

Field Notes

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

Vermont Atlas of Life Celebrates 10 Years

With a decade under their belt, VCE's VAL team created a report synthesizing nearly 8 million observations to explore Vermont's biodiversity trends now and in the future. | BY EMILY ANDERSON

Ten years ago, VCE Conservation Biologist Kent McFarland sketched an idea on a whiteboard. Lines and arrows connected scattered pieces of a vision: "Vermont Life," as the project was first coined, targeted wildlife atlases, metadata libraries, and other data-sharing tools. Today, these ideas form the backbone of the Vermont Atlas of Life (VAL), which released a robust report this summer synthesizing nearly 8

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FIELD NOTES

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Jason Hill, Kent McFarland,
Desirée Narango*

CARIBBEAN CONSERVATION
COORDINATOR
Jim Goetz

STAFF BIOLOGISTS
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Nathaniel Sharp, Kevin Tolan*

DATA SCIENCE TEAM
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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.

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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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Using high-quality data to further conservation is VCE's specialty. Want to know where and how to protect wild bees? We can tell you. Looking to enhance habitat in your yard or woodlot? There's VCE science for that. Wondering how to maximize the biodiversity bang for your stewardship buck? We've got answers based in evidence. Just ask the government agencies, land trusts, and consulting foresters who turn to us for help. This issue of *Field Notes* profiles two new VCE projects that address emergent issues in conservation, each designed to guide decision-making.

VCE's Director of Science Ryan Rebozo is partnering with Green Mountain National Forest to study the use of prescribed fire in habitat management. This project addresses how climate change may favor beech and red maple over oak regeneration, and how invasive species pressure and deer density could affect a forest's response to fire.

Another new VCE project operates on a much smaller scale: that of the tiny invertebrates in the forest of your lawn. Ticks have expanded their range along with the alarming array of human diseases they transmit. An unregulated—and understudied—industry to control backyard ticks has sprung up, and VCE Conservation Biologist Jason Hill decided to give it some scientific attention. He led a team this summer to examine two key questions about these lawn treatments. Do they truly affect backyard tick populations, and do the chemicals used adversely affect other

invertebrates?

In this edition of *Field Notes*, these two newer initiatives share space with some of VCE's "bread-and-butter" projects. Ten years ago, VCE Conservation Biologist Kent McFarland launched the Vermont Atlas of Life (VAL) to ensure Vermont's biodiversity data were archived, managed, and available when new questions emerged. It was (and still is) a massive undertaking with the audacious goal of making every bit of Vermont's biodiversity data accessible to everyone.

Over that decade, as they built the infrastructure to manage and share millions of records, the VAL team tackled the critical question of pollinator decline. VAL's legion of community scientists, rich archive of historical data, and team of experts combined forces to shed light on this issue. First, they focused on the plight of bumble bees; then, on all of Vermont's 325+ native bee species. They discovered recent extirpations and dramatic declines, hotspots of bee diversity, and essential habitats for specialist bees. This has yielded a variety of conservation activities and efforts to stem the tide of losses and bend the curve toward recovery.

In these pages, you'll read an interview with Kent as he reflects on VAL's first 10 years, with thoughts on both its past and potential. It's a model that demonstrates the power of the partnership upon which VCE depends: people and science, united for conservation.

Susan Hindinger
EXECUTIVE DIRECTOR

White-tailed Deer standing alert.
Right: Thermal sensor image of deer.



As deer numbers increase so do concerns for insect and breeding bird communities supported by high plant diversity.

Deer, Dry Oak Forests, and You

Studying deer density and its impacts on forest plants

| BY RYAN REBOZO

For many Vermonters, fall signals the start of hunting season, and no animal is more commonly hunted than the White-tailed Deer. After populations crashed in the 1800s and early 1900s from human hunting pressure, White-tailed Deer numbers in the Northeast have rapidly increased. The elimination of natural predators, milder winters, and a more fragmented landscape have all played a role in their population explosion. While higher deer densities may mean a greater chance of success for hunters, it can also drastically alter our forest landscapes.

Deer browse on a wide variety of plants, from low-growing herbs to shrubs and even tree seedlings and saplings. As deer numbers increase so do their impacts on forest plants and especially young trees. Nearby states have many eye-opening examples of what elevated deer densities can do. These forests don't have young saplings to replace the canopy trees when they fall, and their understories are often dominated by a monoculture of an aggressive invasive species. High deer densities can also facilitate the spread of diseases among deer and even other

ungulates like moose. Because of this, gaining a better understanding of local deer densities becomes especially important when planning forest management for ecological purposes.

Our ability to predict how trees will regenerate after disturbance is limited by what we know about deer density. For this reason, when we set out to study dry oak forest response to prescribed fire in the Green Mountain National Forest, we knew we had to include a close look at deer density and deer herbivory. Using a drone outfitted with a thermal sensor, we conducted nighttime deer surveys to obtain more reliable results than scat surveys or spotlighting would produce. These surveys revealed deer densities of 10 and 12 deer per square mile, numbers that have negative impacts on oak and other preferred browse species, according to previous studies.

Unsurprisingly, signs of herbivory on shrubs and saplings were found throughout our study plots, raising concerns for insect and breeding bird communities supported by high plant diversity. An accurate measure of deer density in a particular forest system is important. This information helps us understand the limitations of regeneration, formulate future management decisions, and address deer density before it becomes difficult to control. **FN**

© KENT MCFARLAND

Backyard Tick Project Crawls into Existence



This past summer, the Upper Valley Backyard Tick Project crawled into existence to gather data that will help landowners make informed pest management decisions.

BY JASON HILL

You see them every spring: articles announcing the growing menace of tick-borne diseases to human health. The headlines alone can induce a wriggling sensation beneath the cuff of your sock. By some accounts, the number of bacterial, viral, and sporezoan infections originating from tick bites has more than doubled in the last two decades. Lyme disease, tularemia, and spotted fever are just a few of the possible outcomes when ticks sink their mouthparts into people and pets.

Against this backdrop of foreboding, it's easy to understand the motivation behind efforts to control backyard ticks with conventional pesticides or organic sprays. Barbecues without babesiosis are always better!

But does spraying your yard for ticks unintentionally reduce local insect numbers in the midst of a global insect decline? Could the practice be

killing insects that feed our wild birds, pollinate our food and flowers, and eat undesirable pests such as mosquitoes and aphids? And does backyard tick control even work? These questions have received little attention in the peer-reviewed scientific literature; however, their importance increases each year as New England gets warmer and wetter with climate change, creating more favorable conditions for ticks.

This past summer, the Upper Valley Backyard Tick Project crawled into existence to gather data that will help landowners make informed pest management decisions. Thanks to the hard work of my incredible teammates, Amber and Hannah, we were able to survey 71 properties throughout the Upper Valley, almost a quarter of the nearly 300 properties we were invited to visit. We made two visits to each property, surveyed for ticks, and

NEW FACES AT VCE



© HANNAH OBENAUS

We walked about 19 miles of survey transects across those lawns, collected 92 adult American Dog Ticks (*Dermacentor variabilis*) and 48 Black-legged Ticks, also known as Deer Ticks (*Ixodes scapularis*).

performed non-lethal sampling for insects and other invertebrates. For properties that used chemical controls, we typically surveyed on the day before and the day after treatments were applied.

We walked about 19 miles of survey transects across those lawns, collected 92 adult American Dog Ticks (*Dermacentor variabilis*) and 48 Black-legged Ticks, also known as Deer Ticks (*Ixodes scapularis*). In addition, we counted and released over 9,000 other invertebrates (such as insects, snails, and spiders) from more than 2,000 shrubs and trees located along the lawn edges. I will take a closer look at the data this winter and seek grant-funding for another year of sampling. So stay tuned, folks, and thank you to all landowners who generously participated in the inaugural year of our research. **FN**



JIM GOETZ

Caribbean Conservation Coordinator

Earlier this year, VCE welcomed Jim Goetz as our Caribbean Conservation Coordinator. Jim has extensive scientific experience in the Caribbean, where he worked with species such as Bicknell’s Thrush, Black-Capped Petrel, and Golden Swallow on Hispaniola and directed a forest conservation program in Haiti. For VCE, Jim will direct our capacity-building efforts for Caribbean colleagues and NGOs. He will also spearhead an update to the International Bicknell’s Thrush Conservation Group’s action plan. Jim lives in Upstate New York where he is working on completing his Ph.D. at Cornell University!



TONI LUFF

Administrative Coordinator

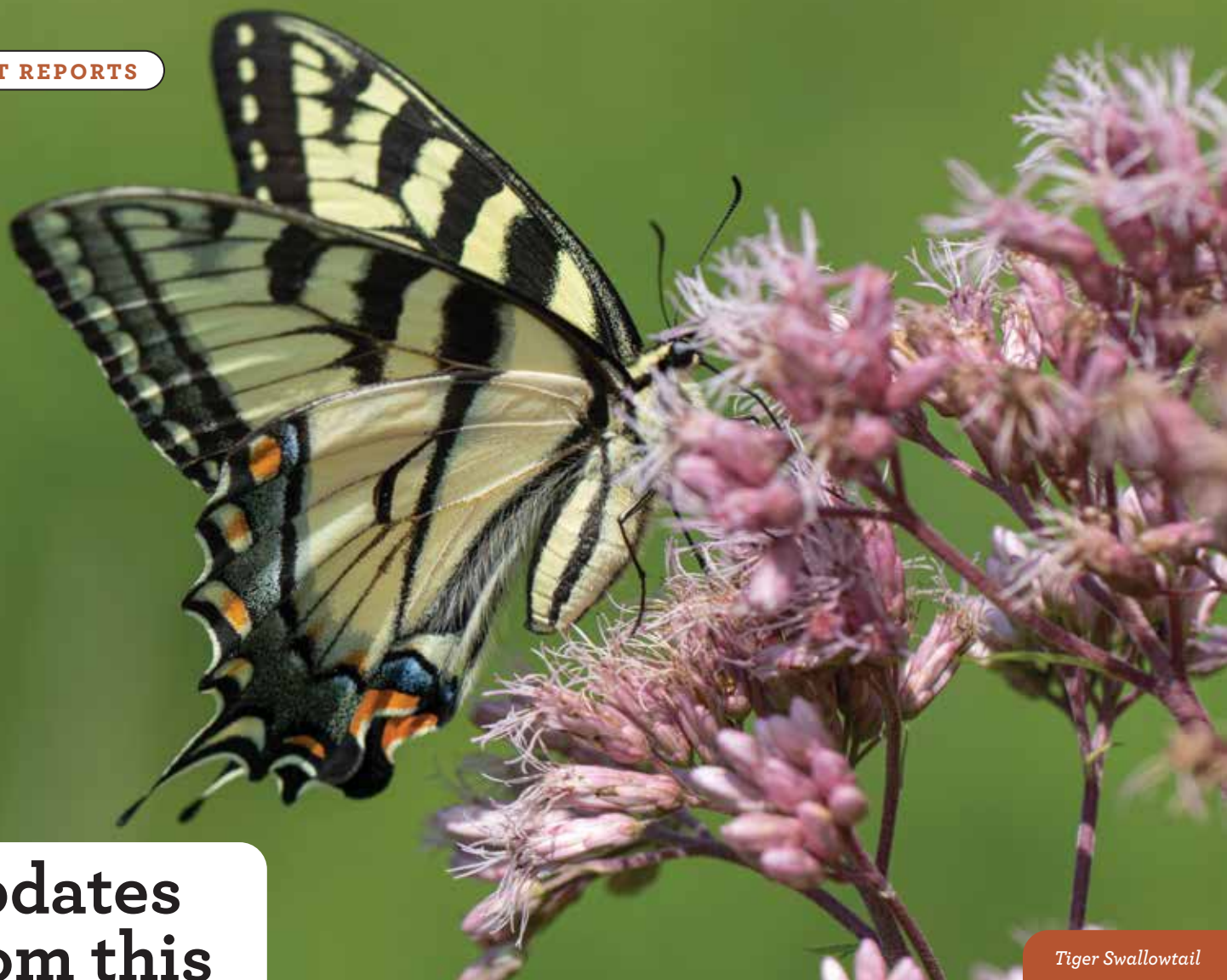
Since joining the VCE staff in May, Administrative Coordinator Toni Luff has approached her work with a blend of warmth and efficiency that reflects her nearly two decades of experience as a stay-at-home mom. On a typical day, she might field phone inquiries, record minutes for a committee, troubleshoot a plumbing problem, and renegotiate a vendor contract—all before lunchtime. With just a few months under her belt, Toni led the year’s most energized staff meeting, compelling many of the participants to continue to meet (for fun!) after the session had officially adjourned. Although her effectiveness as a facilitator may be related to her generosity with chocolates, it’s also a product of the focus and preparation that she brings to all of her work. Thank you, Toni, for enhancing the office experience!



RACHEL MCKIMMY

ECO AmeriCorps Member

VCE is thrilled to welcome our newest ECO AmeriCorps member, Rachel McKimmy! Rachel is joining us as a second-year ECO AmeriCorps member, having just completed her first service year in the Vermont Department of Environmental Conservation’s Clean Water Initiative Program. Originally from Northern California, she moved to Vermont two years ago after completing her B.S. in Environmental Studies and minor in creative writing at the University of Michigan. Rachel is serving as VCE’s Communications and Outreach Coordinator, where her love of nature and writing skills will support numerous projects. Welcome aboard, Rachel! **FN**



Tiger Swallowtail

Updates from this Field Season

VCE scientists broke ground with both existing and new projects this field season.



© ELINOR OSBORN

Wow, what a field season! Do we feel like that every year at VCE? Truthfully, yes, but this year is one for the books.

SECOND VERMONT BUTTERFLY ATLAS

This summer marked the first year of the second Vermont Butterfly Atlas, a historic undertaking led by VCE's Kent McFarland and partner Vermont Fish & Wildlife Department. Our brave little state is the first to begin a second butterfly atlas, giving us valuable information regarding species distributions and how they have changed in the last 25 years. So far, atlas volunteers have recorded 6,301 observations of 89 species and will continue to survey for the Atlas through 2027.

VERMONT LOON REPORT

Many wondered how Vermont's loons fared this past summer, given the state's historic flooding in July. We were also concerned and are now happy to report that flood waters only inundated six loon nests out of 107 total nesting pairs in 2023. Our resident loon biologist, Eric Hanson, speculated that the flood would have been disastrous for the birds if it had occurred just two to three weeks earlier. Even though Vermont's loons lost a few nests, it all worked out in the end—volunteers found six new nesting pairs in the state this year. In total, VCE's loon biologists and volunteers documented 147 territorial loon pairs—the highest since tracking began in 1978—and a 71% chick survival rate.

Golden-crowned Kinglet captured on Mount Mansfield



© CHARLES GANGAS

MOUNT MANSFIELD BANDING PROJECT

Despite retiring from VCE's helm last September, our executive director emeritus Chris Rimmer joined us on Mount Mansfield this summer for his final, official bird banding season. However, we know he will continue to make occasional appearances among our team of skilled banders in future seasons. VCE's Mount Mansfield Banding Station is now under the direction of Conservation Biologist Desirée Narango. In addition to continuing the iconic Bicknell's Thrush studies you all know and love, we also collected data on invertebrates near the top of the mountain this summer. You can read about Chris' final Mansfield trip on the VCE blog.

WHIP-POOR-WILL PROJECT

VCE has continued our Whip-poor-will project with our brave volunteers who go out at night to listen for these birds. Sightings this year were slightly higher than our last sampling period, with an average of 3.6 singing Whip-poor-wills per route (2020-2023 was 3.52 birds per route).

Stay on top of our field season updates by subscribing to eNews (vtcostudies.org/subscribe/) and be the first to know all of the big plans we have for the 2024 field season! **FN**

We excel in training and coordinating community scientists to help us conduct rigorous wildlife studies.



Whip-poor-will

© LAURA GOOCH

6,301

VERMONT BUTTERFLY ATLAS OBSERVATIONS

32

YEARS BANDING BIRDS ON MOUNT MANSFIELD

147

TERRITORIAL LOON PAIRS DOCUMENTED

3.6

AVERAGE SINGING WHIP-POOR-WILLS PER ROUTE

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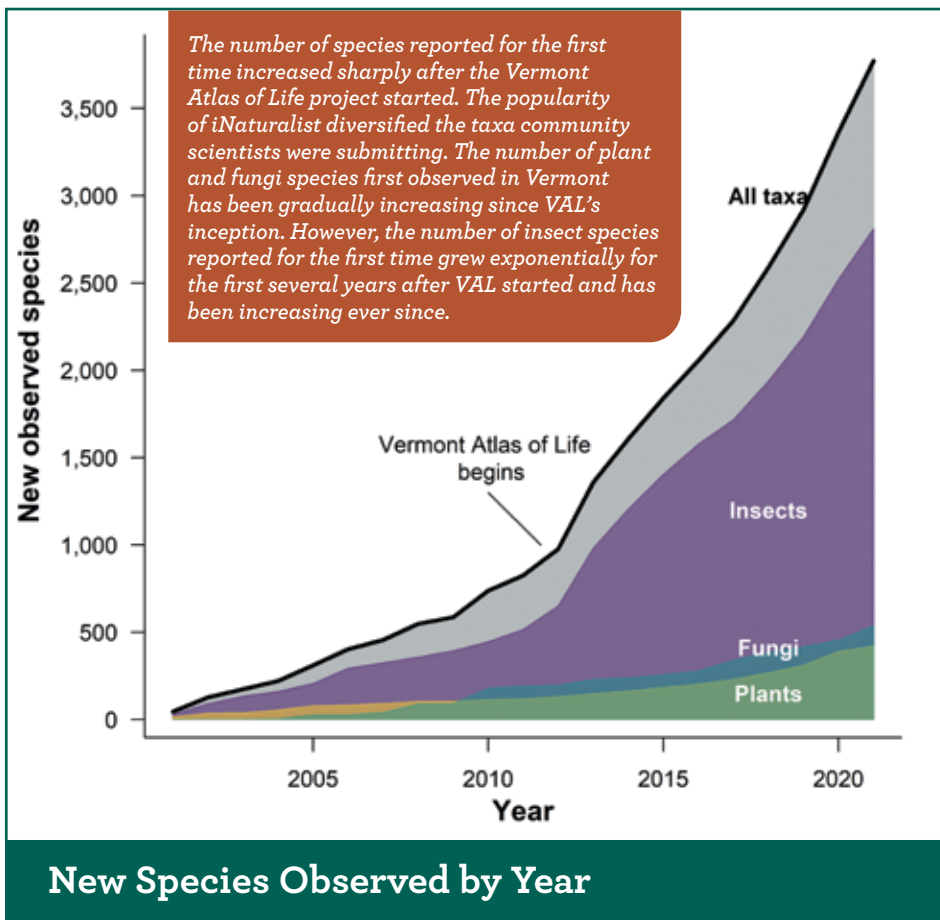
- Include VCE in your will or living trust
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To learn more, contact Susan Hindinger Executive Director shindinger@vtcostudies.org 802-649-1431 x 203

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million observations collected through its first 10 years (val.vtcostudies.org/val-10th-anniversary-report).

This vast dataset allowed McFarland and VCE Data Scientist Mike Hallworth to model the current and potential future distribution of more than half of the almost 12,000 species reported across the state. From this analysis they determined that Vermont could lose 386 of the 6,372 modeled species (or 6%) by 2100 under the current greenhouse gas emissions scenario. Despite this grim warning, the report also holds room for optimism, particularly in using VAL as a tool for further informing conservation decisions at state and local levels.

“VAL data allow us to predict biodiversity hotspots now and into the future,” explained McFarland. “And we can actually test and monitor them. Our report indicates that these hotspots may not remain in place over time;

however, our models can help us project where they may move, allowing conservation planning to adjust with them.”

While VAL began 10 years ago, the seeds for it were planted in 2008 with a different project.

McFarland originally got the idea for VAL’s predecessor—the Vermont Invertebrate Database Alliance (VIDA)—while serving on Vermont’s Invertebrate Scientific Advisory Group. Surrounded by brilliant entomologists, McFarland was blown away by the depth of their knowledge.

“These two scientists in particular could list off the locations of a rare beetle from memory,” McFarland said. “It was incredible. After a couple of years, I realized that everything we knew about many Vermont insect species was either in their heads or in a museum. We didn’t have a database.”

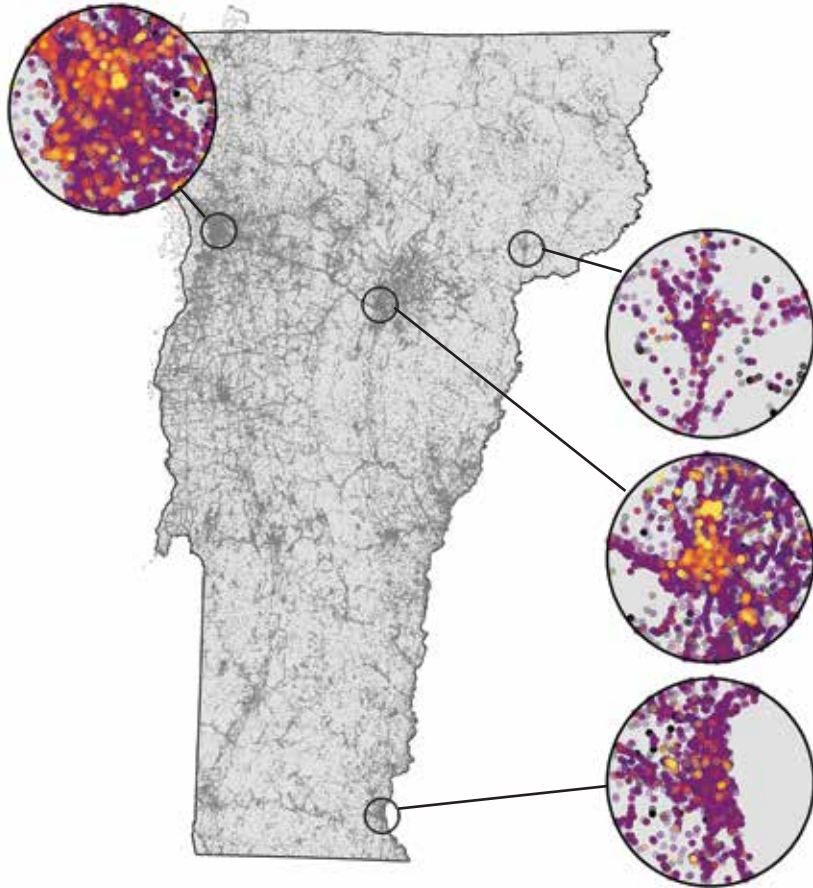
As VIDA began, McFarland was

advised to select some of the more easily cataloged species as low-hanging fruit to showcase the project’s potential. After much deliberation, he and an advisory group settled on carabids, a group of beetles. The final product was a published book titled *Carabidae of Vermont and New Hampshire*.

“After this project, I realized we can actually gather species occurrences and determine what we’ve got and what we need to prioritize for conservation,” said McFarland.

Outside of VIDA, VCE was embarking on several other projects spanning across Vermont, including the second Vermont Breeding Bird Atlas and the first Vermont Butterfly Atlas. McFarland dug deeper into massive datasets from people around the state and became one of the first few hundred people to join iNaturalist. The rising volume of crowdsourced data is what

Iconic Points



© MICHEAL HALLWORTH

Almost 8 million occurrence records have been submitted from across Vermont (as of December 31, 2022). The circle insets highlight observations from Brattleboro (bottom right), Montpelier (middle right), St. Johnsbury (top right), and Burlington (top left). Observations in the insets are colored by taxonomic group.



© ALEX JOHNSON

triggered his whiteboard brainstorm and the first draft of VAL.

“Only entomologists were excited by VIDA,” McFarland recalled. “But with the Vermont Atlas of Life, we could have an umbrella encompassing all the atlases VCE was already doing. Plus, we could incorporate historical records and answer some of our biggest questions. The fact that we didn’t know what species Vermont has or how they’re doing blew me away. Everyone thinks about going to Costa Rica or Peru to discover a new species, but we don’t even know what’s here in Vermont.”

“Everyone knew bumble bees weren’t doing well globally,” McFarland continued. “However, when you share real data in a place like Vermont that show half the species have declined in

the past 25 years and some that used to be incredibly common have disappeared entirely, people start to pay attention (stateofbees.vtatlsofife.org). Thanks to the atlas, we were the first state to list bumble bees as endangered.”

Because of data collected through VAL projects, multiple species have received threatened or endangered listings and new conservation need rankings. From VAL’s diligent efforts, Vermont’s next Wildlife Action Plan (scheduled for 2025) will likely address the conservation requirements of many lady beetles, moths, and bees.

After 10 years and one 50-plus-page report, what is next for VAL? More targeted reports and peer-reviewed papers are in the pipeline, and the team is already planning for the third Vermont Breeding Bird Atlas in 2028.

“The big thing to me in the future is more coupling automated monitoring with community science,” said McFarland. “My dream is that someday there are biological monitoring stations similar to the meteorological monitoring stations that have helped us track climate change over the past 100 years. Like weather stations, biological monitoring stations would marry automation with community science to track trends in biodiversity around the world.”

As with all VCE projects, people form the foundation of VAL’s success. No one knows this better than the project’s founder, who invites all VAL collaborators and community scientists to take pride in a decade of hard work.

“I recently revisited a record of my whiteboard sketch, and I thought to myself, ‘Holy cow, we actually did all those pieces,’” said McFarland. “It took 10 years, but all those original ideas actually exist. There’s no way that would have happened without everyone jumping in to participate.” **FN**



© NICKI STEEL

Henry Dandeneau

A Vermont Loon Volunteer | BY EMILY ANDERSON

It's no understatement to say that Henry's contributions have had a large impact on VCE's Vermont Loon Conservation Project.

Like many volunteers on VCE projects, this year's winner of the Julie Nicholson Community Science Award turned his curiosity about nature into a decades-long passion. "I just knew what a loon looked like—I had no idea where they were or how long they nested." Henry Dandeneau got his start with loons while working at the Deerfield River Power Company. In 1992, the Federal Energy Regulatory Commission (FERC)

wanted to begin relicensing some of southern Vermont's facilities, including the dam at Somerset Reservoir. However, officials at other government agencies swiftly intervened, citing concerns over the loons nesting in the reservoir.

"At the time, my boss told me that the most important part of my job was compliance with our FERC license," Henry said. "And I told him that I agreed one hundred percent because without our

© JOE ZIGMONT



license, we couldn't operate. However, I needed his clearance to start working with and learning about Vermont's loons because I had no hope of keeping us in compliance if I knew nothing about the loons."

As the process began, Henry quickly became enchanted by these charismatic birds, and what started as a quest to understand the Somerset pair drove Henry to get involved with more loon work. He soon joined the annual LoonWatch in July and visited Somerset Reservoir nearly every day to watch for the birds. "I think we were in total compliance every year I was in charge," Henry said.

Since those early days, Henry has dedicated 28 years as a loon monitor. To VCE loon biologist Eric Hanson, Henry is affectionately known as "the Southern Loon Biologist." "VCE is so fortunate to be affiliated with a person like Henry," Hanson says. "I admire his passion for adventure, his love of wildlife, and his sense of responsibility to get a job done well."

Henry tracks the four loon pairs currently inhabiting the 1,600-acre Somerset Reservoir almost weekly (a 6-8 hour endeavor). He drives, hikes, and boats for over 20 hours on and around LoonWatch day to survey two huge

reservoirs and another half dozen small ponds. He also visits many other smaller lakes throughout the season as the loon population has expanded.

It's no understatement to say that Henry's contributions have had a large impact on VCE's Vermont Loon Conservation Project. In the weeks from mid-May to mid-July, he is usually out monitoring loons two to three days per week and covers four primary water bodies. When a loon is in trouble, he is usually one of the first called in to help, sometimes as the primary responder.

"I typically only help with the southern Vermont rescues," Henry explained. "However, I'll go pretty much anywhere in Vermont with enough notice."

Over the years, Henry has amassed just as many thrilling stories of loon encounters as he has bird knowledge. From witnessing unusual behavior to finding island-bound roosters, every venture as a loon monitor has yielded remarkable discoveries. **FN**

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

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, volunteers visit their "adopted" vernal pools and collect data, following standard protocols and using VCE-provided equipment.

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

To learn more about volunteering with a VCE project, visit vtecostudies.org/volunteer

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Beech Leaf Disease



© CHASE MAYERS

The parasitic nematode *Litylenchus crenatae* threatens this iconic tree.

| DESIRÉE NARANGO

Beech leaf disease (BLD), a tree pathogen first identified in 2012, is spreading across the Eastern United States from its apparent origin in the Midwest. Although much remains unknown about the disease, it occurs in trees parasitized by the nematode *Litylenchus crenatae*. It's not clear whether other ailments are at play, or how it spreads. This disease shows up as strange discolored stripes or bands on beech leaves, which may give the impression of variegation. BLD leads to premature leaf drop and eventually the tree's death. This disease, which affects both young and mature trees, could

combine with other ailments like beech bark disease to cause widespread declines in northern hardwood and mixed forests. This could be catastrophic, as beech makes up a significant amount of Vermont's forests and provides important resources—such as shelter, nuts, and pollen—for wildlife.

Since its discovery in Ohio, this disease has been reported in several states, including neighboring Massachusetts, New Hampshire, and New York. It was just reported in Vermont in October. In the next year, VCE ecologists will begin research to understand how the loss of beech from BLD will impact forest regeneration. We will simultaneously monitor other Northern Forest species, such as native insects and birds, to assess effects on the food web.

If you have beech trees on your property, please look for any signs of BLD. You can report your observations on *iNaturalist* (www.inaturalist.org/observations?place_id=any&sub-view=map&taxon_id=1103716) and to Vermont Invasives (vtinvasives.org/get-involved/report/reporting-a-tree-disease). There is currently no known treatment, so our best course of action is prevention by restricting the movement of beech materials from areas with BLD. For more information, visit the beech leaf disease page on the USDA Forest Service's website (www.fs.usda.gov). **FN**