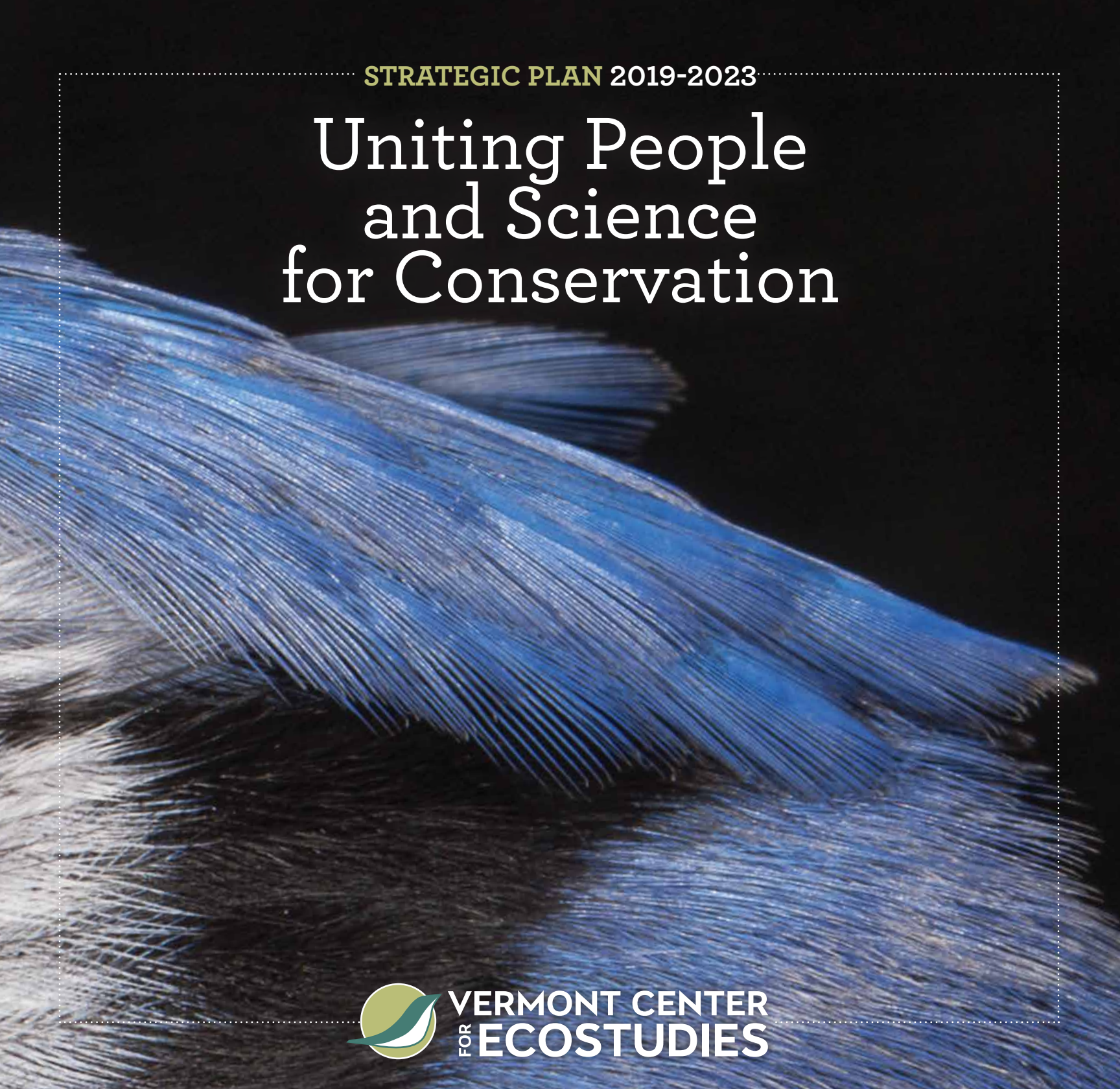
STRATEGIC PLAN 2019-2023

Uniting People and Science for Conservation



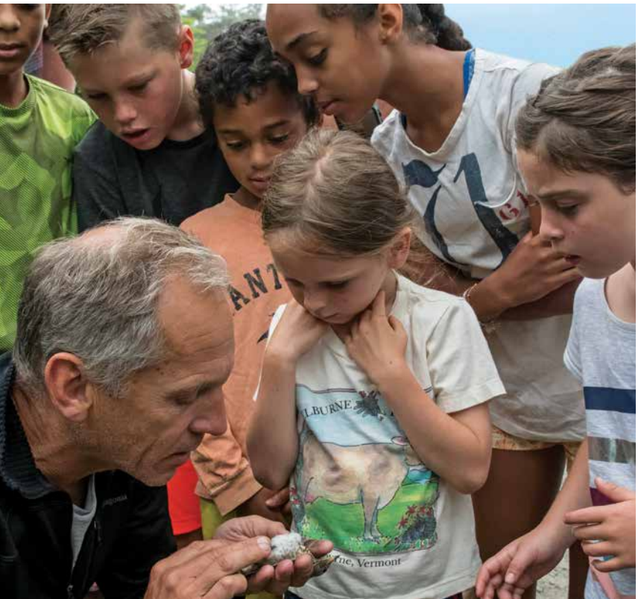
VERMONT CENTER FOR ECOSTUDIES

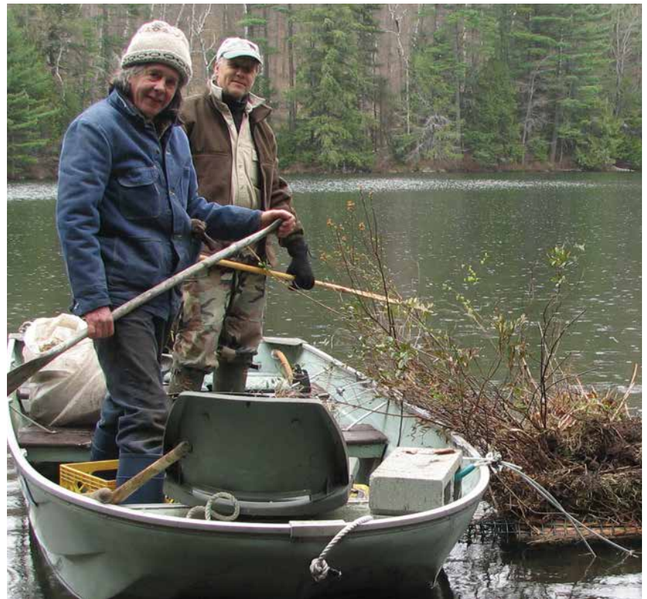
OUR MISSION

The Vermont Center for Ecostudies advances wildlife conservation across the Americas using the combined strength of scientific research and citizen engagement.

OUR VISION

We envision a society that sustains healthy ecosystems through science-based decision making.





Clockwise from top right: © K.P. McFarland, © Eric Hanson, © Charles Gangas. Right: © Jason Hill

VCE faces an exhilarating period of growth and transition as we celebrate our first 12 years and look ahead to our next chapter.

Reflecting on VCE's past decade, together we have achieved a great deal.

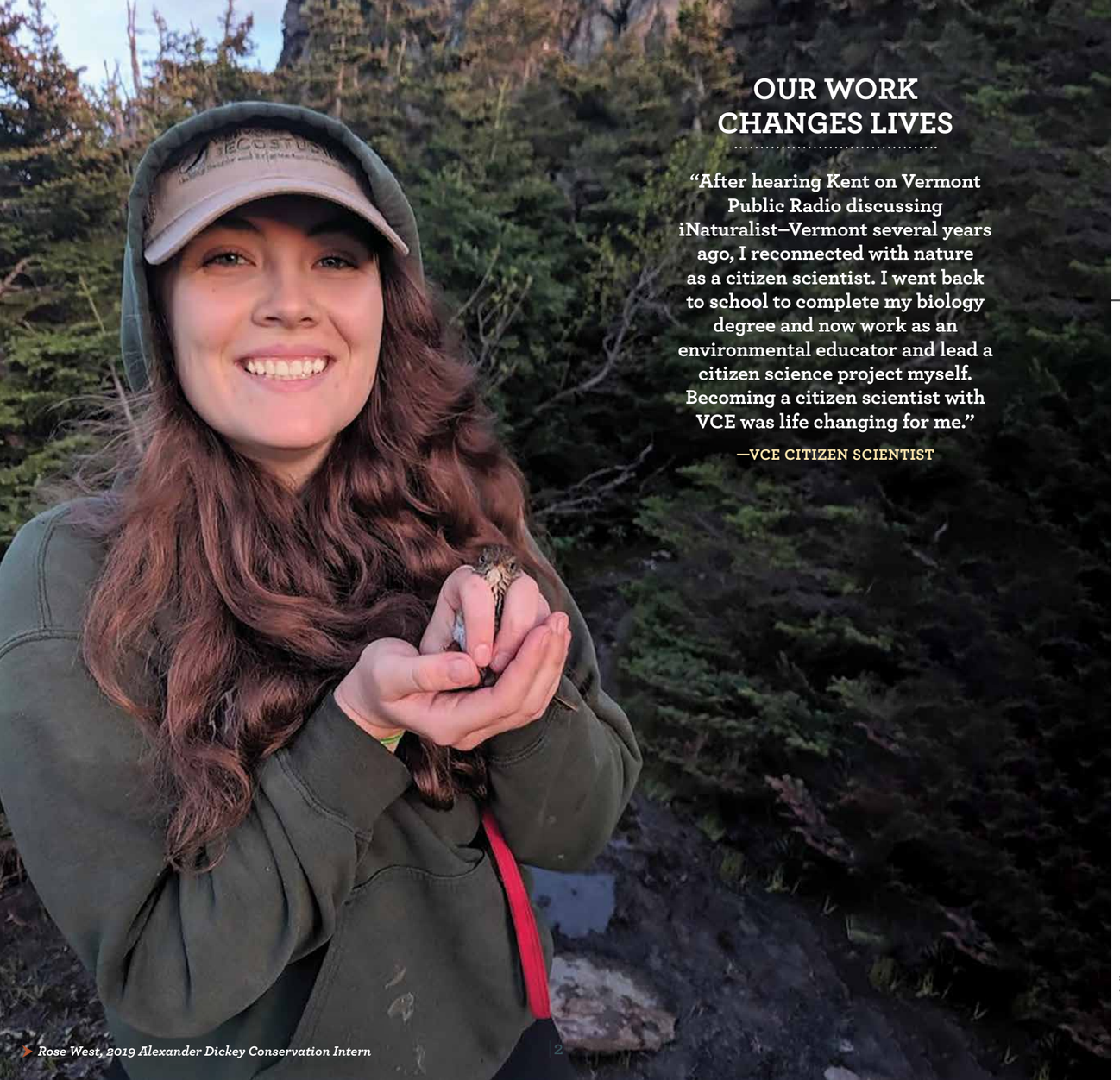
- Deciphering the breeding and winter ecology of Bicknell's Thrush and Bobolink led to conservation strategies devised and carried out collaboratively with international partners.
- Our loon project combined conservation science with the efforts of hundreds of volunteers and partners to direct the recovery of Vermont's loon population, from just seven nesting pairs 30 years ago, to a record-breaking 97 in 2017.
- Important atlas projects, fueled by hundreds of citizen scientists, documented a precipitous decline of four bumble bee species in Vermont, range expansions for several butterflies, and a vernal pool location map to aid in protecting this vulnerable habitat type.

And yet, there is so much more to do! Earth's astonishing biodiversity is dwindling before our eyes, often before we even recognize what we've lost. We must investigate vulnerable species, understand their threats, and apply strategic leverage to conserve them.

This work is urgent. With your help, VCE will make a difference.

Above: *Upland Sandpiper*

Facing Page: *Clockwise from top: Tara Rodkey finds a Monarch egg. Volunteers inspect a loon nesting raft. Chris Rimmer shows a banded Bicknell's Thrush to enthralled students on Mt. Mansfield.*



OUR WORK CHANGES LIVES

"After hearing Kent on Vermont Public Radio discussing iNaturalist–Vermont several years ago, I reconnected with nature as a citizen scientist. I went back to school to complete my biology degree and now work as an environmental educator and lead a citizen science project myself. Becoming a citizen scientist with VCE was life changing for me."

—VCE CITIZEN SCIENTIST

Rose West, 2019 Alexander Dickey Conservation Intern

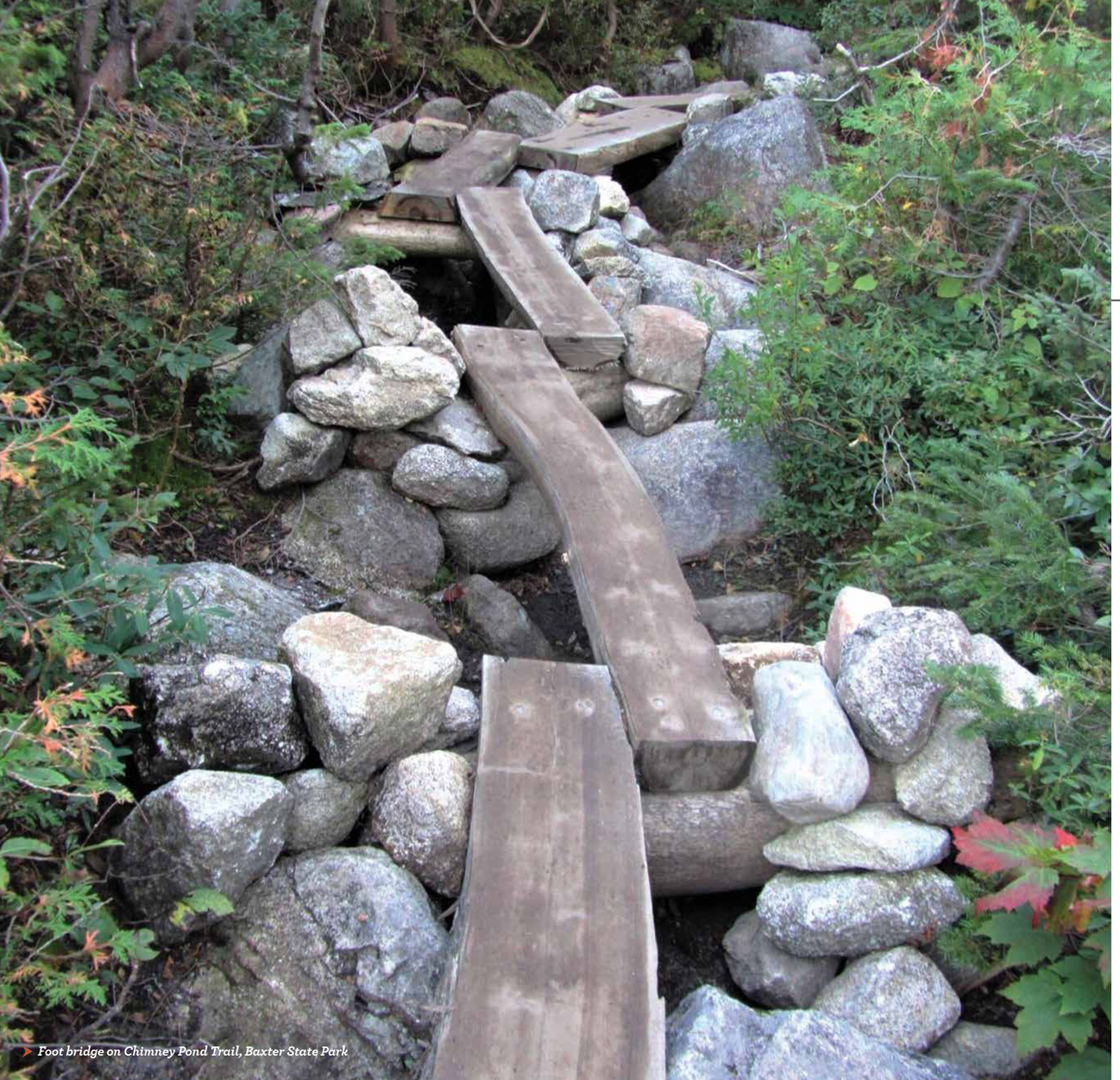
What Sets Us Apart

- **Accessibility:** Join us at a field site, participate as a citizen scientist, take part in conservation science at work. With VCE, you can witness the work you help to support.
- **Scientific integrity:** Rigorous, unbiased conservation science is VCE's top priority, and the constant guidepost by which we evaluate our impact.
- **Communication:** Our scientists are gifted speakers, writers, and photographers. At VCE, you'll find science delivered with artful creativity.
- **Experience:** Our team has worked together for decades to produce tangible results with meaningful conservation impact, all while nurturing the next generation of conservation scientists.
- **Outreach:** From workshops for the public to individual consultation on habitat management with grassland landowners, we share our knowledge to help you conserve wildlife.

We have never been stronger. Yet, we have stretched as far as we can within our skin. It's time for VCE to molt, and emerge as an even more impactful leader in conservation science.

The plan we present here will ensure that VCE's work achieves its highest impact, reaching more people and achieving greater gains for wildlife than ever before.

Read on to discover what's in store.



Foot bridge on Chimney Pond Trail, Baxter State Park

Our Plan at a Glance

In the next five years we will focus on three strategic goals in addition to the ongoing, innovative conservation science programs that are our hallmark.

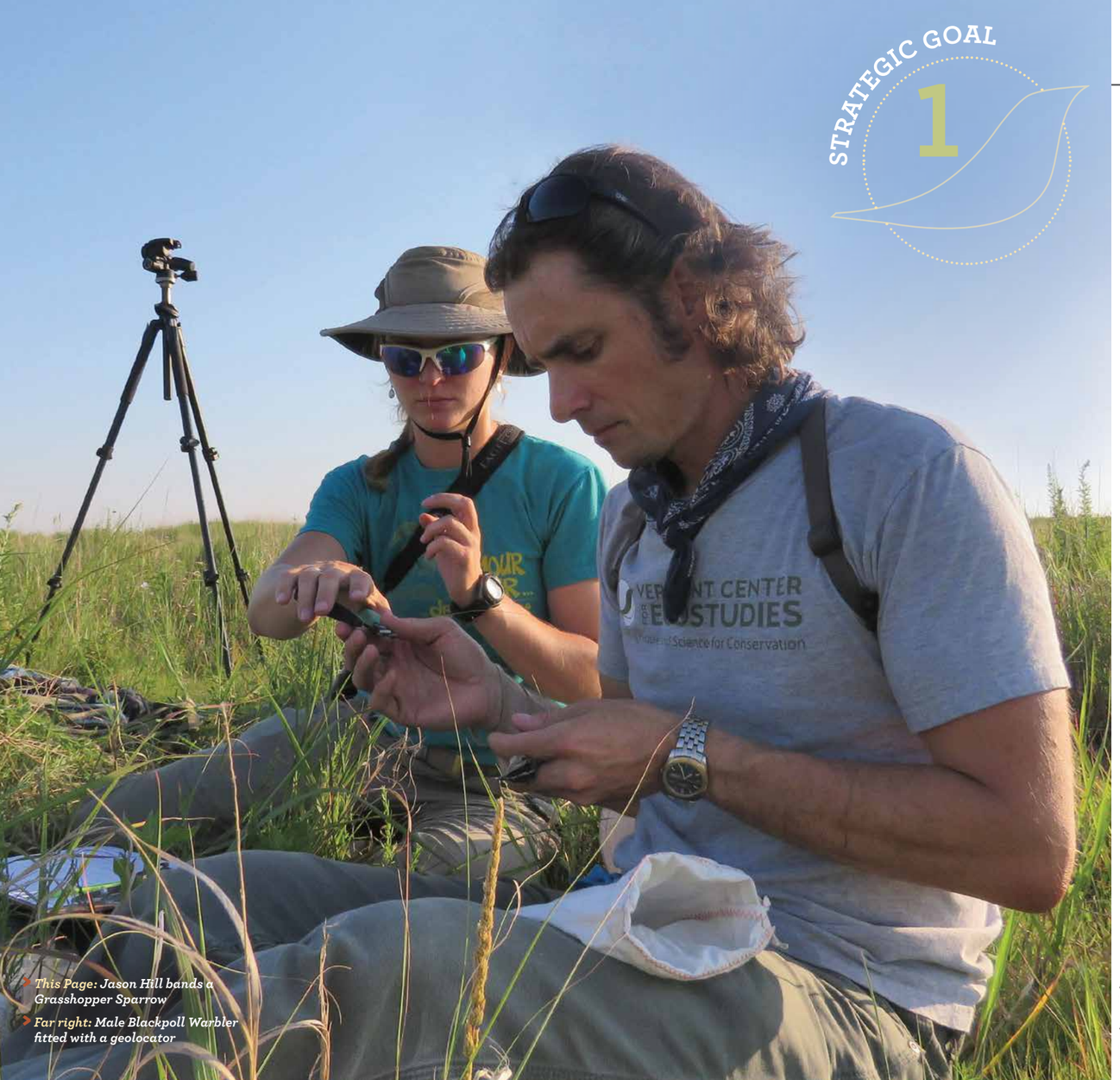
STRATEGIC GOALS

1. **Invest in Pioneering Science**
2. **Close the Loop for Conservation**
3. **Broaden our Vision for Citizen Science**

These overarching goals are reflected in the priorities of each science program, which are highlighted in the pages ahead.

PROGRAM OBJECTIVES

- **Mountains:** Ecosystem-scale research and conservation
- **Caribbean:** Conserving vulnerable avian winter habitats
- **Biodiversity Mapping:** Harnessing big data for conservation
- **Forests:** Protecting functional forested landscapes
- **Loons:** Building on an unqualified conservation success



This Page: Jason Hill bands a Grasshopper Sparrow

Far right: Male Blackpoll Warbler fitted with a geolocator

© Stephanie Hale

Invest in Pioneering Science

VCE's tight-knit team of conservation scientists is our greatest asset. We bring leadership, expertise, and collaboration to the table. We work with expansive data sets and tackle cutting-edge research questions.

Technological developments and advances in data analysis have transformed conservation science. To remain on the leading edge of this curve, we must add depth and breadth to our core team.

Most of VCE's operating expense funds our staff. By investing in exceptional people, by helping to strategically build our team, you can make the work in this plan possible.

Investing in exceptional people and strategically building our team will make the work in this plan possible.

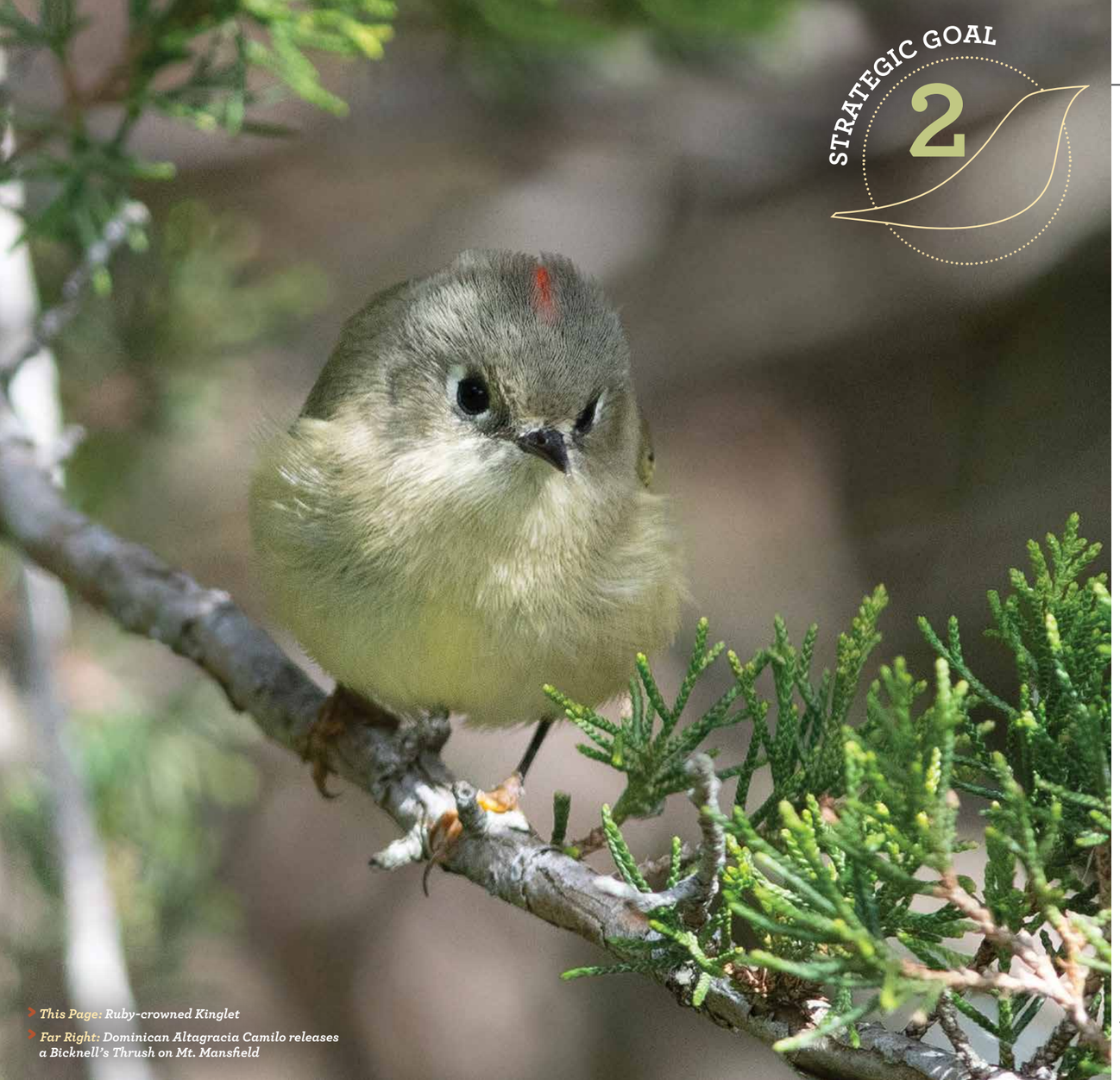
© Susan Hindinger

ACTIONS

Diversify our funding stream for science programs to buffer increasingly variable public agency funding.
How: Strengthen collaborations that will diversify funding sources. Seek larger and longer-term philanthropic support for science. Endow core staff science positions. Create an Enterprising Science Fund to encourage creative and cutting-edge projects.

Expand our capacity to manage and analyze large datasets and serve as a resource to other institutions.
How: Add a Data Technician and Data Scientist to our staff. Expand formal partnerships with other scientists and institutions working on "big data" projects.

Provide opportunities for young scientists and students.
How: Endow an annual summer internship. Design and implement projects to engage undergraduate and graduate students and young professionals in VCE science projects.



STRATEGIC GOAL 2

> *This Page: Ruby-crowned Kinglet*

> *Far Right: Dominican Altagracia Camilo releases a Bicknell's Thrush on Mt. Mansfield*

Close the Loop for Conservation

We work with partners to achieve science-driven conservation.

VCE is known for compelling, cutting-edge conservation science. But what happens after the data have been analyzed, conclusions drawn, and scientific papers published? Science can, and must, make a real difference for wildlife. During the next five years, with your help, we will amplify the conservation impact of VCE's work.

The world needs science-driven conservation. VCE can provide the science. Sweeping issues like climate change, invasive species, and biodiversity loss demand a collaborative approach. We will build ever more effective collaborations with scientific and conservation partners, thus "closing the loop" for conservation.

ACTIONS

Implement science-driven conservation on the wintering grounds of focal bird species.
How: Work with identified partners in Cuba, Haiti, the Dominican Republic, Puerto Rico, and Canada to translate VCE's science into action.

Collaborate with decision makers and conservation partners to address shared priorities.
How: Develop and formalize ongoing collaborations with key conservation partners. Work with and for groups who can affect policies and protect habitats. Meet regularly with conservation partners such as land trusts, policy groups, and land managers to discuss information gaps and priority science needs.

Secure "full life cycle" project funding.
How: Secure project funding beyond scientific pursuits to allow for building partnerships, communicating results, and providing open access to our data.

Pursue new scientific collaborations.
How: Engage key collaborators with complementary areas of expertise to tackle complex issues such as climate change, biodiversity and human health, and infectious disease and invasive species impacts.

This Page: Dean Greenberg observing forest wildflowers

Far Right: Noah Milligan handling a larval salamander

STRATEGIC GOAL 3

A Broader Vision for Citizen Science

Citizen science is fundamental to VCE's mission and how we approach our work. It builds our constituency and enables us to gather data over large geographies.

Involving the public has never been more essential. Citizen science nurtures conservation advocates. It fuels passion and promotes engagement in conservation activities at state and local levels.

We are inspired to think big, to cultivate a robust program that will stretch our conservation goals, enrich the lives of our citizen scientists, and sustain VCE into the future.

"By participating in citizen science, I'm doing what I can on a small scale to contribute to the larger picture of conservation, all while becoming a better naturalist. It's a win-win."

—VCE CITIZEN SCIENTIST

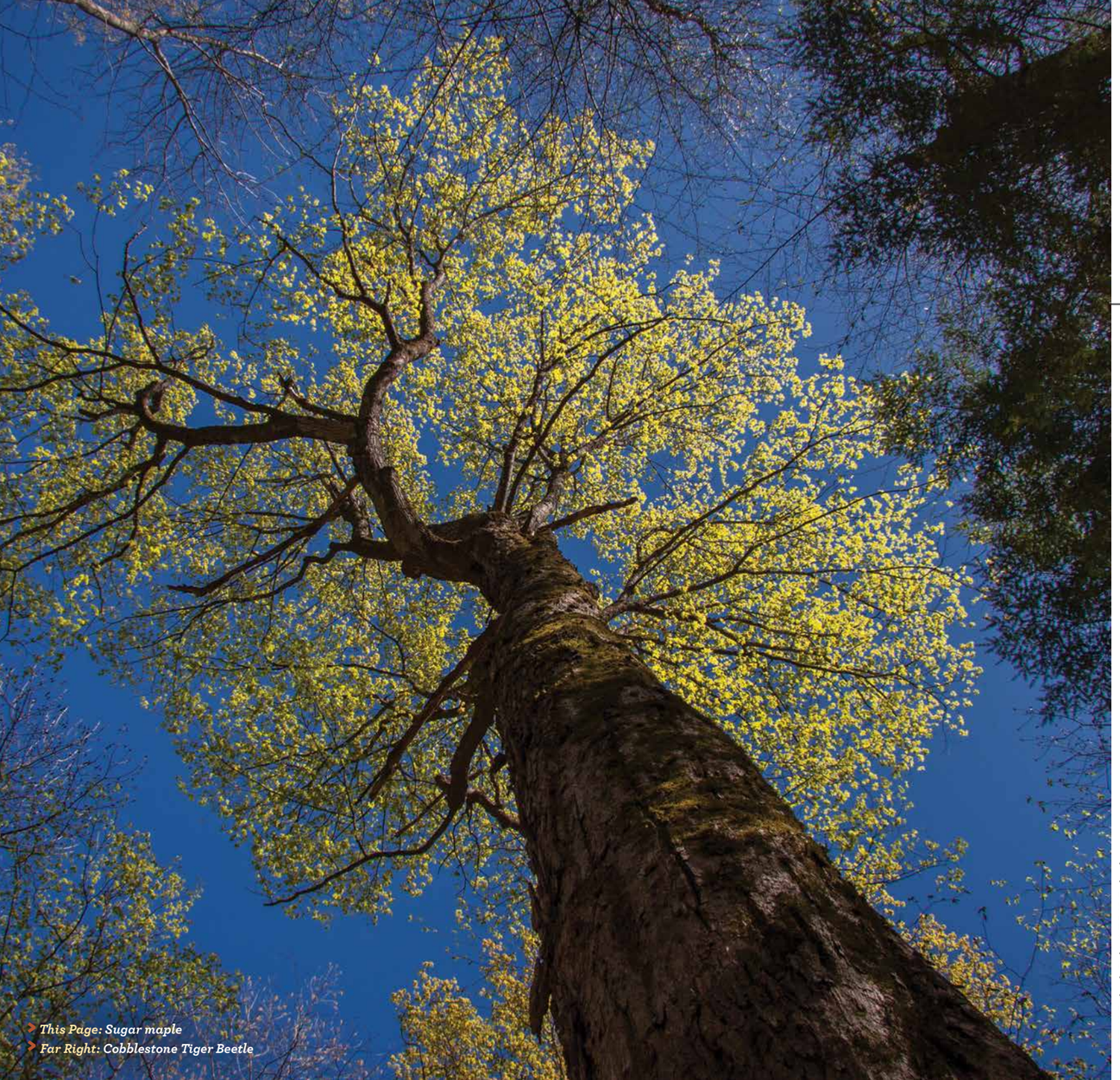
Our citizen science program empowers volunteers to participate in science, and is at the heart of VCE's approach to conserving wildlife.

ACTIONS

Build a sustainable and diverse citizen science community.
How: Systematically evaluate our current citizen science program, to both enhance participation and identify gaps. Act on our findings to ensure that this community is sustainable and increasingly diverse.

Convene and lead Vermont's first statewide Citizen Science Union.
How: Share best practices and the work of creating and carrying out citizen science across the state by collaborating and sharing resources with sister organizations. Serve as a science resource to environmental education organizations and their audiences, and in turn benefit from their expertise in public education, program delivery and access to local audiences.

Put more "science" into citizen science.
How: Enhance opportunities for citizen scientists to participate beyond data collection, including examining and interpreting raw data, designing protocols, developing follow-up studies, and writing papers.



This Page: Sugar maple
Far Right: Cobblestone Tiger Beetle

Conservation Science Program Objectives

We describe our program objectives on the following pages. They reflect and build on our organization-wide strategic goals of investing in **pioneering science**, achieving **conservation outcomes**, and broadening our vision for **citizen science**.

GUIDING PRINCIPLES:

- Collaboration is essential to address complex issues.
- Science achieves conservation when it is applied to solve problems.
- Science should be transparent, reproducible, and openly available to all.
- We prioritize projects with the highest potential conservation impact.

VCE's team of conservation scientists undertakes research projects that focus on wildlife in Northeastern North America, engage and involve the public, and advance our mission.

This Page: View looking south from Mt. Mansfield
Right: Male Blackpoll Warbler
Far Right: Jason Hill examining a Bobolink

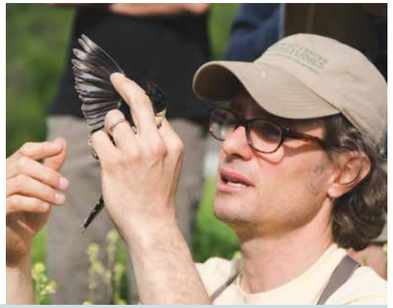
MOUNTAINS

During the next five years, we will transform the Mountains Program from one largely focused on a single species (Bicknell's Thrush) into an ecosystem-level research program.

FROM BIRDS TO BIOMES:
Ecosystem-scale Research and Conservation

The Mountains Program includes some of VCE's most well-known projects, such as our long-running citizen science project, Mountain Birdwatch (MBW). The Mountains Program has also featured groundbreaking research on the breeding ecology of Bicknell's Thrush and the first documentation of mercury in terrestrial food webs. This work has gained widespread acclaim from our peers and has directly informed management and protection of high-elevation forests across the Northeastern U.S., as well as on the Caribbean wintering range of Bicknell's Thrush.

During the next five years, we will transform the Mountains Program from one largely focused on a single species (Bicknell's Thrush) into an ecosystem-level research program. We will broaden our scope of inquiry to include the ecological processes that drive change and shape the fate of Bicknell's Thrush and the entire assemblage of avian species in the Northeastern spruce-fir zone.



ACTIONS

Improve the scientific power of Mountain Birdwatch.
How: Ensure that MBW yields actionable science, adjusting the protocol to detect population trends of all focal species and uncover factors driving those trends. Reposition MBW to respond to emerging threats in montane forests of the Northeastern U.S.

Focus new research on ecosystem processes.
How: Use a multidisciplinary approach to study mechanisms that drive population dynamics of focal avian species by collaborating with experts in complementary scientific fields.

Serve as founding partner of the Mt. Mansfield Science and Stewardship Center and participate in its programmatic development.
How: Partner with the University of Vermont to help establish the first high-elevation field station of its kind in Vermont.

This Page: Francoise Benjamin conducts Bicknell's Thrush surveys in the Dominican Republic

Far Right: Bicknell's Thrush

We will support our international colleagues in science-driven conservation initiatives, providing our scientific expertise to underpin and advise their efforts.

© Hodali Almonte

CARIBBEAN

SCIENCE-DRIVEN CONSERVATION:
Protecting Avian Wintering Grounds

The Caribbean Program focuses on research and conservation actions that improve the quality, quantity, and security of habitat for Bicknell's Thrush on its restricted wintering grounds. We have gained novel insights into the ecology of the region's resident and migrant birds, shared our breakthrough results through a long list of scientific publications, contributed to on-the-ground conservation efforts such as creation of the Dominican Republic's first-ever private nature reserve, and co-authored a field guide to the birds of Hispaniola.

During the next five years, we will support our international colleagues in science-driven conservation initiatives, providing our expertise to underpin and advise their efforts, while leading an international network of stakeholders to support them.

ACTIONS

Improve understanding of the winter distribution of Bicknell's Thrush.
How: Determine the species' status in Cuba and Jamaica through surveys completed by VCE staff and our in-country colleagues. Clarify sex-based habitat partitioning in winter, its implications for conservation, and effects on survivorship and productivity.

Support conservation of high-value habitat.
How: Guide strategic conservation activities through delivery and promotion of science-based decision-making tools. Identify and advance protection of priority sites that both support large concentrations of birds and face a high risk of deforestation.

Lead the International Bicknell's Thrush Conservation Group.
How: Facilitate communication among multiple stakeholders in six countries to maximize effectiveness of conservation efforts across the species' migratory range.

Support colleagues and partners working for avian conservation in the Greater Antilles.
How: Work closely with local partners to build capacity, garner resources, advise strategic conservation initiatives, and develop collaborative projects to advance shared goals.

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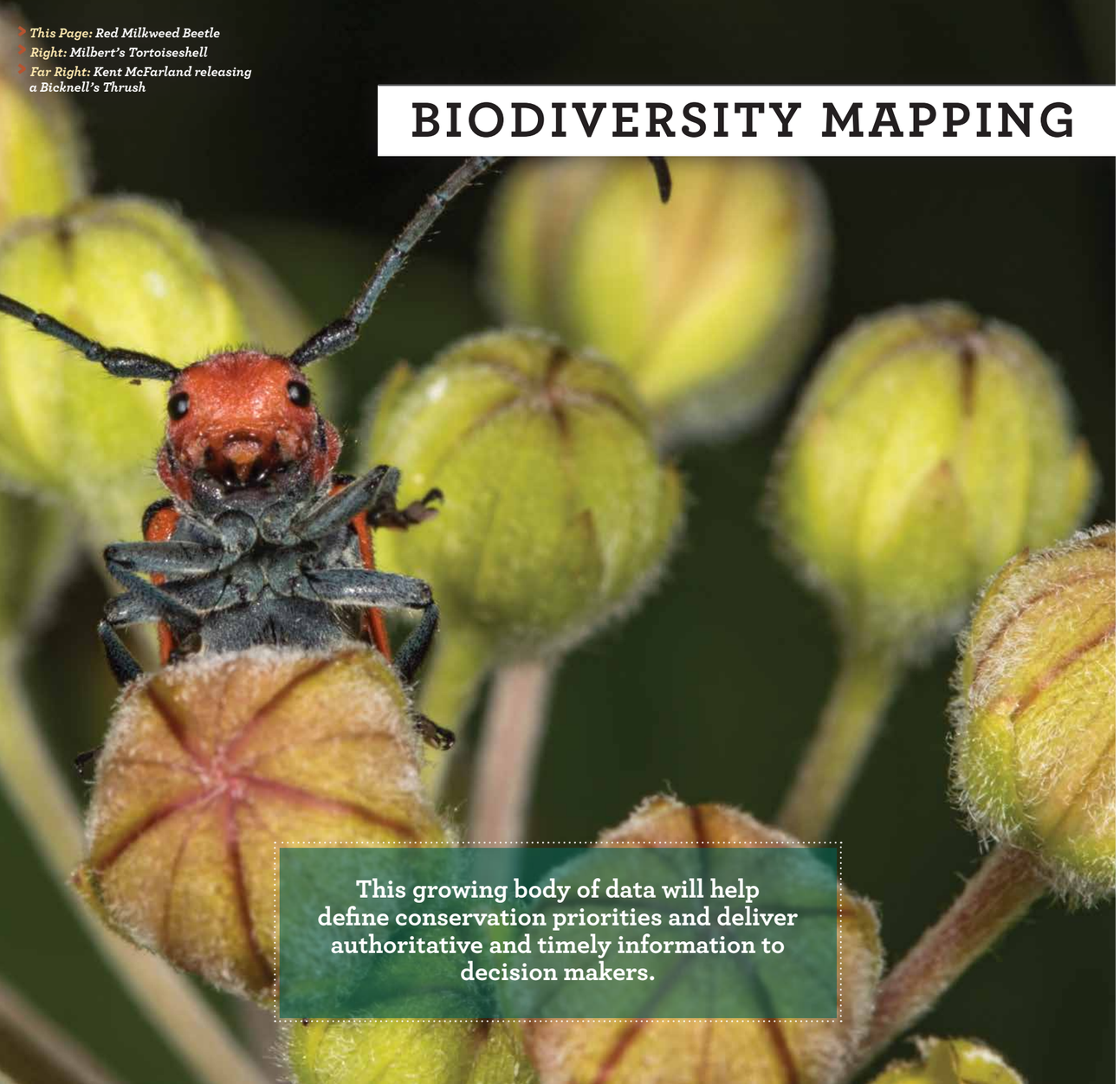
This Page: Red Milkweed Beetle
Right: Milbert's Tortoiseshell
Far Right: Kent McFarland releasing a Bicknell's Thrush

BIODIVERSITY MAPPING



This growing body of data will help define conservation priorities and deliver authoritative and timely information to decision makers.

© K.P. McFarland; Top: © K.P. McFarland

MOBILIZING CITIZEN SCIENTISTS:

Harnessing Big Data for Conservation

As human activity profoundly alters the map of life, our response requires knowledge of plant and animal distributions across vast landscapes, and their changes over time. The Vermont Atlas of Life (VAL) provides a structure and process for compiling and conveying information on every species in Vermont—an audacious goal, yet a critically important step towards biodiversity conservation. This growing body of data will help define conservation priorities and deliver authoritative and timely information to decision makers.

Progress on this visionary project will shift into overdrive during the next five years, as we train and mobilize more citizen scientists and archive more data to the Atlas than ever before. Digital tools will provide unprecedented opportunities for the public to discover biodiversity and share observations. Building our VAL Team to include a Data Scientist, Data Technician, and Outreach Naturalist will allow us to cultivate a robust citizen science community across Vermont and beyond.

ACTIONS

Digitize and share biodiversity data with a global community.
How: Provide a pathway for sharing data with scientists, decision makers, and the public through VAL's official link to the Global Biodiversity Information Facility.

Breathe new life into biodiversity data.
How: Provide free, online access and tools to learn about nature and to visualize and download millions of data records spanning more than a century. VAL is quickly becoming the most comprehensive and accessible data archive ever assembled on Vermont's biodiversity.

Launch the next major statewide citizen science biodiversity project.
How: Mobilize citizen scientists to amass crowd-sourced biodiversity data, complete a multi-year wildlife atlassing effort, and launch shorter-term "mapping missions" to address gaps in our biodiversity knowledge.

Expand e-Butterfly across the Americas.
How: Through a collaborative enterprise with partner organizations, hundreds of regional experts, and thousands of users, develop e-Butterfly to be the de facto tool used to document butterfly distribution, abundance, habitat, and population trends throughout the Western Hemisphere.

© Charles Gangas

This Page: Steve Faccio peering into a vernal pool
Far Right: Red eft

FORESTS

During the next five years, we will focus on understanding the growing array of stressors on forest habitats across Vermont and New England.

© Kate Buckman

RESEARCH AND CONSERVATION:
Protecting a Functional Forested Landscape

Forests are central to life in Vermont and across New England. They sustain deep-rooted cultural traditions and provide habitat for most of our fish and wildlife. They are also remarkably resilient: almost completely cleared for agriculture by the end of the 19th century, Vermont's forests now cover about 75% of the state. However, after a century of recovery, the trend is reversing. Our forests are shrinking once again, as growth in suburban and exurban human communities accelerates. Compounding forest loss and fragmentation is a growing array of introduced pests, pathogens, and invasive species, all of which are responding to a rapidly warming climate.

During the next five years, VCE's Forests Program will focus on understanding the impacts of these and other stressors, gathering baseline information to monitor ecological change over time, and working with conservation partners, landowners, and policy makers to put our findings to work for the woods.

ACTIONS

Measure and monitor vernal pool ecology.
How: Train citizen scientists to monitor both physical and biological features to document the health of vernal pools over time.

Advance vernal pool conservation.
How: Develop and promote science-based best management practices for forestry around vernal pools. Expand regional data sharing through the North Atlantic Vernal Pool Data Cooperative, allowing for a better understanding of vernal pool species' distribution across political boundaries.

Develop methods to detect critical amphibian road crossing sites across Vermont and New Hampshire.
How: Refine our model for remote detection of amphibian crossings piloted for one Vermont county, and expand its use across Vermont and New Hampshire.

Investigate impacts of invasive species on forested ecosystems.
How: Advance research on invasive species impacts to forest food webs. Conduct collaborative research on the infectious amphibian diseases caused by non-native *Ranavirus* viruses and Chytrid fungi, which threaten native amphibians.

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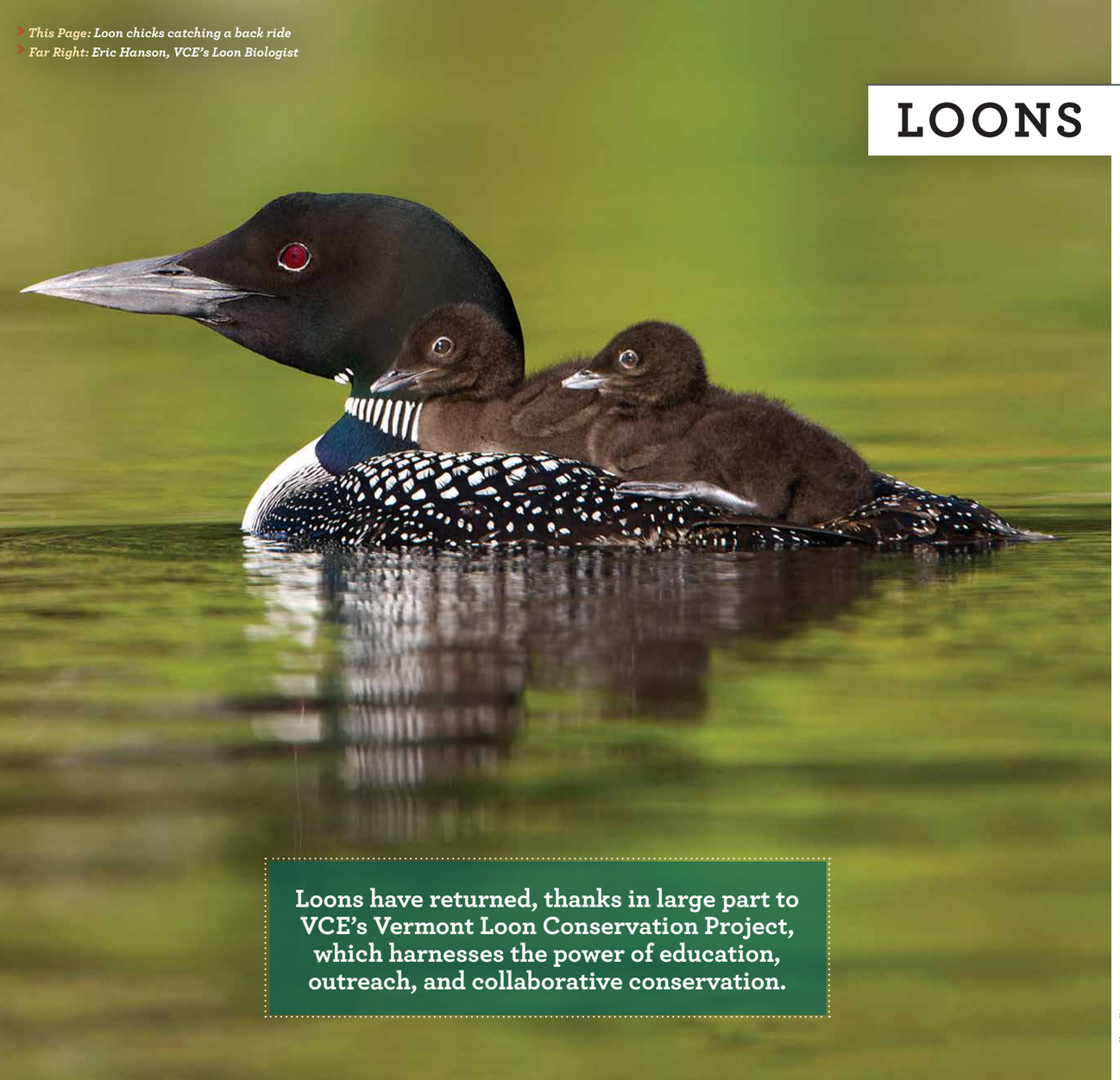
This Page: ***Loon chicks catching a back ride***
Far Right: ***Eric Hanson, VCE's Loon Biologist***

LOONS



Loons have returned, thanks in large part to VCE's Vermont Loon Conservation Project, which harnesses the power of education, outreach, and collaborative conservation.

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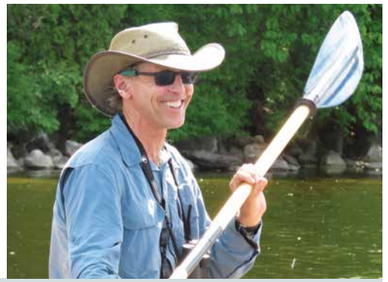
PEOPLE + PASSION:
An Unqualified Conservation Success

The remarkable recovery of Vermont's Common Loon population is one of the state's greatest conservation success stories. Since 1983, when only seven pairs nested statewide, the population has grown to nearly 100 nesting pairs. Loons have returned, thanks in large part to VCE's Vermont Loon Conservation Project (VLCP), which harnesses the power of education, outreach, and collaborative conservation.

Loon habitats are ever-changing, however. Emerging climate-related threats include increasing infectious disease, exposure to cyanotoxins from algal blooms, and extreme weather events that impact productivity. During the next five years, VLCP will improve our ability to identify population declines and respond to issues that threaten Vermont's breeding loons. We will develop an integrated data management system, conduct a demographic analysis of Vermont's loon population, and increase the capacity and knowledge of our volunteers.



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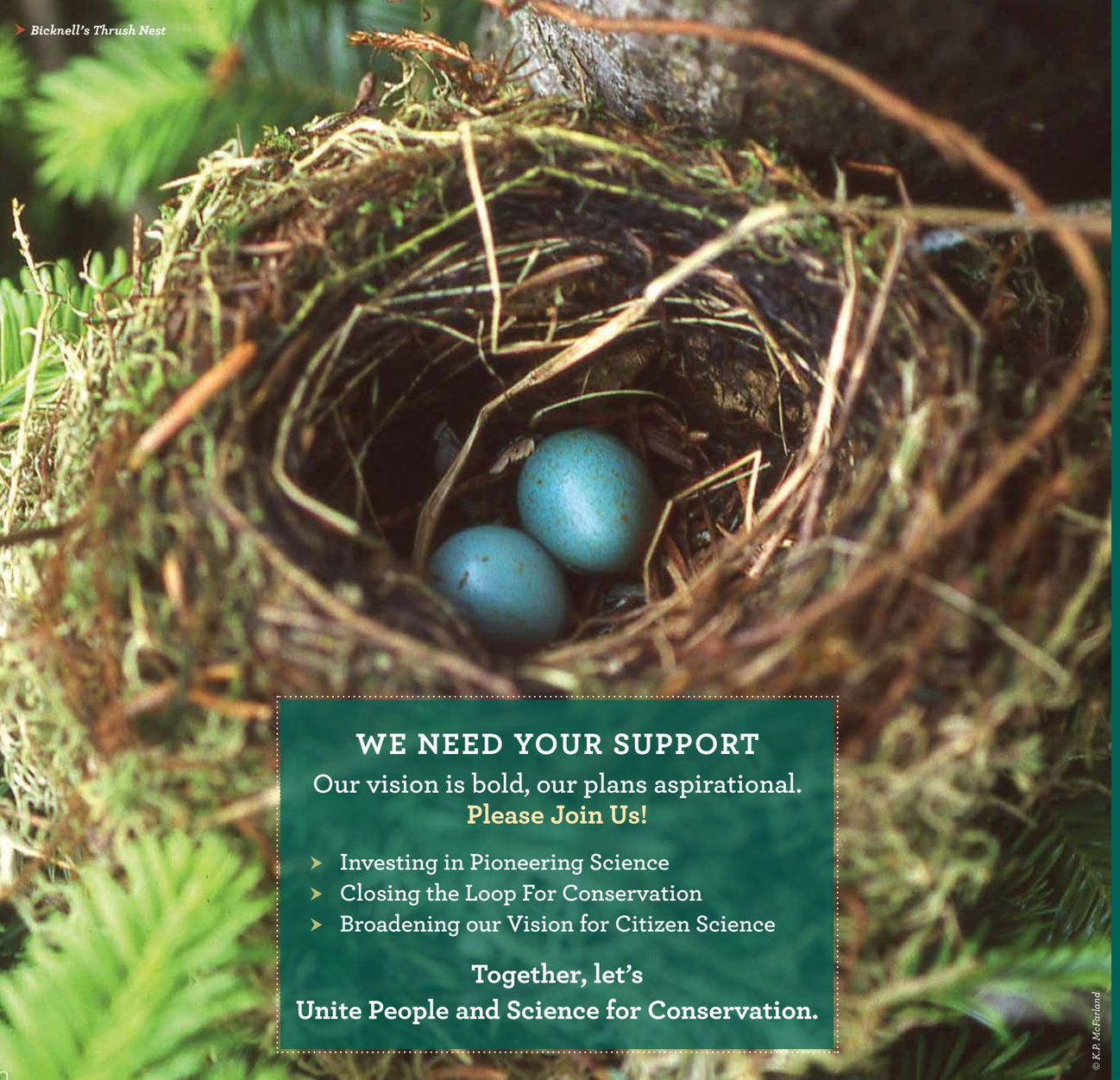
ACTIONS

Build and strengthen loon project partnerships.
How: Expand the VLCP network of partners. Train and steward additional volunteers. Formalize procedures for responding to distressed loons, especially with veterinarians and wildlife rehabilitators.

Streamline loon data management.
How: Create an integrated database to house and manage all VLCP records, facilitating data analyses and adaptive management.

Ensure that VLCP is able to detect population declines.
How: Monitor key demographic parameters on a subset of core lakes to provide adequate statistical power to detect statewide changes.

Collaborate on research to understand and strategize responses to emerging climate-related threats to loons.
How: Join in ongoing, and initiate new, research with partners across North America to collectively study and assess emerging threats, and to plan and evaluate management interventions.



Bicknell's Thrush Nest

© K.P. McFarland

WE NEED YOUR SUPPORT

Our vision is bold, our plans aspirational.
Please Join Us!

- Investing in Pioneering Science
- Closing the Loop For Conservation
- Broadening our Vision for Citizen Science

Together, let's
Unite People and Science for Conservation.

STRATEGIC PLAN 2019-2023

Uniting People and Science for Conservation

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"Our rapidly changing natural world demands novel, forward-thinking approaches to conservation. With your help, VCE will continue to push boundaries through cutting-edge research, translating science into conservation action, and inspiring citizen scientists to participate."

—CHRIS RIMMER

Front Cover: *Blue Jay © K.P. McFarland*

VERMONT CENTER FOR ECOSTUDIES

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