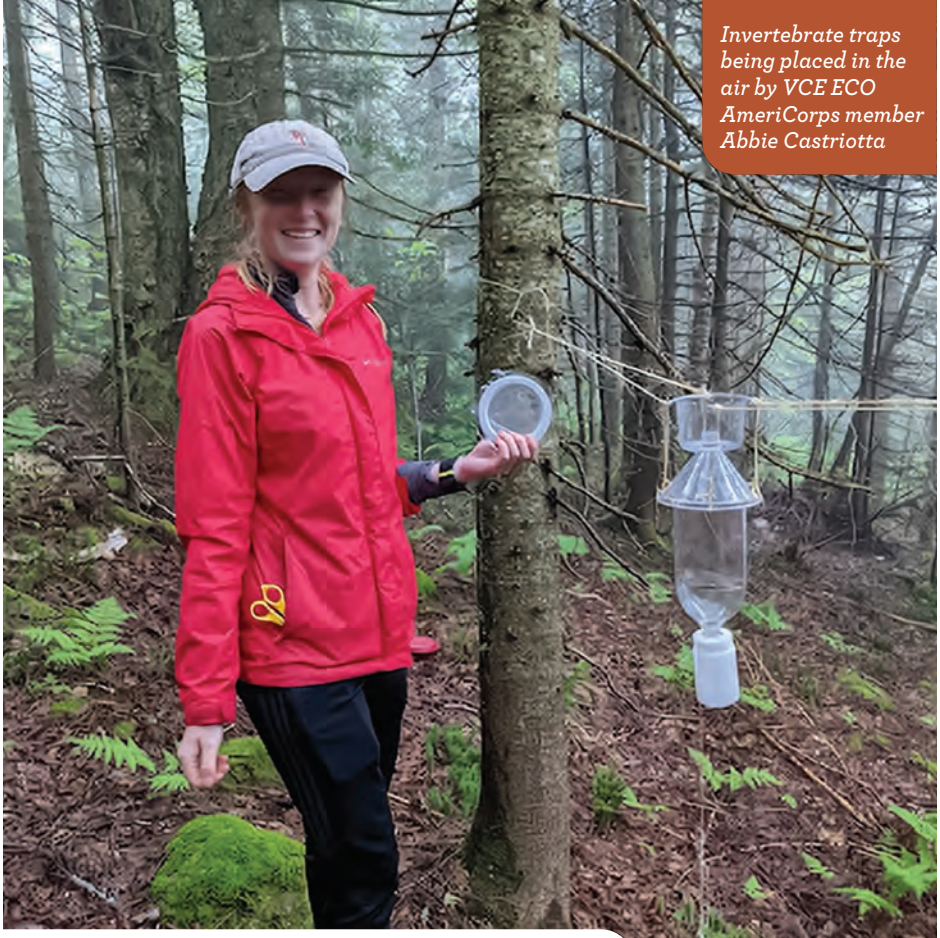

Invertebrate traps being placed in the air by VCE ECO AmeriCorps member Abbie Castriotta

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Invertebrate Network Crawls into Existence

Exploring bird-invertebrate interactions in Vermont's spruce-fir ecosystem | BY JASON HILL

Each bird species' abundance was associated with one or two specific groups of invertebrates.

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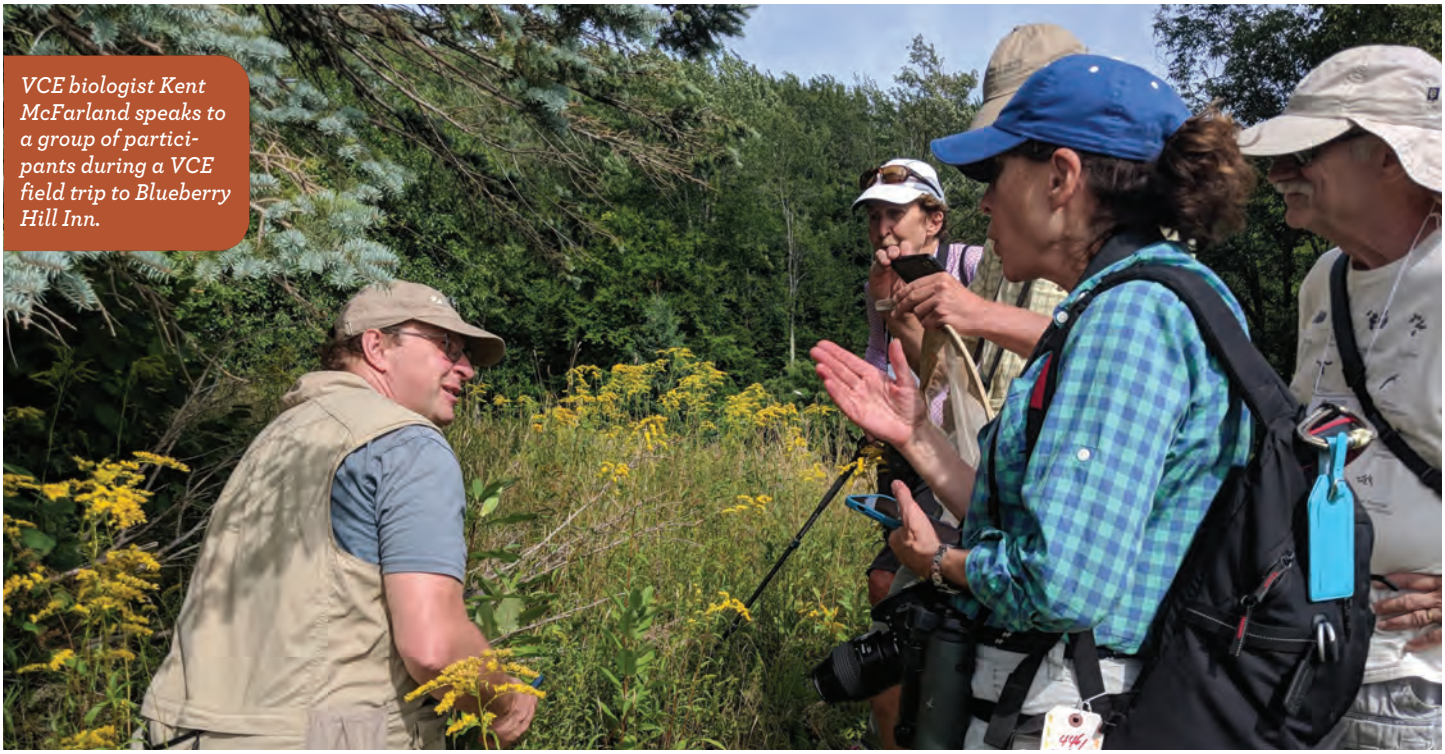
Stop for a moment, and consider something underappreciated in your life. Got it? Perhaps this person or object enables you to pursue your passion or to do your job better. What comes to mind for me are hiking trails, critical pieces of infrastructure that support my research. My work in montane ecosystems would simply not be possible without them. I recently had the honor of speaking at a Green Mountain Club meeting where I thanked a few of the many folks that build and maintain the backcountry infrastructure that facilitates montane research.

Last summer, Abbie Castriotta (VCE's former ECO AmeriCorps member) hiked up and down mountains to complete the first full field season of our Montane Invertebrate Network sampling project. The overall goal of this work is to clarify the relationship between montane bird and invertebrate communities. Sampling takes place at 42 high-elevation sites located along VCE's Mountain Birdwatch routes, where community scientists conduct point counts for montane birds each June. Using pitfall and aerial insect traps, we collected just over 5,000 invertebrates, hiked them out, and painstakingly identified them under a microscope back in the lab.

In total, we captured invertebrates from at least 14 taxonomic orders, and we now have the clearest image yet of the structure of our montane invertebrate community. After the microscope marathon was over, we found that almost 60% of these invertebrates were flies and 18% were beetles. I was surprised at how similar the communities were across the 42 sites. I examined the data for a relationship between invertebrate community characteristics and the abundance of six bird species of the spruce-fir zone, including Blackpoll Warbler (*Setophaga striata*) and Bicknell's Thrush (*Catharus bicknelli*). Contrary to our expectations, invertebrate community diversity and total invertebrate biomass were poor predictors of bird abundance.

Instead, each bird species' abundance was associated with one or two specific groups of invertebrates. For example, Swainson's Thrush numbers were higher at locations with lots of Hymenoptera (ants, bees, wasps, and sawflies), an important food group for this species. Although it was not our primary goal, we were also the first folks to document more than a dozen invertebrate species in Vermont and New Hampshire, including Upland Blackclock (*Pterostichus adstrictus*), a ground beetle, and *Metanomus insidiosus*, a member of the click beetle family. We're already looking forward to the next field season in 2023, when we'll continue to deepen our understanding of the spruce-fir ecosystem, accessed via hiking trails. Thank you to all the trail clubs and organizations that make the mountains accessible to the rest of us. FN



VCE biologist Kent McFarland speaks to a group of participants during a VCE field trip to Blueberry Hill Inn.

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Butterfly distributions in Vermont were largely a mystery before the first atlas. The knowledge gained from a second atlas will help us understand how butterflies in Vermont have changed over the past two decades.

to day and even year to year. However, when examined across a long span of time, the results can be eye-opening.

Every 20 years, Vermont Center for Ecostudies staff, working alongside hundreds of volunteers, sling binoculars over their shoulders, grab sweep nets and cameras, and scour the state to document a targeted group of organisms. These systematic statewide surveys, which take multiple years to complete, are known as atlases. An atlas is a standard status assessment, meaning that every area is surveyed multiple times, during a specific time period. Atlasing, as a concept, began with birds and has since been applied to other taxa. Vermont is at the forefront of collecting this type of data and has already completed two breeding bird atlases (1976-1981, 2002-2007), a bumble bee atlas (2012-2017), and a butterfly atlas (2002-2007).

This year, VCE will uphold Vermont's position at the forefront of community data collection by leading a second butterfly atlas for the state. Butterfly distributions in Vermont were largely a mystery before the first atlas, despite the lofty status of this fluttering group among insects. A second atlas unlocks a new and important type of information: trends. The knowledge gained from a second atlas will help us understand how butterflies in Vermont have changed over the past two decades. If each atlas acts as a snapshot of data, frozen in time, then comparing two atlases side-by-side will allow us to see differences between the two. For example, we may find new butterfly species that occur in Vermont today that were not here in the first atlas and vice versa. We'll also be able to show how butterfly distributions within Vermont have changed in the last 20 years with data that could help us understand how certain species are responding to changes in climate and landscape use. The results from this second atlas will play an important role in conservation decision-making and assist insect conservation efforts.