With recent funding from the Forest Ecosystem Monitoring Cooperative, I hope to draw more scientific and public attention to montane invertebrates. (You know, the things that Blackpoll Warblers eat during the summer months. Ahem.) Fortunately, VCE has dabbled in arthropod sampling atop Mt. Mansfield, and I was able to draw from those experiences to design an initial monitoring regime that we hope will form the basis of a regional montane invertebrate community science project in the coming years. Our primary goal is to document changes in abundance and biomass of invertebrates as climate change advances.

The two biggest obstacles we faced this summer were logistical and methodological, and they were both sizable. Conducting "manipulative" research in the spruce-fir zone atop Mt. Mansfield required extensive (and necessary) permitting and coordination with many people—only made that much more protracted by COVID-19. With the help of former ECO AmeriCorps member Pete Kerby-Miller, we settled on a suite of sampling methods for our initial foray that we hoped would be scalable to a future region-wide community science effort. Therefore, we chose not to utilize labor intensive or skill-based sampling methods (e.g., hand netting and searching). We also avoided sampling methods that were impractical for remote locations (e.g., large, bulky traps or ultraviolet light traps that required electricity).

In the end, we deployed dozens of modified pitfall traps (for ground-dwelling invertebrates) and sticky traps (for flighted insects), and we performed mustard water extraction (for belowground invertebrates). It felt like we were reinventing our methods and redesigning our traps every week of this pilot season, but we learned what did and what did not work at an exponential pace. This winter we will sort through our samples (currently stored in alcohol) to determine which invertebrate groups we captured (and which ones we missed), in anticipation of a full-blown field season next summer at several dozen Green Mountain locations. Stay tuned. FN

Field biologist Bethany Smith measures the diameter of a large (31 in.) Sugar Maple.

Testing the Efficacy of Bird-friendly Maple

VCE and collaborators conclude their second and final field season of an innovative project.

BY STEVE FACCIO

Like music, field biology is based on repetition—scientists repeatedly collect data about variables of interest from numerous sample points in hopes of creating a clear final composition. For the past two summers, teams of field biologists have engaged in this practice by making daily visits to 14 different Vermont sugarbushes where they collected data for the Bird-Friendly Maple Efficacy Study. Gathering detailed information representing the intricate patchwork of relationships in sugarbushes is no easy task. Our teams' numbers tell the story. Across the 14 study sites, they conducted early morning bird surveys at 354 point count locations, meticulously quantified forest vegetation and structural characteristics at 1,416 "veg" plots, and sampled 285 native bees along 25 transects. Not wanting to leave even the smallest arthropod unaccounted for, they also carefully searched beneath 1,062 small cardboard squares placed on the forest floor and used a cordless shop-vac to suck foliage-dwelling invertebrates off understory vegetation on 3,186 plots. By tallying birds, characterizing vegetation, and surveying arthropods, we will better understand how to manage maple-producing forests in a way that provides high quality habitat for breeding birds.

All this repetition and diligent data collection has paid off. The study's database now boasts a long list of carefully quantified variables: well over 8,000 bird observations; 10,000 woody seedlings; diameters of 11,000 canopy trees, 7,000 saplings, and 1,000 downed logs; and close to 10,000 arthropod samples.

Field biologists Max Carroll (left), Eileen Fitzgerald, and Patrick Gourlay at the Branon family sugarbush in Bakersfield, VT. We are grateful to the participating sugarmakers who provided access to these working forests.

© STEVE FACCIO

This project will provide guidance to ensure that these working forestlands are managed in ways that enhance habitat for birds and other wildlife.

© STEVE FACCIO

Once analyzed, these painstakingly-gathered data will allow us to identify the most biologically significant habitat factors that explain variation in forest bird abundance, and species richness and diversity across a gradient of sugarbush production and management intensities. We can then assess which of those factors can be manipulated through silvicultural practices to achieve the structural conditions that result in the best habitat for forest birds. Audubon Vermont, one of our collaborators on this study, will use these results to update management recommendations of their Bird-Friendly Maple Project, which guides participating maple producers to sustainably manage their forests for birds *and* sap. In exchange, sugarmakers receive promotional materials that allow them to uniquely market their syrup as "bird-friendly."

Moreover, this study will contribute to a larger project by University of Vermont Professors Brendan Fisher, Tony D'Amato, and Rachelle Gould, and PhD candidates Liza Morse and Daniel Pratson. Their work will not only investigate how intensity of maple sugar production affects biodiversity, but will assess its impact on ecosystem services (such as carbon sequestration and storage) and its resistance to invasive species and climate change, while investigating socio-economic outcomes of maple production at different scales.

As more and more forestland is managed for maple syrup production across Vermont, this innovative project will provide needed guidance to ensure that these working forestlands are managed in ways that enhance habitat for birds and other wildlife. We also hope our findings will alter how maple sugarmakers view their role as stewards of forested landscapes, from simply managing trees for sap, firewood, and other products, to a deeper understanding of their role in biodiversity conservation and the ecosystem services that working forests provide. Our hope is that this knowledge will support productive sugarbushes and allow sugarmakers and wildlife to co-exist in sweet harmony. FN

SELECTED PUBLICATIONS

2021

Wilson, J.K., N. Casajus, R.A. Hutchinson, K.P. McFarland, J.T. Kerr, D. Berteaux, M. Larrivée, and K.L. Prudic
2021. Climate Change and Local Host Availability Drive the Northern Range Boundary in the Rapid Expansion of a Specialist Insect Herbivore, Papilio cresphontes. *Frontiers in Ecology and Evolution* 9:85. https://doi.org/10.3389/fevo.2021.579230

Bates, A.E., R.B. Primack, PAN-Environment Working Group (incl. K.P. McFarland), and C.M. Duarte
2021. Global COVID-19 lockdown highlights humans as both threats and custodians of the environment. *Biological Conservation*, 109175. https://doi.org/10.1016/j.biocon.2021.109175

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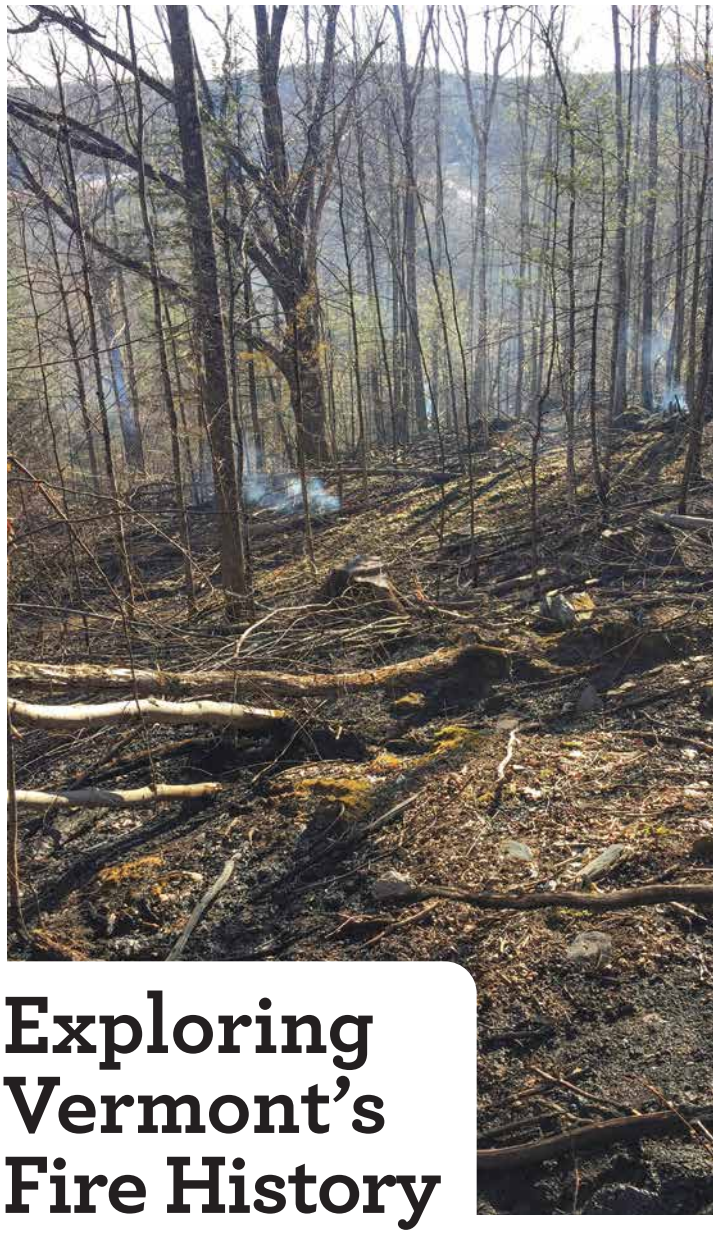
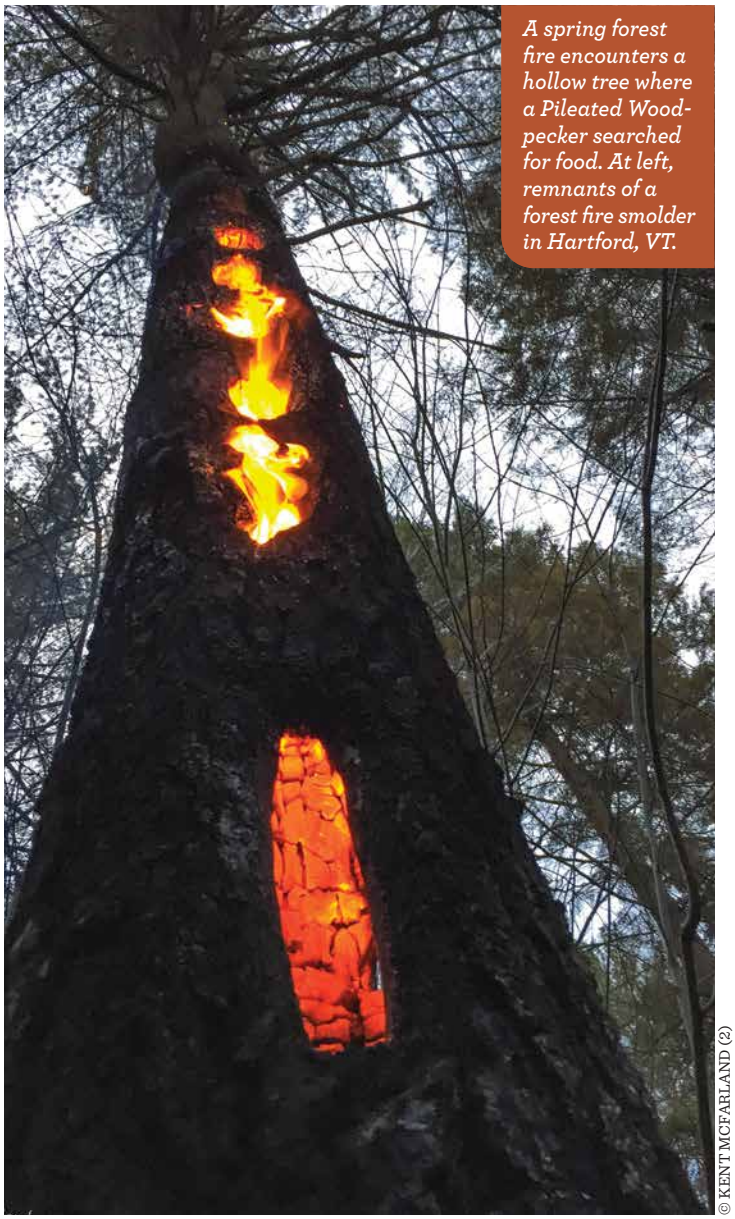




A spring forest fire encounters a hollow tree where a Pileated Woodpecker searched for food. At left, remnants of a forest fire smolder in Hartford, VT.

Exploring Vermont's Fire History

Western fires spark nationwide interest in fire ecology and wildfire risk.

BY RYAN REBOZO

When most people think of Vermont, verdant peaks and vibrant fall colors undoubtedly come to mind. But wildfires? Not likely. However, recent fires in the western US and Canada have featured prominently in the news, sparking a greater interest in forest fires throughout the country, including here in Vermont. Indeed, your outing to view peak foliage might feature a vista atop a fire tower and make you wonder about wildfire occurrence in the lush Green Mountains.

Forest fires are typically characterized as either wildfires—a natural disturbance much like wind, ice, and flooding—or human-caused (anthropogenic) fires, which include prescribed burning and accidental blazes. In addition to identifying a fire's source, both scale and return intervals are important factors when describing fire's impact on the landscape, particularly when comparing fire regimes among different regions of the country.

Fire is most likely to ignite and spread when climate and weather combine to create hot, dry conditions. In Vermont, this means that most fires occur in late spring or fall when lack of canopy cover allows the forest floor to dry quickly between rainstorms. Given this narrow window of ideal conditions, fire has played a

relatively minor role in our forests when compared to other forms of disturbance.

Despite Vermont's limited wildfire history, examining previous fires can shed light on historic climate conditions and land use. Scientists investigating fire frequency can find evidence of past burns in scars on tree rings, charcoal, and pollen cores, and use them to determine roughly when former fires occurred. Estimates of past fire return intervals in New England range from 20 years or less to hundreds or even thousands of years depending on forest type. Many factors can influence how intensely a wildfire burns, including land use practices. Researchers suspect that fires that swept through Vermont when forests were heavily cleared in the 1800s and early 1900s were typically two orders of magnitude larger than the approximately two-acre burns we see on average today. To enable early detection and easier suppression, timberland owners, state governments, and eventually the Civilian Conservation Corps constructed watch towers on peaks all across the Northeast. Aircraft eventually rendered staffed fire towers obsolete in the late 20th century, with the last Vermont tower closing in 1985.

Although natural wildfire is uncommon in Vermont, anthropogenic fire has a long history here.

Although natural wildfire is uncommon in Vermont, anthropogenic fire has a long history here, beginning with Indigenous communities, who utilized fire to improve local travel, hunting, and fruiting of specific plant species. Today, over 95% of Vermont fires are thought to be human-caused. Prescribed burns are still used to achieve ecological management goals, typically in fire-adapted systems subjected to long-term fire suppression. When employed as a management tool, prescribed burns also act as safety measures to limit fuel availability and ultimately reduce wildfire risk. Although some worry about the safety of these burns, they are invariably conducted under a strict set of conditions that consider temperature, windspeed, humidity, and fuel load among other fire-related variables to decrease the chance that flames escape the intended burn block. In Vermont, the US Forest Service uses prescribed fire to maintain an oak-dominated component of dry oak forests found in the southern reaches of the Green Mountain National Forest.

What happens to the plants and animals in a fire's path? You can be sure that organisms in fire-adapted systems have developed strategies that enable them to survive. For example, plants have evolved a wide array of protective traits, including thick bark, coppice growth, serotiny, and seed banking. Meanwhile, highly mobile animals such as large mammals and birds can easily flee burning areas, particularly when fires are limited to a few acres. Less mobile animals, including some insects, reptiles, and amphibians, can insulate themselves from scorching temperatures by sheltering in tree bark or burrowing underground. Thanks to these strategies, plant and animal mortality is typically low after burns in fire-adapted ecosystems.

Although Vermont's climate leaves our state less fire-prone than much of the west, fire nonetheless influences some ecological communities. Because of these localized fire-adapted communities and conditions, fire is sure to remain an important form of both natural and anthropogenic disturbance on our landscape. The next time you can take in the view from one of Vermont's scenic fire towers, imagine the ways fire has shaped the landscape, even in the temperate Green Mountains, and the plethora of ecological adaptations that allow plants and animals to persist through this fierce yet restorative disturbance. FN

COMMUNITY SCIENCE OPPORTUNITIES

© SUSAN HINDINGER

You don't need a background in science to be a Community Scientist!

From backyards and bogs to mountains and meadows, you'll find many ways to get involved and make a real contribution to wildlife conservation. If you'd rather not muck around a swamp or hike to a summit, you can still volunteer for VCE—even from the comfort of home.

We hope you'll join us!

iNaturalist Vermont

Volunteers share observations of all Vermont biodiversity in this digital project of the Vermont Atlas of Life.

www.inaturalist.org/projects/vermont-atlas-of-life

Mountain Birdwatch

Each June, volunteers hit the trails to complete bird survey routes on 123 mountain ridgelines across the Northeast.

vtecostudies.org/projects/mountains/mountain-birdwatch

Vernal Pool Monitoring

In April, May, and September each year, volunteers visit and collect data to monitor "adopted" vernal pools following standard protocols and using VCE-provided equipment.

vtecostudies.org/projects/forests/vernal-pool-conservation

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

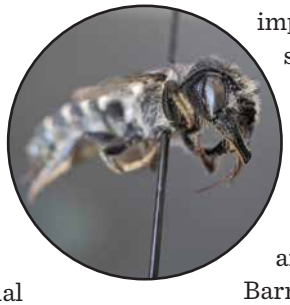
A Three-way Tie

Enhancing our knowledge of Vermont's bees.

BY SPENCER HARDY

VCE's Community Scientist of the Year Award recognizes the accomplishments and dedication of volunteers who contribute to our science and conservation work. VCE biologist Spencer Hardy offers the following tribute in recognition of these volunteers' tremendous efforts collecting difficult-to-identify bees in under-surveyed parts of Vermont.

As with most VCE projects, the Vermont Wild Bee Survey (VTBees) has been blessed with an incredible wealth of skilled and dedicated volunteers during the year. This year alone, 428 people have contributed observations to our project on iNaturalist. With so many deserving candidates, it was impossible to pick just one! We are therefore delighted to present our second annual VCE Community Scientist of the Year award to three women who have done tremendous work helping us document bee (and other taxa) diversity in less well-studied parts of Vermont. In addition to documenting numerous new county records, all three volunteers are collecting specimens with malaise traps; these will be invaluable to fill in gaps of difficult-to-ID specimens.

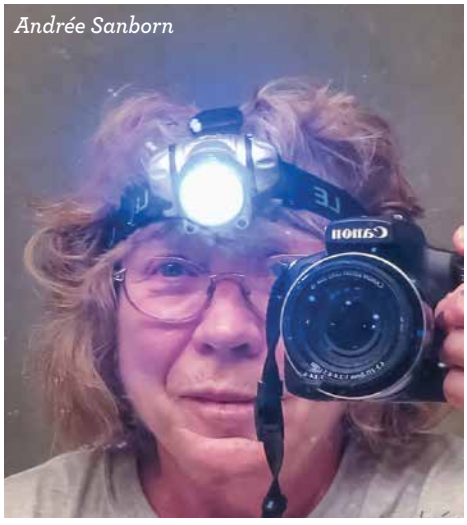


Rugose-fronted Resin Bee (Megachile rugifrons) ▲

Few people credit horseflies with any redeeming qualities, but Deborah Laramie got hooked on insects by *Tabanus calens.* This strikingly large horsefly prompted Deb to start documenting insects on her property on the west side of Snake Mountain in Addison. Several years ago, Deb set up a horsefly trap to monitor and control the many different species of horse flies that were tormenting her horse. For the past three years, she has opportunistically and meticulously collected any bees that have found their way into the trap, sharing her finds with VTBees. Deb's laborious work has provided VCE with an amazing dataset that includes several species we'd have otherwise missed, and provides a multi-year window into the bee fauna of a unique natural area.

Jody Frey became hooked on nature as a kid through the National Wildlife Federation's magazine, *Your Big Backyard.* During the COVID-impacted summer of 2020, she finally found time to document the diversity of flora and fauna in her own backyard in Barton. Jody credits her good friend Andrée with introducing her to iNaturalist, which she now refers to as a "magic carpet that connects your backyard to the rest of the world." Her particular backyard happens to host an impressive number of unusual bees, including several species previously unknown from the Northeast Kingdom. Although Jody is an avid iNaturalist user, she also delights in sharing the wonders of her remarkable garden and yard with neighborhood children and anyone else who ventures by.

Several decades ago, Andrée Sanborn had an intense spider phobia, but ironically it was a Barn Orbweaver *(Araneus cavaticus)* that caught her eye and launched her into arthropod photography. "I went back and back, with tighter and tighter shots. I fell in love. I overcame the phobia. I moved on to any arthropods I could find," she explained. Once she developed a photographic interest in arthropods, her late husband would assist her in spotting and identifying the many "wonderful miracles living mostly invisibly" around their house in Barton. Since 2013, she has shared her photographs on iNaturalist and BugGuide, documenting at least 1,000 species in Orleans County. This year, she and Jody added malaise traps to their yards to help a PhD student studying ichneumonid wasp systematics. This fall, they both plan to help sort out any bees that were accidentally collected and donate them to VTBees, enhancing their already-unique dataset for a region of the state where we have precious little knowledge of our bee fauna. FN

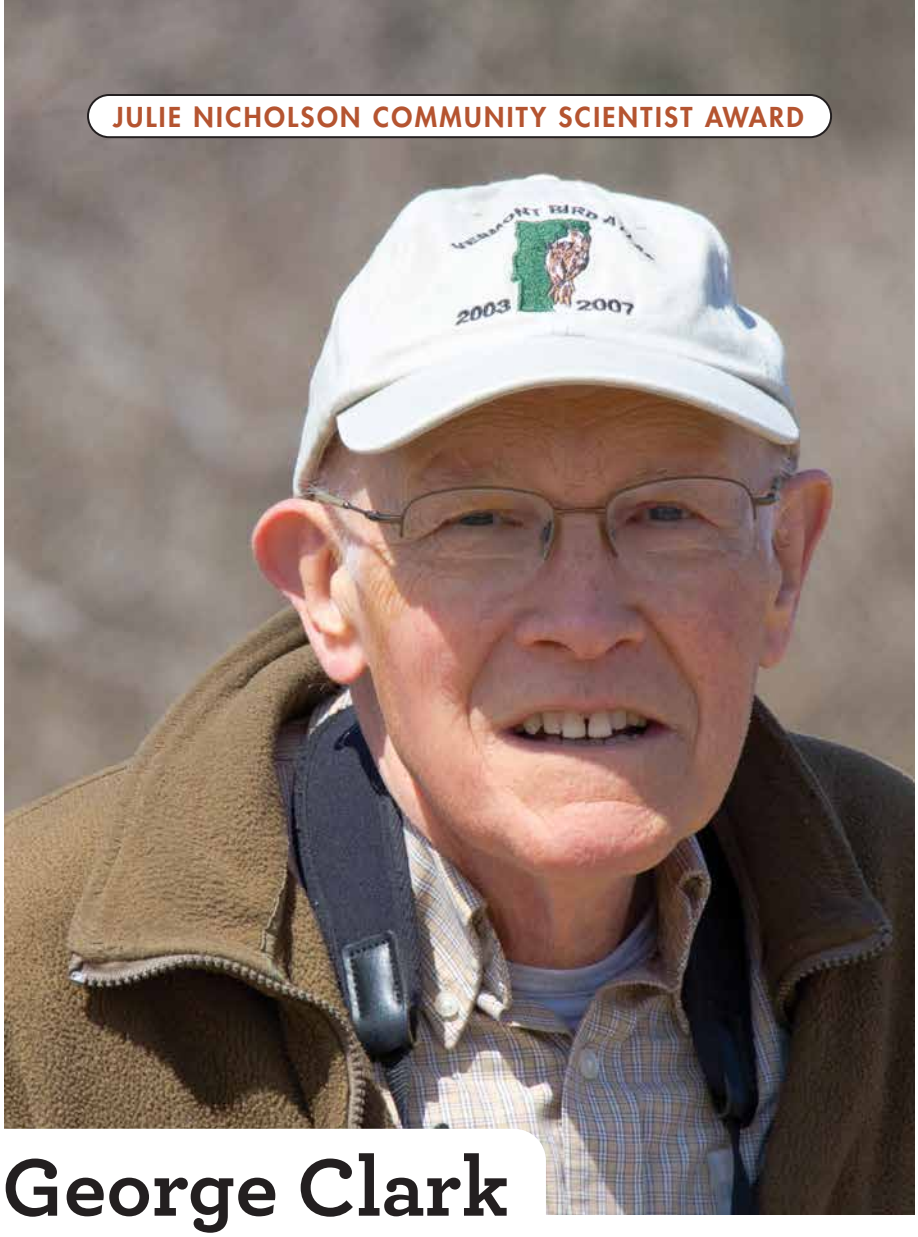


Andrée Sanborn

Deborah Laramie

Jody Frey

JULIE NICHOLSON COMMUNITY SCIENTIST AWARD



© DOUG HARDY

George Clark

A community-minded ornithologist and birder. | BY CHRIS RIMMER

George Clark's soft-spoken demeanor belies a remarkable vitality and enthusiasm, not only for birds and their habits, but for inspiring others to care about them. While his contributions as a professional ornithologist and teacher are innumerable, George has embodied the notion of volunteerism since retiring and moving to Vermont in 1997—giving abundantly of his time and energy as a community scientist, never seeking anything tangible in return.

George's passion for birds took root during his childhood in New Jersey. "My maternal grandfather was a professional entomologist and all-around naturalist," he says, "and a strong early influence on my interest in birds. He lived in Cape May County, which was a fantastic area for seeing a diversity of birds and witnessing their spectacular migrations." After earning his bachelor's degree from Amherst College, where he "discovered that it was possible to focus on birds professionally," and a PhD from Yale in 1964, George spent two years at the University of Washington in Seattle before moving to the University of Connecticut, where he spent 32 years as a Professor of Ecology and Evolutionary Biology (now Emeritus), and was appointed as State Ornithologist.

A lifelong teacher with extraordinary patience and curiosity, George is in his element when introducing people to birds and the natural world. His extensive knowledge has made him a much sought-after leader for birding expeditions all over the globe (including Brazil, Argentina, Chile, Scotland, Denmark, Norway, Finland, and Greenland!), although his recent efforts have been more local. He frequently leads community birding walks in the Upper Valley, where he has served on the Norwich Trails Committee, the Milton Frye Nature Area Committee, the Norwich Conservation Commission, and the steering committee of New Hampshire Audubon's Mascoma chapter.

George Clark has served as a dedicated community scientist for several decades, where his substantial knowledge and enthusiasm for birds has proved invaluable on numerous projects.

VCE and the Vermont birding community have been fortunate beneficiaries of George's expertise and dedication as a community scientist. His contributions during the second Vermont Breeding Bird Atlas alone were nothing short of heroic. During that multi-year project, George served as volunteer coordinator for northern Windsor County, where he organized scores of amateur birders to beat the bushes for nesting birds, logged 450 hours in the field himself, and wrote 22 of the 209 species accounts for the Atlas book published in 2013! Further, he served 11 years on the Vermont Bird Records Committee and has actively participated in VCE's Upper Valley Grassland Ambassador project. Last, but far from least, George's contributions as an inveterate Vermont eBirder can hardly be ignored—he ranks ninth on the state's all-time list of checklists submitted with >6,500 and #1 in his home Windsor County, where he has submitted nearly 6,400 of those!

In typically modest, understated fashion, George's perspective is all about what he has gained rather than given: "Over the years, I've truly appreciated my involvements and friendships generated through interactions with the Vermont birding community at large—very satisfying!" We are all better off, thanks to this unassuming, community-minded ornithologist and birder. George's fond memories of birding with Julie Nicholson herself underscore to all of us at VCE that there could not be a more deserving recipient of our 2021 Julie Nicholson Community Scientist Award. FN

FIELD NOTES
VERMONT CENTER FOR ECOSTUDIES
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European Hornet {*Vespa crabro*}

A European Hornet crawls through grass and leaf litter in southern Vermont.

This unmistakable invader has spread largely unnoticed.

BY SPENCER HARDY

Some introduced insect species are well-known and well-tracked (think Emerald Ash Borer [*Agrilus planipennis*]), others not so much. Despite its unmistakable (and unforgettable) appearance, the European Hornet (*Vespa crabro*) has spread across the eastern US with little fanfare. As soon as mainstream media sources picked up the arrival of Asian Giant Hornets (*Vespa mandarinia*) in the US, people started reporting "Murder Hornets" throughout the east. However, pictures inevitably showed the closely related but long-established European Hornet. While these two species are easy to separate, both are much larger and appear more menacing than our native wasps and yellow jackets.

In June of 2018, Vermont's Department of Forests, Parks and Recreation confirmed the first known occurrence of the European Hornet in Vermont. In 2019, it was reported to the Vermont Atlas of Life (VAL) on iNaturalist from multiple locations in central Windham county. During 2020 and 2021, the species appears to have spread beyond Windham County, with at least one found as far north as Montpelier. While rapid spread of an introduced species makes a compelling story, in this case it's not the whole story. Thanks to insect collections from Green Mountain College and the Fairbanks Museum, we now know that European Hornets were present in multiple locations across Vermont in the mid-1990's, but the specimens went unidentified until recently.

We may never know if the 1990's populations blinked out or persisted undetected for 25 years, but thanks to data aggregated by VAL, we are now able to predict what the future might hold for this species (and thousands of others). Currently, its distribution is restricted to the lower Connecticut River Valley and western lowlands south of Lake Champlain. However, in coming decades it could occur in most locations, except for the highest elevations.

Why do we care about the distribution of European Hornets? For one, this species is likely to become the apex insect predator anywhere it gets established. The hornets are nearly twice the size (and frequent predators) of Bald-faced Hornets (*Dolichovespula maculata*), our largest native yellow jacket. Other confirmed insect prey include cicadas, darner dragonflies, and honey bees. They will even take moths from porch lights in the middle of the night! Watch for them this fall on rotting fruit and other sugar sources, and if you find one, make sure to report it to VAL on iNaturalist. By documenting their spread, phenology, and diet we may be able to understand any long-term impacts on native insects and the larger ecosystem. FN