



Smithsonian
*National Zoological Park
Conservation Biology Institute*

Virginia Working Landscapes 2024 Annual Report



Our Mission

Virginia Working Landscapes (VWL) is a program of the Smithsonian's National Zoo and Conservation Biology Institute (NZCBI) in Front Royal, Virginia **that promotes the conservation of native biodiversity and sustainable land management through scientific research, community engagement, and education.**

2024 Team



Amy Johnson
Program Director



Justin Proctor
Virginia Grassland Bird Initiative Coordinator



Erin Shibley
Survey & Volunteer Coordinator



Natalie Izlar
Botany Technician



Christopher Rademacher
Biodiversity Technician



Nick Garnhart
Field Technician & Scientific Illustrator



Brooke McDonough
Communications & Development Assistant

Research Fellows

Jordan Coscia
Allison Huysman
Bernadette Rigley
Caylen Wolfer
Graham Diedrich

Interns

Janna Knight
Maya Gonzalez
Ari Sandall
Miranda Rich
Maddie Reim

Steering Committee

Beatrice Von Gontard,
Chair
George Ohrstrom II, Vice
Chair
Cary Ridder, Treasurer

John Beardsley
John Jacquemin
Stephanie Ridder
Michael Sands
Kate Wofford
Peter Leimgruber, NZCBI

A Note from our Director

Dear Friends,

As you take a moment to sit down and peruse our Annual Report, I encourage you to picture yourself exploring the open grasslands of rural Virginia in early summer. Tall grasses swaying, pollinators buzzing among native wildflowers, and our treasured, grassland birds carrying food to the nestlings they've hidden in the depths of pasture grasses. Now imagine exploring that same grassland alongside a scientist, a group of neighbors, or a team of knowledgeable community volunteers. Together, you gain insights into what species are there and exchange knowledge that shapes the way you care for your land. This is the essence of Virginia Working Landscapes: where science and stewardship come together to create community and lasting environmental impacts.

In 2024, that impact took on new energy. With the addition of two new team members, we expanded our research and outreach strategies while strengthening conservation efforts where they matter most—on the ground! We uncovered hidden biodiversity on private lands, revealing endangered species thriving in places we didn't expect (page 7). We studied how birds help control agricultural pests, connecting conservation with working lands in ways that benefit both nature and people (see page 8). And we turned our attention beneath the surface, exploring the rich, unseen world of soil microbiomes (page 13), because healthy landscapes start from the ground up.

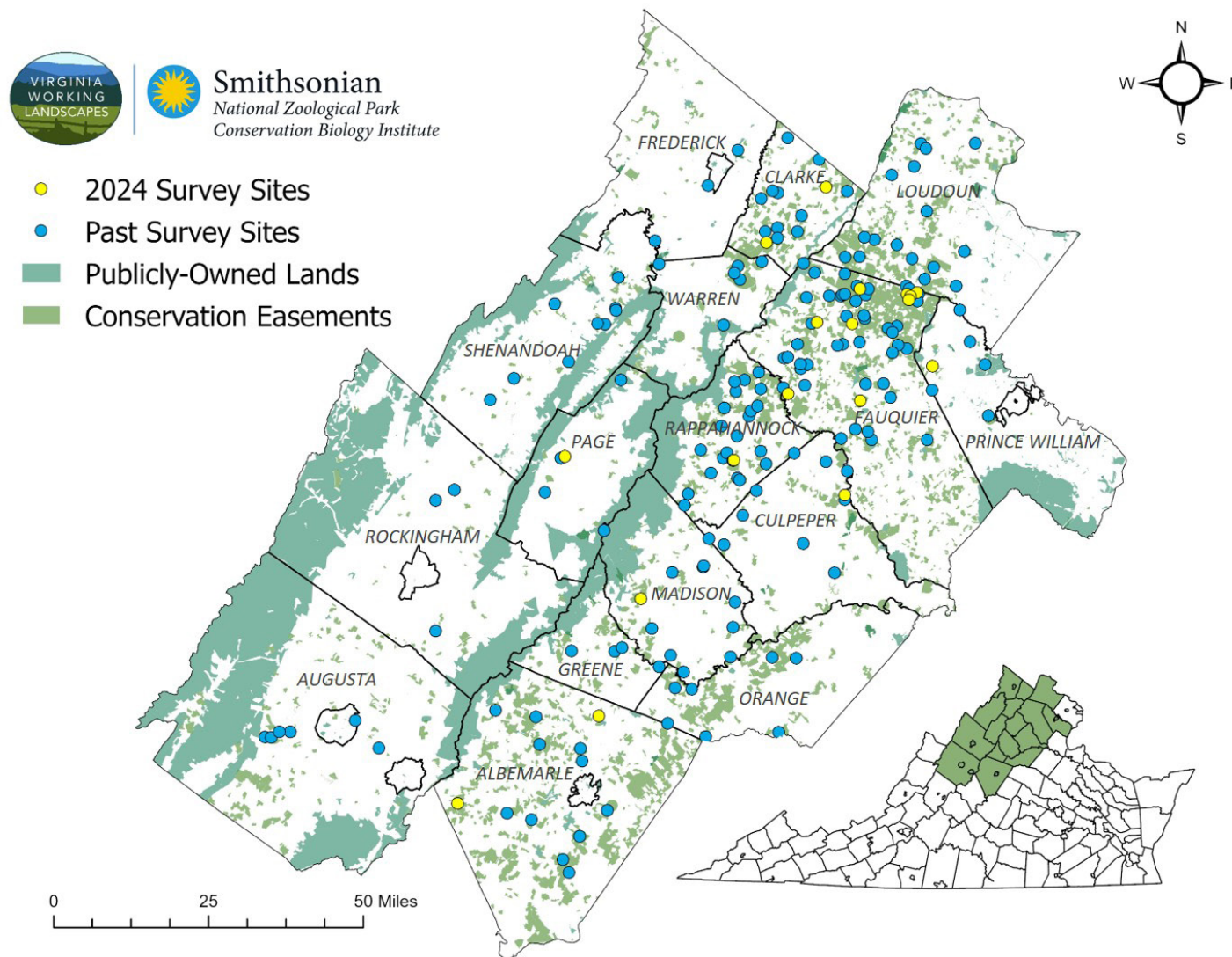
But science alone isn't enough. Conservation happens when knowledge turns into action, and this year, we made that connection stronger than ever. We created new educational resources featuring local artists (page 25), led immersive workshops (page 19), and welcomed more landowners and partners, ensuring that research isn't just published—it's put into practice. New philanthropic partnerships provided critical support, enabling us to grow our team and extend conservation efforts across the region (page 23). Through community science and collaboration, we are building a movement where conservation isn't an "extra" effort, but woven into the way we farm, steward, and care for the land.

The challenges facing our local biodiversity and working landscapes are complex, and so are the solutions. They require curiosity, collaboration, and a willingness to think differently about how we contribute to conservation in our daily lives. That's what we are building together: a growing community of people who not only care about nature but are shaping the future of conservation across our region.

Thank you for being an integral part of this work. We can't wait to see what we'll accomplish next.

Amy Johnson, PhD
Program Director, VWL

Our Survey Region



VWL collaborates with landowners who generously volunteer their properties for Grassland Biodiversity Surveys and focal research projects. Our landowner network spans across 16 counties, encompassing the Northern Shenandoah Valley, Blue Ridge, and Piedmont regions of Virginia. New sites are added each year to broaden our reach and strengthen partnerships with communities who share our commitment to research and conservation.

2010-2024 VWL Survey Network Acreage

15,179 Public Land

98,331 Private Land

Conservation Science

VWL is dedicated to advancing the science of conservation and land management by conducting innovative research on working farms. Results are used to inform best practices that promote and protect native biodiversity while supporting the goals of land managers.



Birds, Bugs, and Boxes: Uncovering the Hidden Allies of Agriculture



In 2024, VWL PhD Research Fellow Allison Huysman launched a pilot study looking at the beneficial impacts of cavity-nesting birds on working lands. Ultimately, this research aims to illuminate how supporting bird populations through conservation practices can benefit the ecological health of working lands, fostering a reciprocal relationship between biodiversity and agriculture.

This research is in collaboration with the University of Maryland and Smithsonian's Center for Conservation Genomics. Our 2024 interns, Ari Sandall and Maya Gonzalez, supported the field work. We would like to express our gratitude to Smithsonian's Life on a Sustainable Planet and the National Fish and Wildlife Foundation for supporting this project.

2024 by the numbers:



99 nest boxes monitored



75% of nest boxes occupied



127 insect communities sampled

Species on the Brink

The Henslow's Sparrow (*Centronyx henslowii*), a grassland bird species of high conservation concern, has faced steep declines due to habitat loss. This year, VWL conducted targeted surveys on private lands and confirmed the presence of three breeding pairs, the only known breeding population in Virginia.

The team was able to band an adult male and two young, establishing a foundation for ongoing monitoring. Through monitoring efforts and collaboration with private landowners, VWL helps identify opportunities to protect and support habitats for this threatened species in Virginia.

We would like to thank our intern, Maya Gonzalez (pictured), for her contributions to this research and express our gratitude to Virginia's Department of Wildlife Resources for supporting this project.

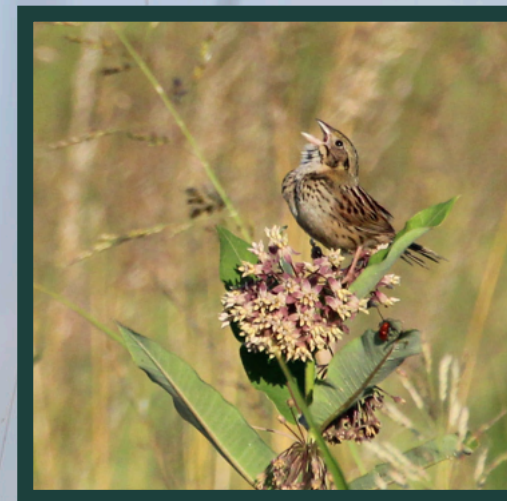
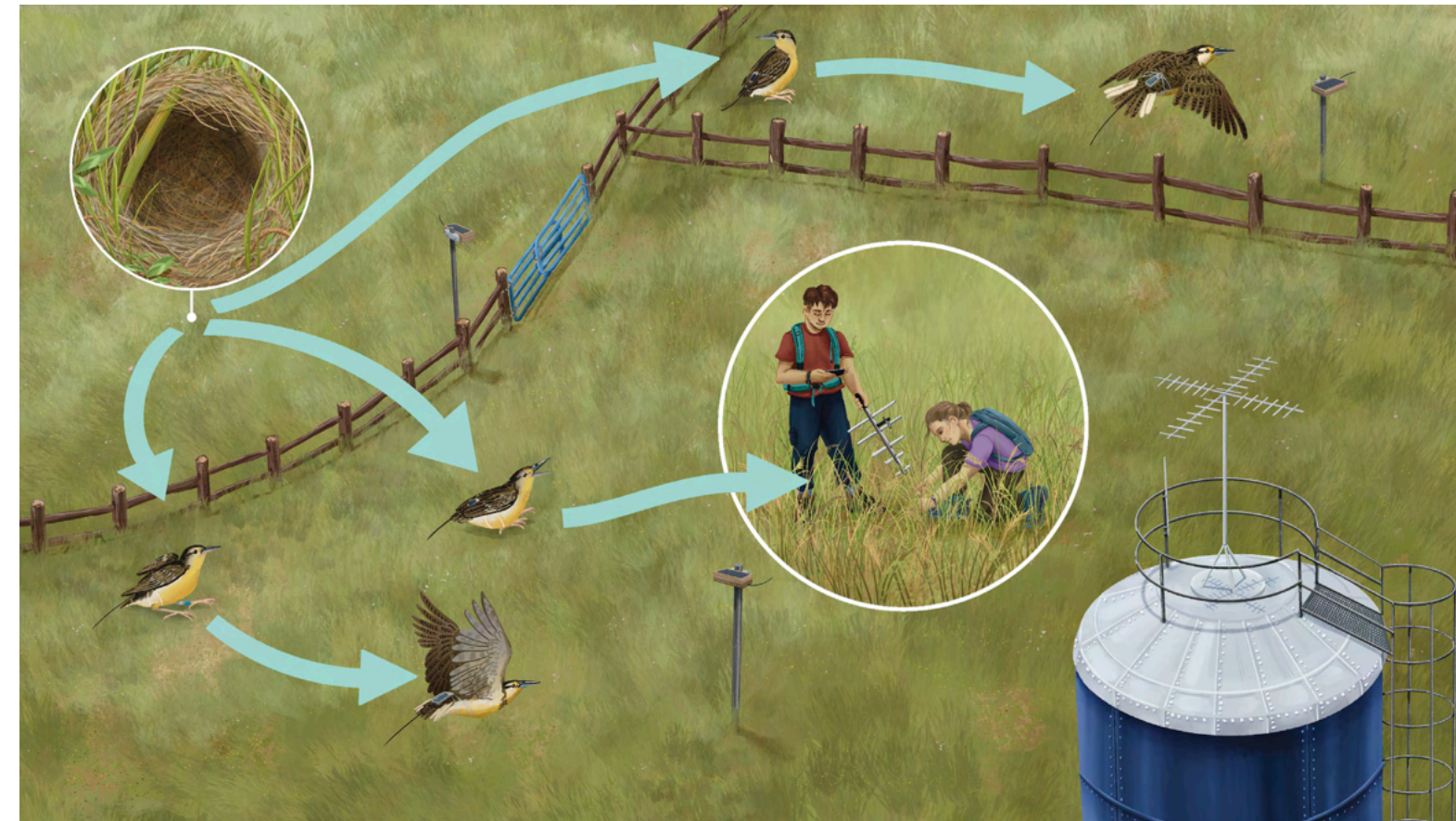


Photo by Christopher Rademacher





Project Fledgling: Understanding Grassland Bird Survival



VWL's PhD Research Fellow Bernadette Rigley continued her research investigating the movement and survival of juvenile grassland birds in the weeks after they fledge the nest, a largely understudied and cryptic life stage known as the post-fledgling period. Her study used advanced tracking technologies to monitor the behavior and small-scale movements of juvenile birds on grasslands under varied agricultural management practices. Results from Rigley's study are now being analyzed for future publication. This research complements our Bird-Friendly Beef study, and together, these efforts enhance our understanding of habitat needs for grassland birds throughout their nesting cycle—from egg laying to fledgling. The findings will provide crucial insights to enhance conservation efforts to support the survival of grassland birds during one of their most vulnerable periods.

Illustrations by Nick Garnhart

Special thank you to intern Janna Knight and field tech Nick Garnhart for their support in the field. We would like to express our gratitude to the Smithsonian Women's Committee, the BAND Foundation, Beatrice and Adie von Gontard, the Katherine G. McLeod Charitable Fund, and the Jacquemin Family Foundation for supporting this project.

By the numbers:

Since the start of Project Fledgling, the team has tracked:



21 Eastern Meadowlarks



20 Bobolinks



28 American Kestrels







Bee-Friendly Beef Making a Buzz

In 2024, the Bee-Friendly Beef project wrapped up a successful three-year study focused on integrating native wildflowers into livestock pastures. The research demonstrated that these enhancements significantly benefited both vegetation and pollinator communities, offering an effective solution for supporting declining pollinators. Community scientists were instrumental in gathering data through vegetation and pollinator surveys across six Virginia farms. The findings have the potential to enhance grazing systems across the fescue belt, simultaneously benefiting livestock producers and native biodiversity.

This research is in collaboration with the University of Tennessee and Virginia Tech. We would like to express our gratitude to the USDA NRCS Conservation Innovation Grant Program and USDA NIFA for supporting this project.

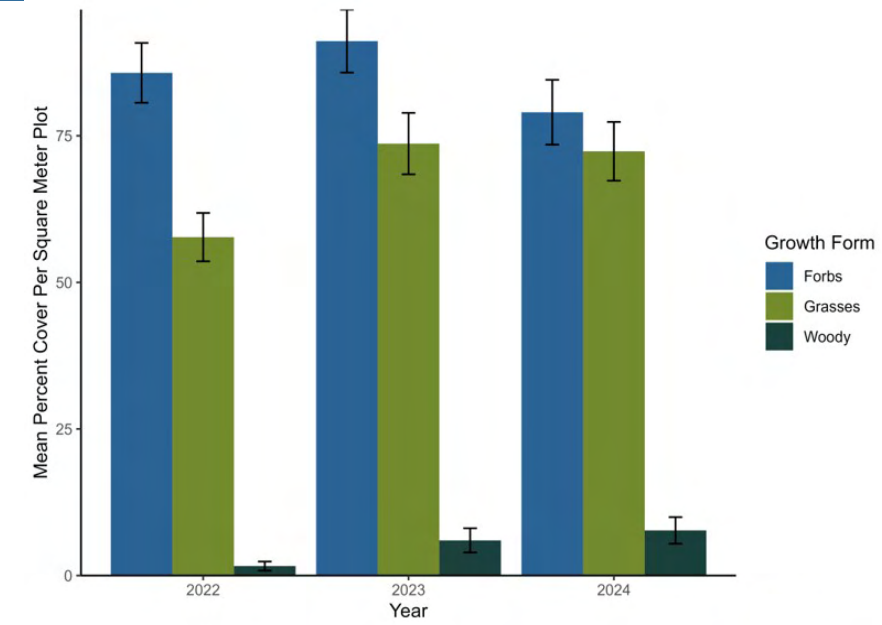
2024 by the numbers:

-  **3.7 x** more Bumble Bees observed in wildflower-enhanced pastures
-  **2 x** more pollinators overall observed in wildflower-enhanced pastures
-  **3.9 x** more groundcover of native forbs in the wildflower-enhanced pastures
-  **2.6 x** greater species richness of native forbs in wildflower-enhanced pastures

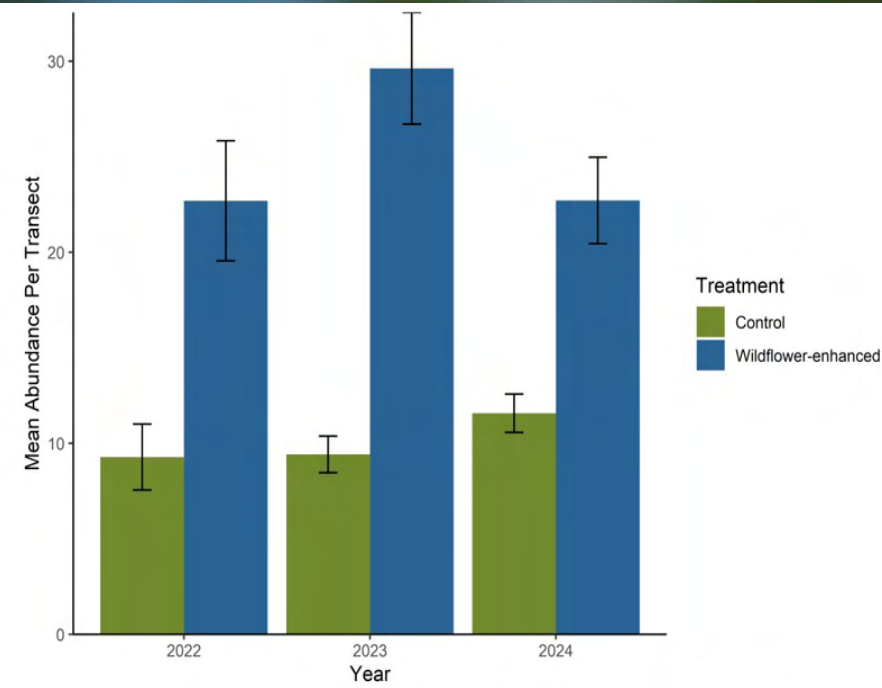
Mean percent cover of forbs, grasses, and woody plant species per square-meter survey plot in the wildflower-enhanced treatment fields from 2022-2024 (A). Mean abundance of the full pollinator community per 100-ft. survey transect in the wildflower-enhanced and control treatment fields from 2022-2024 (B). Cattle were removed from the study fields in 2022 to promote wildflower establishment success, and regular grazing and field management regimes were resumed by producers in 2023 and 2024.

Across all three growing seasons, we found that the cover ratios of forbs to pasture grasses in the wildflower-enhanced treatments were similar, indicating greater availability of pollinator resources while maintaining adequate cover levels of pasture grasses for livestock forage. As a result, on-farm trial data collectively indicated greater mean total pollinator community abundance across all surveyed taxa in the wildflower-enhanced pastures compared to traditionally grazed control pastures.

A) Vegetation Cover in Wildflower-Enhanced Pastures Across Survey Years



B) Pollinator Abundance in Wildflower-Enhanced vs. Control Pastures



Environmental, but Equitable? Solar Energy Across Underserved Virginia Farmlands

In 2024, Community and Nature Fellow Graham Diedrich launched a groundbreaking study to understand how underserved farming communities in Virginia are engaging with solar energy (photovoltaic technology). With the rapid expansion of solar facilities on agricultural lands in Virginia, Diedrich’s research aims to identify barriers that limit these communities’ access to resources associated with solar development. By surveying farmers and analyzing demographic data, his work seeks to offer policymakers a clearer picture of how climate solutions are impacting these communities.



Graham Diedrich, MS
Community &
Environment Fellow, VWL

“Underserved farmers are a critical group for this study. No previous research has explored the barriers to solar adoption within these communities, and addressing this gap is key to creating equitable climate policies.”

— Graham Diedrich,
VWL Community &
Environment Fellow

LIFE ON A
SUSTAINABLE
PLANET

The Farm Beneath our Feet

In 2024, several NZCBI centers and programs came together to launch a collaborative study to explore how regenerative agriculture practices influence the interconnected microbiomes of soil, plants, and animals. This research, conducted on farms across the VWL region, examines how native seed mixes and diverse grazing regimes impact soil health, biodiversity, and livestock well-being. Our findings will provide valuable insights for farmers seeking to enhance productivity, restore soil health, and support biodiversity.

This research is in collaboration with NZCBI’s Center for Conservation Genomics and the Migratory Bird Center. Our 2024 intern, Janna Knight, supported the field work. We would like to express our gratitude to Kathryn & Tony Everett for supporting this project.



Steve Kutos, PhD
Postdoctoral Researcher
Center for Conservation
Genomics, NZCBI

The Sea of Grass: Annual Grassland Biodiversity Surveys

2024 was a noteworthy year for our Grassland Biodiversity Surveys, marking our largest survey season to date. With **82 volunteers** deployed across **30 properties** in **11 counties**, we significantly expanded our reach, covering over **4,000 new acres of working land**. This surge in community engagement enabled us to gather more data than ever before, documenting information on our local bird, plant, and soil communities.

These annual surveys are critical for understanding how land management practices impact biodiversity across Virginia's grasslands. By conducting baseline surveys, we often open landowners' eyes to the biodiversity on their properties—sometimes for the first time. This newfound awareness informs their land management decisions, helping them improve habitats for native

species or conserve the valuable biodiversity already present. We also facilitate knowledge-sharing opportunities within the landowner community, allowing them to connect, exchange experiences, and learn from one another's successes. In 2024, our expanded volunteer capacity not only provided deeper insights into the connections between land management and biodiversity but also created community ambassadors to enhance the relationship between conservation research, land stewardship, and community engagement. This collaborative approach is setting the stage for future research that will continue to guide sustainable practices for years to come.

Special thanks to our Avian Point Count intern Miranda Rich and Grassland Plant Ecology intern Maddie Reim for their support in the field.

2024 Research Properties

Broad Hollow Farm
Cedar Heights Farm
Chancellors Rock
Chapman Farm
Clifton Institute
Cunningham Property
Deerfield Farm
Eldon Farms
Frankford Farm
Fuller Property

Glen Ora
Graves Mill Farm/
Rapidan River Ranch
Hidden Creek Farm
Kinloch Farm
Lakota Ranch
Leopold's Preserve
Martin Farm
Meadowbrook
Mill Run Farm

Millstream Farm
Millway Farm
Montaña Farm
Nuss Property
Oak Grove Farm
Over Jordan Farm
Oxbow Farm
Pea Ridge Farm
Purple Rock
Raines Property

Rallywood Farm
Rucker Farm
Selby Farm
Stonehedge Farm
Sunnyside Farm & Conservancy
Two Owls Farm
Weiss Farm
White House Farm
Woodside

The Bobolink’s Epic Quest

Bobolinks (*Dolichonyx oryzivorus*) migrate approximately 12,500 miles round trip between North America and central South America. To better understand this journey, our team deployed 20 barometric pressure geolocators on Bobolinks breeding on Virginia farms to track their routes with high precision by recording both light and barometric pressure during migration. With Bobolink populations declining by more than 50% in the last 50 years, a more refined understanding of their migratory routes is critical in protecting these birds throughout their full annual life cycle.

This research is in collaboration with Smithsonian’s National Zoo and Conservation Biology Institute programs: VWL and the Migratory Bird Center. Special thanks to intern Janna Knight, field tech Nick Garnhart, and Smithsonian biologist Valentine Herrmann for their support in the field. We would like to express our gratitude to the ConocoPhillips Charitable Investments Global Signature Programs for supporting this project.



Amy Scarpignato
Bird Conservation Specialist
The Migratory Bird Center, NZCBI



Virginia Grassland Bird Initiative

The Virginia Grassland Bird Initiative (VGBI) — a partnership between Smithsonian’s Virginia Working Landscapes, The Piedmont Environmental Council, American Farmland Trust, and Quail Forever — is innovating new ways to reverse the declines of grassland birds on working lands in the Virginia Piedmont, Blue Ridge, and Shenandoah Valley. Together, VGBI partners work with landowners and producers in 16 counties to optimize grassland management for the benefit of birds, farms, and farmers. VGBI’s approach to doing so is a comprehensive one, including one-on-one site visits, an in-house financial incentives program, unique workshop experiences, a nest box program, extensive partnership building, and the creation of novel educational resources.

2024 by the numbers

-  **2** new VGBI staff
-  **1,527** acres of delayed hay and stockpiled fields enrolled in VGBI’s financial incentives program
-  **1,000** acres enrolled voluntarily (without incentives)
-  **75** events hosted or participated in
-  **3** new resources created

Community Engagement

Over 80% of Virginia's landscapes are held in private ownership, making landowners the primary stewards of healthy, biodiverse ecosystems. Through our landowner network and community science program, VWL strives to empower communities with tools to maximize our collective conservation impact.

Conservation Engagement: Events by the Numbers

VWL prioritizes education and training at all levels; we regularly host expert-led workshops, trainings, and lectures that are open to the public at our Front Royal campus and participating farms. These programs aim to share knowledge with those who have the interest and capacity to implement conservation practices on their own properties.



38

events hosted by VWL



35

events participated in via presentations, tabling, or other support



2

events hosted to specifically support historically marginalized communities

Beyond Research: The Impact of VWL's Community Scientists

Our Community Scientists play a vital role in documenting how land management practices shape grassland ecosystems, providing valuable insights for private landowners interested in supporting biodiversity conservation. We are deeply grateful for their dedication—not only do they contribute to our mission, but they also serve as conservation ambassadors, inspiring stewardship within their communities.

2024 Community Scientists

Sally Anderson
Don Arnold
Rob Beaton
Karl Brotzman
Rodney Brown
Alexali Brubaker
Mark Bruns
Caryl Buck
Alex Bueno
Linda Bueno
Cali Busch
Bob Butterworth
Mona Carney
Dorothy Carney
Joanne Carpenter
David Matthew Czenas
Nancy Cohen
Timothy Cotter
Andrea Cubelo-McKay
Deirdre Curran
Lori Dabinett
Hillary Davidson
Art Drauglis
Richard Dynes
Jesse Edwards
Valerie Galati
George Gardner
Christina Goldizen
Erin Gore

Brigitte Grimm
Paul Guay
Kristina Hagman
Kieran Haney
April Harper
Rebecca Harriett
Gary Harvey
Richard Hayden
Kate Heneberry
Kayla Hinrichs
Holly Hintz
Jennifer Mara Holder
John Corey Hunsdon
Scott Jost
Phil Kenny
Jyotirmoy Bhavanishankar
Kyasapura
Sara Lawrey
Lynne Leeper
Edmund LeGrand
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Rae Stone
Elizabeth Sutphen
Eleanor Tatman
Russell Taylor
Tonya Taylor
Elizabeth Train
Janet Walker
Michaela Weglinski
Tracy Whittington
Robert Williams
Amelia Wilson
James Wilson
Chel Wock
Mary Beth Yarbrough
Lucy Zimmerman

Remembering Mary Beth Yarbrough

Written by Erin Shibley, VWL Survey & Volunteer Coordinator

The VWL community lost a dear friend and dedicated volunteer in early 2025 - Mary Beth Yarbrough. Mary Beth's dedication to conservation, learning, and discovering the natural world were only a few of the skills that made her an outstanding Community Scientist. She joined the VWL community science team in 2024 as a new volunteer, eager to learn and work alongside others to study and conserve Virginia's native biodiversity. VWL was not the only organization that she contributed her time and knowledge to. She was an avid birder who contributed to local Eastern Bluebird monitoring, the annual Audubon Christmas Bird Count, Project Feeder Watch, and the Great Backyard Bird Count.

She was also a dedicated Virginia Master Naturalist with over 1000+ hours of volunteer service and served as President of the local Shenandoah Chapter for two years - recently being named the 2024 Volunteer of the Year! Additionally, she conducted numerous annual butterfly counts for the North American Butterfly Association and advocated for ways that everyone can support these important communities in their own backyards. As a former elementary educator and National Park Service Ranger, her love of learning and nature were present in her professional life as well. Mary Beth's efforts for VWL are deeply appreciated and are helping advance conservation. On a personal level, surveying in the field with Mary Beth was such a treat, and her passion for conservation was infectious. It is clear to me that her love for education, mentorship, and stewardship deeply impacted all those around her and made the world a better place.



VWL Survey Coordinator, Erin Shibley (left), conducts a breeding bird point count survey with volunteers, Mary Beth Yarbrough (middle) and Rebecca Harriett (right), at a farm in Fauquier County, VA.



Education

VWL cultivates the next generation of conservation scientists by training and mentoring students, interns, and graduate fellows in research development and implementation, science communication, and community-based conservation.

Training the Next Generation of Scientists

“Virginia Working Landscapes is a team of joy-filled individuals whose passion for grasslands is infectious. **As an intern on their team, I was inspired to dive into research efforts that directly impact the surrounding community, developing a vast array of skills and asking questions to deepen my knowledge.** Each member of the team was a mentor to me in a unique way, whether guiding my skills in data analysis, offering helpful feedback on conservation writing, teaching bird and plant identification, or nurturing a passion for artwork that reflects the beauty of a healthy, thriving ecosystem. In a few months, this team quickly became a family to me, and the lessons they taught me will continue to guide my next steps in becoming a confident researcher.”

— Janna Knight
2024 Intern (pictured below)



Growing with VWL



In 2024, Christopher was hired on as VWL’s Biodiversity Technician, a new position made possible through the generous support of the OCH Conservation Foundation. In this role, he helps lead VWL’s Annual Grassland Biodiversity surveys and serves as a conservation ambassador, providing outreach and education to support landowners in Fauquier and Loudoun Counties with conservation management.

Today, Christopher is motivated by the same awe and wonder he felt during his first season in the field as an intern. “What continues to inspire me is the drive to share the wonders of grasslands with others.”

“I’m excited to be part of an organization that connects people and science to protect these vital landscapes.”

— Christopher Rademacher,
VWL Biodiversity Technician





The Future of Orchids

In the spring of 2024 Smithsonian Gardens hosted an exhibit called, “The Future of Orchids: Conservation and Collaboration.”

The exhibit shared what people are doing to grow, research, protect, preserve, and educate others about these often ultra-specialized plants and habitats — and then to imagine their future.

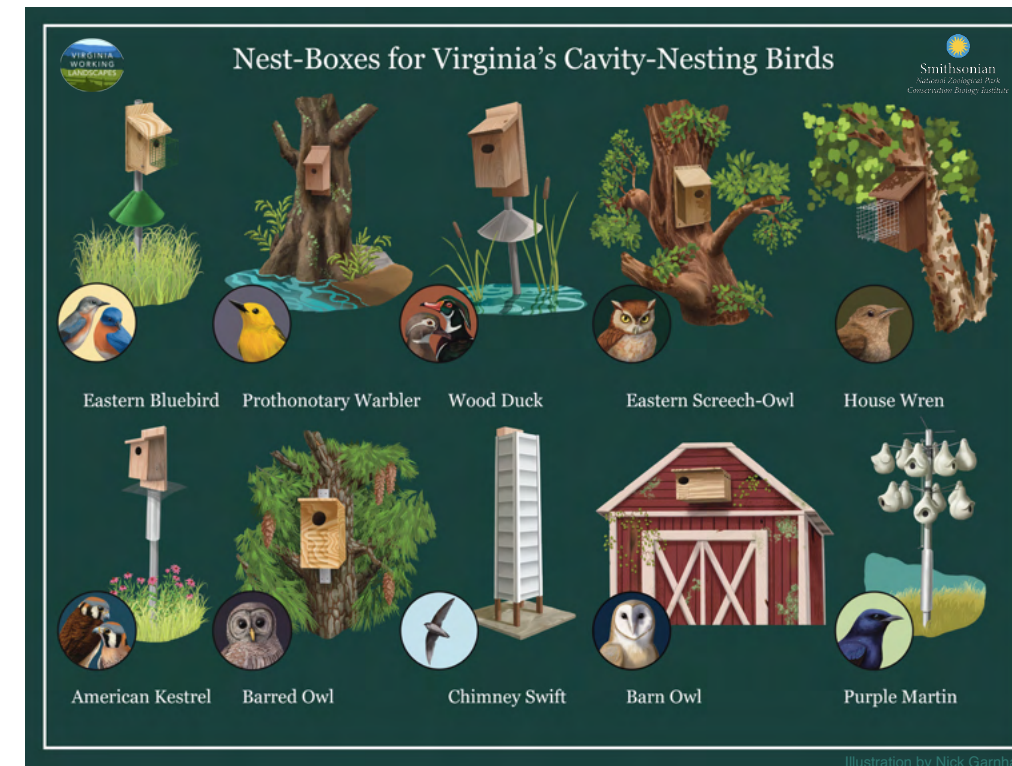
One portion of the exhibit, “Collaborations with the Public,” featured VWL research! VWL’s Program Director Amy Johnson is quoted in the exhibit, “Here in Virginia so much of the landscape is privately owned. Doing research on private land is opening up a whole new picture of how our land management is influencing biodiversity.”

Inclusion in the exhibit showcases the collaborative value of VWL research and the meaningful efforts of our participating landowners and community scientists.



Photos by Amy Johnson

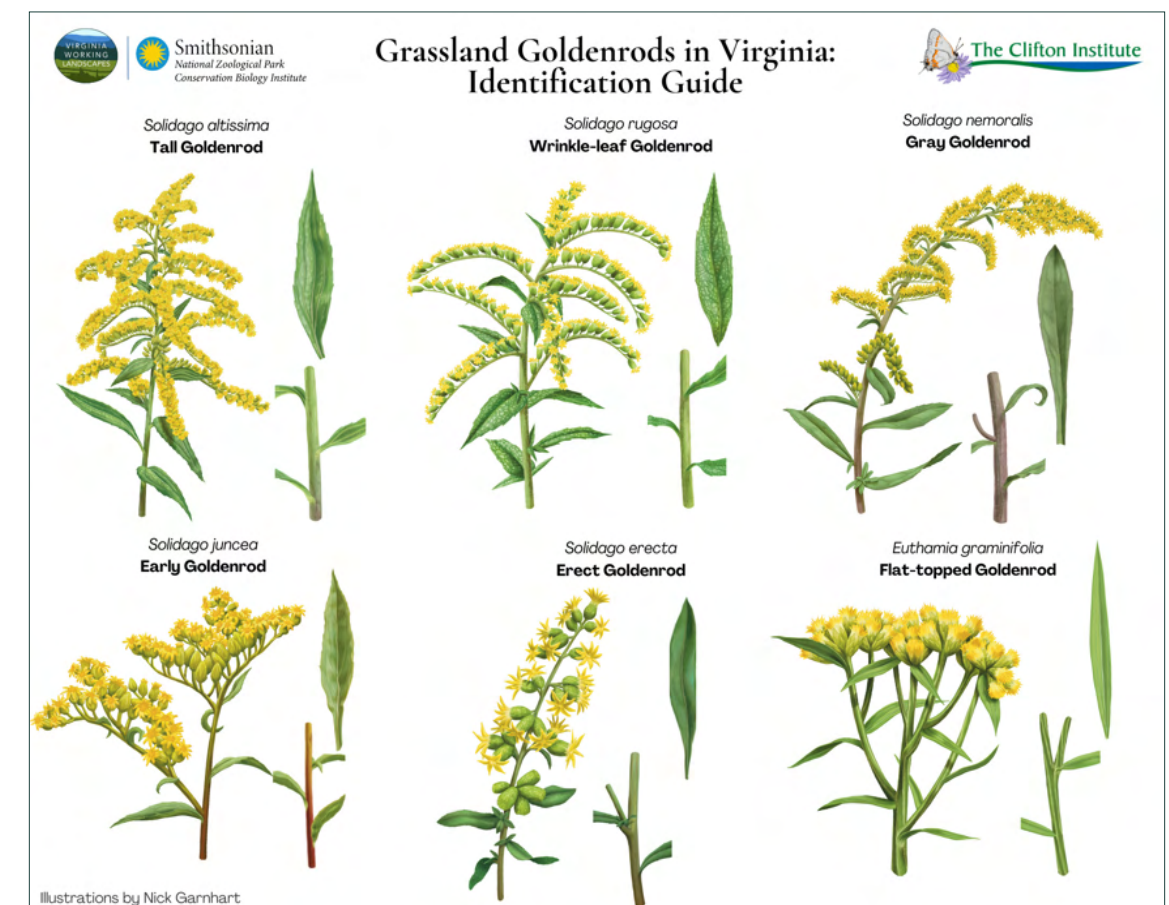
Resources



In 2024, VWL staff collaboratively produced **seven** new educational resources, including guides for nest boxes to support cavity-nesting birds, best management practices for grassland-nesting birds, and plant identification guides. These resources, illustrated by VWL’s Nick Garnhart, were created to ignite curiosity about the natural world around us, portray challenging concepts in easy-to-understand visuals, and inspire meaningful conservation action.



See all VWL Resources here!



www.vaworkinglandscapes.org/education/resources/

Donor Acknowledgements

Karen Allen
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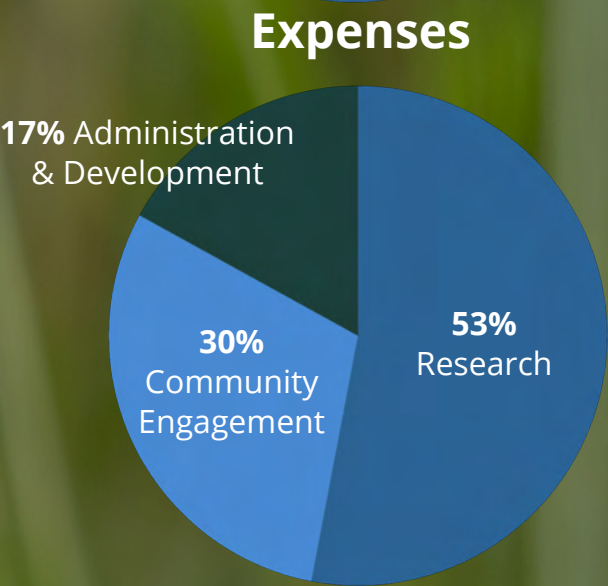
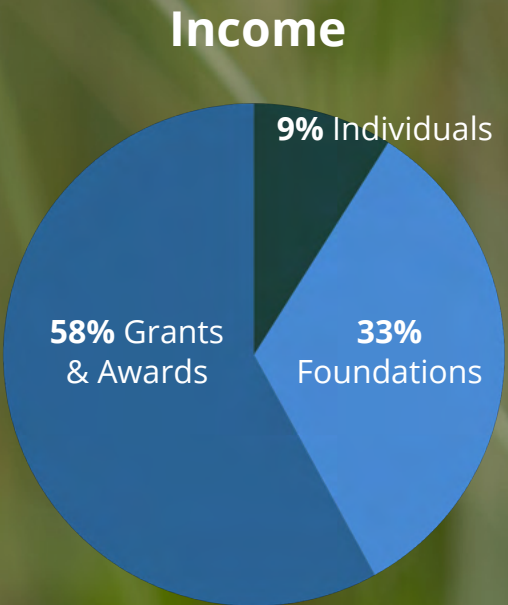
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Conservation Ecology Center, NZCBI
George Mason University
Migratory Bird Center, NZCBI
Migratory Connectivity Project
Movement of Life Initiative, NZCBI

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University of Virginia
Virginia Department of Wildlife Resources
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Virginia Native Plant Society
Virginia Tech

2024 Finances

2024 Operating Budget: \$907,082



100%
of VWL funds come from grants, donations, and community support.

Together we can conserve Virginia's diverse wildlife and beautiful landscapes. To donate to VWL, visit: www.vaworkinglandscapes.org/donate

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