

CONSERVE

VOLUME LVXIV • SUMMER/FALL 2022

Climate Change And Our Work

Western Pennsylvania
Conservancy



water, land, life.

CONTENTS

3	Understanding Climate Change and How You Can Help
6	Protecting Local Land in a Changing Climate
8	Fallingwater: Building Resilience in the Face of a Changing Climate
10	MAP: How Climate Change Affects Some of PA's Special Habitats and Rare Species
12	40 Years of Science Data Helps Now and Into the Future
13	Educational Partnership Sparks Dialogue, Connections and Hope Around Climate Change
14	Green Infrastructure: Acting Locally to Mitigate Stormwater's Effects
16	Helping Waterways and Watersheds Be Climate Change Resilient
18	Harnessing the Power of the Sun at Fallingwater
19	Field Notes: The Conservancy's Forests and Climate Change
20	Make An Impact With Your IRA

Cover Photo: View of Confluence, Pa., and the Casselman River from WPC's Joshua C. Whetzel, Jr. Memorial Recreation Area in Somerset County

For information on WPC, Fallingwater and memberships:

412-288-2777
Toll Free: 1-866-564-6972
info@paconserve.org
WaterLandLife.org
Fallingwater.org



The Western Pennsylvania Conservancy protects and restores exceptional places to provide our region with clean waters and healthy forests, wildlife and natural areas for the benefit of present and future generations. To date, the Conservancy has permanently protected more than 264,000 acres of natural lands. The Conservancy also creates green spaces and gardens, contributing to the vitality of our cities and towns, and preserves Fallingwater, a symbol of people living in harmony with nature.

Western Pennsylvania
Conservancy



Message from the President



This issue of *Conserve* is dedicated to the Western Pennsylvania Conservancy's work on climate change across our various programs. Because of the paramount importance of the issue of climate change, each of our programs works on climate change in a number of ways.

In our natural heritage program, we identify the species that are most at risk from climate change, and study them and their evolving habitats. These include edge of range species, which may not do as well at the warmer edges of their ranges as climate warms overall.

Our conservation science and natural heritage staff identify the locations where certain geophysical settings need to be protected as climate warms.

They also identify corridors for protection in light of climate change. They identify which areas may offer the strongest resilience. And they are looking at which properties have the most potential for carbon sequestration.

Our watershed staff does riparian tree plantings on a large scale. Planting trees along the edges of our rivers and streams helps to keep the streams cooler over time. And our watershed experts work on removing dams and replacing culverts with larger ones so that water and species can better pass through, allowing freer movement toward habitat locations with appropriate temperatures.

Our land conservation staff works to protect properties with resilience, which form key connections, and with geophysical settings that need to be protected in the future. And our stewardship staff works on forest protection and sustainable forest management. The role of large protected forests in addressing climate change is paramount.

Our community forestry staff works on plantings in our communities. Whether in larger forests or on urban streets, trees have a role in carbon storage, shading, cooling and stormwater management.

Climate change work is just one aspect of the work of our different programs, but the study and projects done in this direction are an ever more important part of the Conservancy's work. Our newly adopted strategic plan captures this emphasis on climate, ecosystems and resilience over time as an important part of our work.

Thank you for all you do to support our work. Protecting our forests, our corridors for wildlife, our rivers and streams, and our most vulnerable species wouldn't be possible without the support of all of you. We hope that you enjoy this issue of *Conserve*. Many thanks for all you do to help the work of the Western Pennsylvania Conservancy.

Thomas D. Saunders
PRESIDENT AND CEO

OFFICERS

Carolyn Rizza
Debra H. Dermody
Daniel S. Nydick
Bala Kumar

Chair
Vice Chair
Treasurer
Secretary

BOARD OF DIRECTORS

David Barenfeld
Franklin Blackstone, Jr.*
Barbara Bott
E. Michael Boyle
Geoffrey P. Dunn
Beverlynn Elliott
Donna J. Fisher
Susan Fitzsimmons
Paula Foradora

Dan B. Frankel
Dennis Fredericks
Felix G. Fukui
Caryle R. Glosser
Carolyn Hendricks
Candace Hillyard
Robert T. McDowell
Paul J. Mooney
Stephen G. Robinson

Samuel H. Smith
Alexander C. Speyer III
K. William Stout
Megan Turnbull
Joshua C. Whetzel III
Gina Winstead

*Emeritus Director



Some of the trees in WPC's Old Growth Beech-Maple Forest at Tryon-Weber Woods Natural Area in Crawford County are 100 feet tall and at least 90 to 120 years old.

Understanding Climate Change
And How You Can Help

EXTREME AND FREQUENT WEATHER EVENTS, INCLUDING FLOODING, DROUGHT, HEATWAVES AND WILDFIRES, CONTINUE TO DOMINATE HEADLINES AS SOME OF THE MOST DAMAGING EFFECTS OF CLIMATE CHANGE. CLIMATE CHANGE IS MAKING WEATHER PATTERNS MORE ERRATIC AND ALSO CAUSING THE OCEANS TO WARM, POLAR ICE TO MELT, CORAL REEF TO DECLINE AND SEA LEVELS TO RISE, AND ALL OF THESE CONSEQUENCES IMPACT HUMANS, PLANTS AND ANIMALS IN VARIOUS WAYS.

According to the United Nations Intergovernmental Panel on Climate Change, these negative effects of climate change are increasing at a much faster pace than what scientists predicted less than a decade ago. And they are occurring mainly because of the burning of fossil fuels; coal, oil and natural gas are examples of fossil fuels, which contain carbon and are found in Earth's crust from decomposing plants and animals. The burning of these fuels has increased the concentration of greenhouse gases such as carbon dioxide (CO2) accumulating in our atmosphere. This includes emissions from power plants, trains, trucks, cars and airplanes. In May 2022, the National Oceanic and Atmospheric Administration

(NOAA), measured CO2 at 421 parts per million in the atmosphere, an increase of 1.8 ppm over 2021.

Naturally occurring CO2 and other greenhouse gases—water vapor, methane, nitrous oxide and ozone—eventually dissipate over time. But, human activity produces greenhouse gasses more rapidly and in abundance. The accumulation and trapping of these gases are the primary reasons why the atmosphere is more volatile. Weather is more extreme and our climate, defined as the weather conditions—temperature, air pressure, humidity, wind, precipitation and sunshine—of a region over a period of time, is changing.

A June 2022 NOAA article, "Climate Change: Global Temperature," states that Earth's temperature, which is on average approximately 57 degrees Fahrenheit (13.9 degrees Celsius), has risen on average by 0.14 degrees Fahrenheit per decade since 1880, but the rate of warming since 1981 is more than twice that: 0.32 degrees Fahrenheit per decade. And based on NOAA's temperature data, the nine years from 2013 to 2021, rank among the 10 warmest years on record, with 2021 as the sixth warmest.



Volunteers plant trees along Catfish Run in Allegheny County.

That extra heat, says NOAA, is driving regional and seasonal temperature extremes and changing habitat ranges for plants and animals—expanding some and shrinking others. Over centuries, very slow changes in weather patterns have allowed species to adapt and move within different habitats over many generations.

“There’s considerable data and tangible evidence now that the rate at which the planet is warming is concerning and unrefutably getting worse,” says Charles Bier, senior director of conservation science for the Conservancy.

“There are weather patterns that are strange and different for Pennsylvania due to more water in the atmosphere and an unstable jet stream of fast-moving bands of wind. But it’s not too late for us to understand these impacts and work now to mitigate the effects of our changing climate to our region’s biodiversity,” explains Charles, who helps lead our work to continue understanding climate effects on local plant and animal communities.

Our science staff, which includes scientists who are part of the Pennsylvania Natural Heritage Program, are actively studying climate change’s impacts to Pennsylvania’s plants and animal habitats. One assessment tool, the Climate Change Vulnerability Index, examines the exposure and sensitivity of nearly 100 plant and animal species to risk factors associated with climate change. For example, our state amphibian, the imperiled and

vulnerable Eastern hellbender, a salamander that has been studied extensively by the Conservancy’s aquatic science team, is projected to decrease in numbers or disappear by 2050 due to rising water temperatures and associated decrease in dissolved oxygen within its limited habitat range.

“Our work is necessary to help prevent some of our native species from possibly going extinct in Pennsylvania, especially the rare species that depend on specific natural habitats,” Charles explains.

“The monitoring and assessment work the Conservancy has done will help the most vulnerable species. We are taking some necessary steps now before it’s too late,” Charles adds.

Trees and Forests Capture Carbon Dioxide

Not only do our region’s trees and dense forests provide beauty and wildlife habitat and serve as an important part of our economy, they also help capture and store a significant amount atmospheric CO2. But the state’s forests and forest ecosystems are being stressed by climate change. For example, our state tree, the Eastern hemlock, is under attack by hemlock wooly adelgid, an invasive insect that is killing it. The spread of HWA is thought to be aided by climate change.

One of the key climate action strategies in the 2021 Pennsylvania Climate Action Plan is to protect forests so that they remain forests. And when forest systems stay intact, the entire ecosystem, including

“Our work is necessary to help prevent some of our native species from possibly going extinct in Pennsylvania, especially the rare species that depend on specific natural habitats.” — Charles Bier

headwater streams, plants and animals, continue to become more resilient against climate adversities.

Since the 1950s, the Conservancy has protected and conveyed more than 200,000 acres of forestland to the state for public use. In addition, forests cover most of the 14,000 acres we own and manage on 41 nature preserves that are open and accessible to the public.

Forests also slow and filter significant amounts of stormwater before it enters rivers and streams, and tree leaves form canopies that block direct sunlight, shading and cooling land and water. Trees capture and use CO2 when they perform photosynthesis. When a tree pulls CO2 out of the air, the gas combines with water and sunlight to make sugar, and during this food-making process, oxygen is released helping to clear the air. One mature tree can absorb approximately 48 pounds of CO2 a year. Trees also release CO2, though slowly, through decomposition. This makes trees and forests essential in the fight against climate change.

Individual or small clusters of trees located outside of forests make a difference, too. Across the region in cities and towns, over the past decade, we have planted more than 105,000 trees in parks, on neighborhood streets and along community trails and rural rivers and streams over the past decade.

“I enjoy sharing the many important benefits of trees with our volunteers,” says Alicia Wehrle, a community forestry project coordinator who organizes the Conservancy’s volunteer tree planting and tree care events in cities and towns. The Conservancy plants some of its street trees and green spaces in communities across the region that have limited tree canopy and may be considered heat

deserts or places susceptible to flooding.

“Anyone who wants to make a difference related to climate change, can volunteer with the us and plant a tree. Trees make a difference in our environment in so many ways, but as heatwaves and flooding events become more intense, trees are certainly one of nature’s best tools to have in our climate change toolkit,” she adds. WPC’s volunteer tree-planting events take place in urban and rural settings as well.

Our Work Is Making a Difference

Many aspects of the Conservancy’s past and current work will have long-term importance in the fight against climate change thanks to decades of conservation science, forest protection and water conservation work across Western Pennsylvania.

We believe it is essential to continue assessing, protecting and restoring the region’s rich and varied diversity of plant and animal life to help ensure that Western Pennsylvania’s most vulnerable species and habitats have the best chances to move and survive in the habitats of the future.

In this issue of *Conserve*, you’ll learn more about current work and past projects the Conservancy has led or done in partnership with other agencies to help address climate change in our region.

With so much information in the news today about climate change, we hope these articles and the information available on our website at **[WaterLandLife.org/ClimateChange](https://www.waterlandlife.org/ClimateChange)** provide perspective and insights into how the Conservancy is focusing those efforts. 🌱

A unique ecosystem of rare plant species, shale barrens, located only in Southcentral Pennsylvania, is a dry, rugged and rocky habitat type with several species that will be vulnerable to climate change as Pennsylvania becomes warmer and wetter.



Mussels, important freshwater species that filter and clean local rivers and streams, may be among the first species affected by climate change as water temperatures rise and flooding events intensify.



PROTECTING LOCAL LAND

IN A CHANGING CLIMATE

Matt Marusiak, land protection manager and stewardship coordinator at the Conservancy, is pictured at WPC's Bennett Branch Forest, which will soon help private landowners better understand carbon sequestration.

THE CONSERVANCY'S LAND PROTECTION WORK BEGAN IN THE MID-1940S WITH THE PERMANENT PROTECTION OF 1,000 ACRES OF THE SLIPPERY ROCK GORGE AND HISTORIC GRISTMILL IN LAWRENCE COUNTY. THOSE PROTECTION EFFORTS ESTABLISHED MCCONNELLS MILL STATE PARK MORE THAN 75 YEARS AGO, SAFEGUARDING THE GORGE, NOW A NATIONAL NATURAL LANDMARK, AND THE LAND'S DRAMATIC VIEWS AND TOPOGRAPHY FOR FUTURE GENERATIONS.

Since that first major land conservation project, we have protected more than 264,000 acres of natural lands, most of which have been conveyed as public land for state parks, forests and game lands. We also own 14,000 acres with wildlife habitats, wetlands, forests and waterways that are managed as nature preserves open for public enjoyment.

All these protected acres continue to safeguard wildlife and aquatic habitats, and help keep large patches of contiguous

oak, northern hardwood and other forests intact. As our land protection work continues, Conservancy staff are also examining new concepts in prioritizing land conservation projects in the face of climate change.

"In some ways our land protection work will remain the same," says Shaun Fenlon, vice president of land conservation at the Conservancy. "Continuing to use science and research as our guide, we have already been prioritizing protecting forests and land that hosts rivers, streams and important habitats. But climate change is now dictating and further prioritizing which landscapes and habitat types will need further protection considerations, including connections to other protected lands."

Before protecting a new property, Conservancy staff also use conservation science mapping and scoring. Staff assesses the geophysical setting of species' habitats, meaning the dominant geologic bedrock that underlies an area, such as limestone or other calcareous geology. We also consider a property's resilience to changes in climate by looking at the diversity in topography and other factors that create a large variety of habitats. We are also now gaining the ability to assess a property's potential for carbon sequestration.

For example, habitat connectivity is an important consideration to ensure that plant and animal species have pathways, through connected habitats, to move to more temperate and tolerable environments as the climate changes.

"To safeguard our natural forests and rare habitats, our land protection work remains vital and will continue to be one of the ways that the Conservancy responds to climate change." — Shaun Fenlon

Our Pennsylvania Natural Heritage Program scientists concluded a study in 2020 for the Department of Conservation and Natural Resources that helped identify and map areas where the movement of species would benefit from connected landscapes. This study investigated the entire state of Pennsylvania and analyzed the most important habitats and the most functional connections between those habitats. Our team examined the ecological characteristics of the habitats that will allow species to move, over time, to maintain healthy populations that can escape climate conditions that become unsuitable. This habitat connectivity work is helping to inform our land protection priorities and conservation actions across the state.

Targeting lands for vulnerable species will become more and more important, too. For example, the bog copper butterfly, a species at risk in Pennsylvania, is among the flying insect species that will serve as indicators of how climate change is impacting its sensitive habitat.

From caterpillar to adulthood, the bog copper feeds exclusively on cranberry plants located in acid bogs or other wetland habitats in cooler, northern parts of the state. If these habitats warm too quickly and if no other suitable habitat is available to which the butterfly can move, it could mean extinction of the species in the state.

"That is a good example of why habitat protection of particular

geophysical setting types is so vital to the future of biodiversity in Pennsylvania," says Charles Bier, senior director of conservation science at the Conservancy. "We have to acknowledge that alterations and shifts in species' ranges is inevitable. So, now more than ever we must consider specific habitats and ecosystems when protecting land, as it's one of our best options to help species become more resilient. We are also finding that, due to the stresses of a changing climate, we need to work bigger and faster, and find more support to do the work."

In addition to insects, various plants and animals, including rare bog sedges, freshwater mussels and black spruce, are susceptible to damage from flooding and disease, and will need the same level of conservation science considerations.

Forests are important natural areas that vary in composition and quality, and host many of the state's natural heritage areas of rare, threatened or endangered species. Large forests also help offset other effects of climate change, including carbon dioxide (CO2) sequestration, stormwater capture and filtering and cooling sensitive rivers and streams. In addition to the trees, the forests' soil also captures CO2.

The Conservancy has a history of protecting large intact forests, including the 14,000 acres of forestland we currently own and manage. The mixed hardwood forest and hemlock stands that make up the more than 1,400 acres of the Conservancy's Bennett Branch Forest in Clearfield and Elk counties are part

of these large tracts of connected forests in Northcentral Pennsylvania.

In addition, we will be using our Bennett Branch Forest to help private forest landowners learn about carbon capture. Through a new initiative, funded in part by the Open Space Institute and the Land Trust Alliance, the forest will be used as a demonstration and education landscape to teach landowners sustainable forestry techniques for carbon capture and storage. This effort, says Charles, will hopefully become another example of addressing climate change mitigation for forest landowners across Pennsylvania.

Many large state forests have benefited from our protection work over the years as well. For example, in 2015, we conserved more than 17,000 acres of forestland in McKean County, which was added to Elk State Forest.

As part of the Conservancy's 2022-2025 Strategic Plan, our land protection managers will continue employing climate change science and strategies to help prioritize and refine future protection opportunities for the region.

"To safeguard our natural forests and rare habitats, our land protection work remains vital and will continue to be one of the ways that the Conservancy responds to climate change," says Shaun. "As conservation science and planning for climate change evolves, we must continue to, too." 🌱



FALLINGWATER:

Building Resilience in the Face of a Changing Climate

Thanks to private donations and a matching Keystone Historic Preservation Grant from the Pennsylvania Historical and Museum Commission, in 2021 the team reinforced the nonstructural cracks in the bolsters that support the house's cantilevers with state-of-the-art fiber mesh. At the car bridge, which was suffering from irreparable concrete degradation, they removed and reconstructed the walls.

THE PHRASE “SUSTAINABLE ARCHITECTURE” MIGHT SOUND LIKE JARGON BORN OF THE ENVIRONMENTAL MOVEMENT AND AWARENESS OF THE CLIMATE CRISIS, BUT FRANK LLOYD WRIGHT WAS PRACTICING SUSTAINABLE DESIGN LONG BEFORE THE IDEA REIGNITED IN THE 1970S. IN THE EARLY 20TH CENTURY, HE ADDRESSED CONCERNS ABOUT ENERGY CONSUMPTION IN HIS DESIGN OF SMALL, ONE-STORY USONIAN HOUSES, AND BY USING SUCH TECHNIQUES AS INCORPORATING SUNLIGHT AND WIND TO HEAT AND COOL HOMES.

At Fallingwater, Wright blended the landscape, waterfall, windows, terraces and even furnishings into a unified composition. The hatch, which allows cool air to flow upstairs from the stream, is just one example of how he designed the house to work in tandem with its surroundings. Fallingwater remains an example of organic architecture, a symbol of harmony between people and nature.

But Wright's design, though visionary, was not perfect. The water that marries the house to the landscape is also its worst enemy. A house with flat roofs, built over a waterfall in the woods of southwestern Pennsylvania, will leak. Steel window frames corrode, paint peels, mortar cracks. Preserving

Wright's vision carries responsibilities, and preserving organic architecture in the face of increasingly severe weather events and varying seasonal temperatures presents challenges.

“We're just beginning to fully understand the effects of climate change on building preservation,” says Conservancy Vice President and Director of Fallingwater Justin Gunther. “As a strategic initiative, we'll build a sustainability blueprint with measurable goals that begin addressing issues related to long-term operational and environmental sustainability.”

To better prepare the house for the effects of weather and changing climate, Justin says, “The Fallingwater preservation team uses up-to-date technology and materials to address the major building systems, including repairing masonry, waterproofing roofs and terraces and repairing steel window frames.”

It's not just the house and infrastructure that require attention. “Controlling invasive species on the landscape is an ongoing effort,” Justin says. “Wright was inspired by the landscape to create Fallingwater, so we need to preserve the existing biodiversity.”

As invasive plant and animal species encroach on the forest, the landscape will be a different one than inspired the site. “The better we can preserve the health of the forest and stream, the

more we can preserve the integrity of Wright's vision and work and protect the site from the changing frequency and intensity of weather conditions.”

Although much of the preservation work is reparative, Justin says other work has been proactive. “We've been forward-thinking in terms of green practices and have accomplished a number of initiatives that help us get to sustainable operations.”

The list of sustainable practices at Fallingwater is long and ranges from things as simple as eliminating foam containers in the Fallingwater Café and providing recycling receptacles across the site to those as extensive as installing a solar panel array in the meadow (see page 18) and establishing an on-site sewage treatment plant that provides recycled water for the Barn and Visitor Center.

Some considerations for implementing green practices include installing UV-filtering glass in selected areas of the Visitor Center (the house and guest house already have it), making windows safer to reduce bird collisions and exploring the possibility of adding a green roof on the Visitor Center and at High Meadow. “We're working toward building resilience at Fallingwater,” Justin says.

Education is an important component of Fallingwater's mission. The point of Fallingwater is living in harmony with



Staff and volunteers regularly remove invasive plant species and replace them with native species, and treat hemlocks to combat hemlock woolly adelgid in an effort to support native ecosystems.

Some of Fallingwater's Green Practices

- The Barn at Fallingwater received LEED silver certification in 2006 following extensive renovations.
- Redesigned parking areas use less paving, and strategically located plantings and bioswales in and around parking lots control stormwater runoff.
- Employee parking lots have electric car charging stations; the visitor lot will soon have the same.
- The Fallingwater Café is Green Restaurant Certified and uses only chemicals deemed environmentally friendly by the Green Restaurant Association. Green cleaning products are used across the site.
- The Café sources much of its food locally. In the Fallingwater Museum Store, visitors can purchase locally produced T-shirts, pottery, glass items and more.

nature, and the education team is thinking about how to frame that concept in its educational components, such as through Fallingwater Institute offerings. In the works for next year is a professional development program for those working in horticulture and landscape preservation, and a series of convenings to explore topics around climate change that impact sites like Fallingwater.

Justin says, “How do we best educate the general public about lessons we've learned here and how they can translate these lessons into caring for their own homes and landscapes?” Just as Wright pondered the problem a century ago, Justin continues, “Humans need to look at how we can build our homes to be more sensitive to nature and respond to a changing climate.” 🌿

How Climate Change Affects Some of Our Special Habitats and Rare Species

- EC Ecosystem Characteristics
- CC Climate Change's Potential Effects on Habitats and Species
- VS Examples of Species in This Habitat That Are Vulnerable to Climate Change
- WPC What WPC is Doing to Help

Northern Tier Forests

EC Most common forest habitat in this region of PA: dry oak-heath, oak-mixed hardwood, northern hardwood and hemlock-northern hardwood. Offer opportunity for many species to move to preferred habitat.

CC Plants and some animals will move more slowly to a preferred habitat. Mobile species, such as birds, can choose suitable spots throughout the forest (either in or beyond PA) for nesting each year.

VS Cerulean warbler • Scarlet tanager • Black-throated green warbler

WPC Protecting land and forests, restoring forest habitat, studying habitat preferences of forest interior birds and analyzing habitat connectivity

Vernal Pools

EC Small seasonal pools often embedded in forests and woodlands that support a small ecosystem of unique species including, breeding amphibians and rare plants.

CC Linked to precipitation amounts/frequency and evaporation rates, they are very vulnerable to climate change. These and other species are dependent upon these pools and do not have an option to move. Some pools may become unsuitable or simply cease to exist.

VS Marbled salamander • Fairy shrimp • Northeastern bulrush

WPC Protecting land and forests, assessing habitat and working with landowners to steward vernal pools

Shale Barrens

EC Shale barrens are characterized by open woodlands, with steep slopes and shale bedrock with limited soil development. They are considered isolated habitats that are bound to the geology and erosional history of the site.

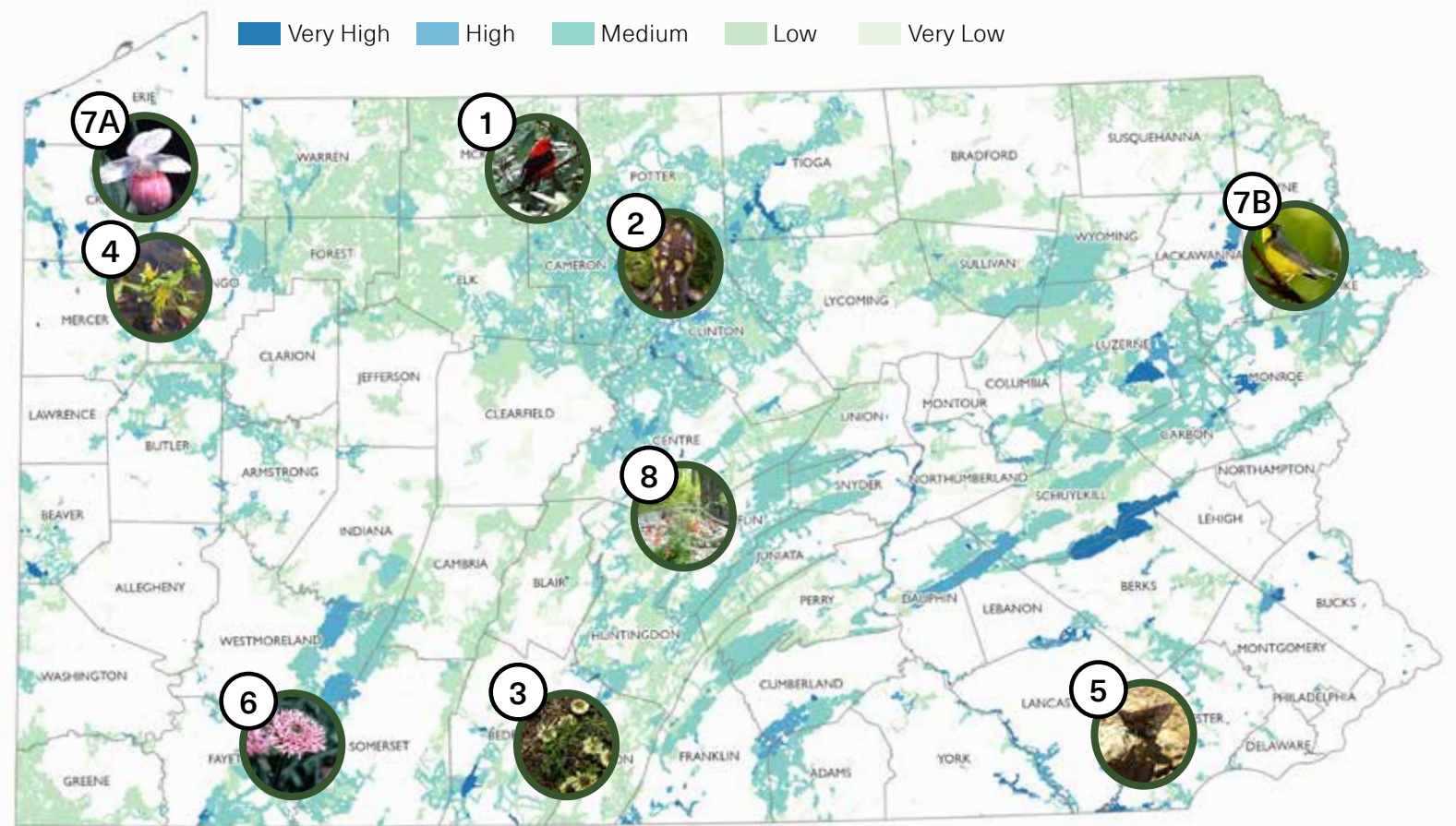
CC Species endemic to or associated with shale barrens have little opportunity to establish in new places.

VS Kate's mountain clover • Shale-barren evening primrose • Shale-barren ragwort

WPC Protecting land and analyzing habitat connectivity

This information provides a small glimpse into the potential conservation challenges related to climate change for a few of Pennsylvania's habitats and rare species. Through a variety of studies and efforts, Conservancy staff is studying habitat connectivity and loss, assessing species and addressing habitat and species resiliency. The content boxes bordering the map highlight a few of the places we are working—in some of our state's most special natural communities—and the climate change concerns for the habitat and the species that call them home.

This map of Pennsylvania is sourced from our "Priorities for Climate Change Connectivity in Pennsylvania" study, which prioritizes biodiversity conservation. The darker blue-green areas show priority conservation areas and corridors for connecting natural habitat through which species may be able to move to more preferred climates and conditions.



Glacial Lakes and the French Creek Watershed

EC Northwestern glacial lakes are fed by alkaline groundwater traveling through glacial sediments containing large amounts of limestone. One example is Lake Pleasant, which collects the headwaters of its small watershed and discharges into the ecologically diverse French Creek. The French Creek watershed provides habitat for rare and endangered species, numerous mussels, fish and other wildlife and unique plant communities

CC Even though glacial lakes are connected to their larger watersheds, they provide unique habitats not found in streams and rivers. So, many species found in the lakes will not be able to readily populate other habitats.

VS Beck's-water marigold • Blackchin shiner • Eastern hellbender

WPC Protecting and restoring land, restoring headwater streams, assessing rare species and conducting aquatic habitat surveys

Serpentine Barrens

EC Found only in southeastern Pennsylvania, these barrens are dry, open habitats that contain numerous minerals in thin poor soils that create a chemically challenging environment for plants to grow. However, prescribed burns and grazing have kept these communities viable and able to support a whole series of rare plants.

CC They will always be unique habitats supporting rare plants, but changes, including in precipitation, may alter their habitat composition. Some species could fare better in serpentine areas in states north of PA if habitat here becomes unsuitable.

VS Dusted skipper • Serpentine aster • Round-leaved fame flower

WPC Managing invasives and assessing rare species



River Scour

EC The edges of some major rivers are often scoured by fast-moving flood waters and ice, leaving large bedrock flats or cobble beaches. With little competition from other plants and minimal soil, they support several rare species.

CC Scour species could disappear from their current habitat. However, because rivers span hundreds of miles, they could establish in new locations where scour exists.

VS Monongahela Barbara's buttons • Carolina tassel-rue • Linear-leaved aster

WPC Protecting land with riparian buffers, restoring and studying rare species



Peatlands – Bogs and Fens

EC Peatland ecosystems characterized by saturated organic soils and large amounts of undecomposed to partially decomposed organic matter. Bogs are acidic wetlands that have deep acidic organic soils fed by rainwater found largely in glaciated regions, particularly in northeastern Pennsylvania. Fens, typical of northwestern Pennsylvania, are peatlands fed by

alkaline groundwater flowing through limestone geology, supplying habitat for many rare species.

CC Peatlands exist due to a unique combination of landscape position, soils and hydrology. Peatland-dependent plant species will have little chance of migrating to another location in the region.

VS Showy lady's-slipper (7A) • Yellow-bellied flycatcher (7B) • Black spruce

WPC Restoring wetland habitat, assessing rare species and monitoring for climate change effects



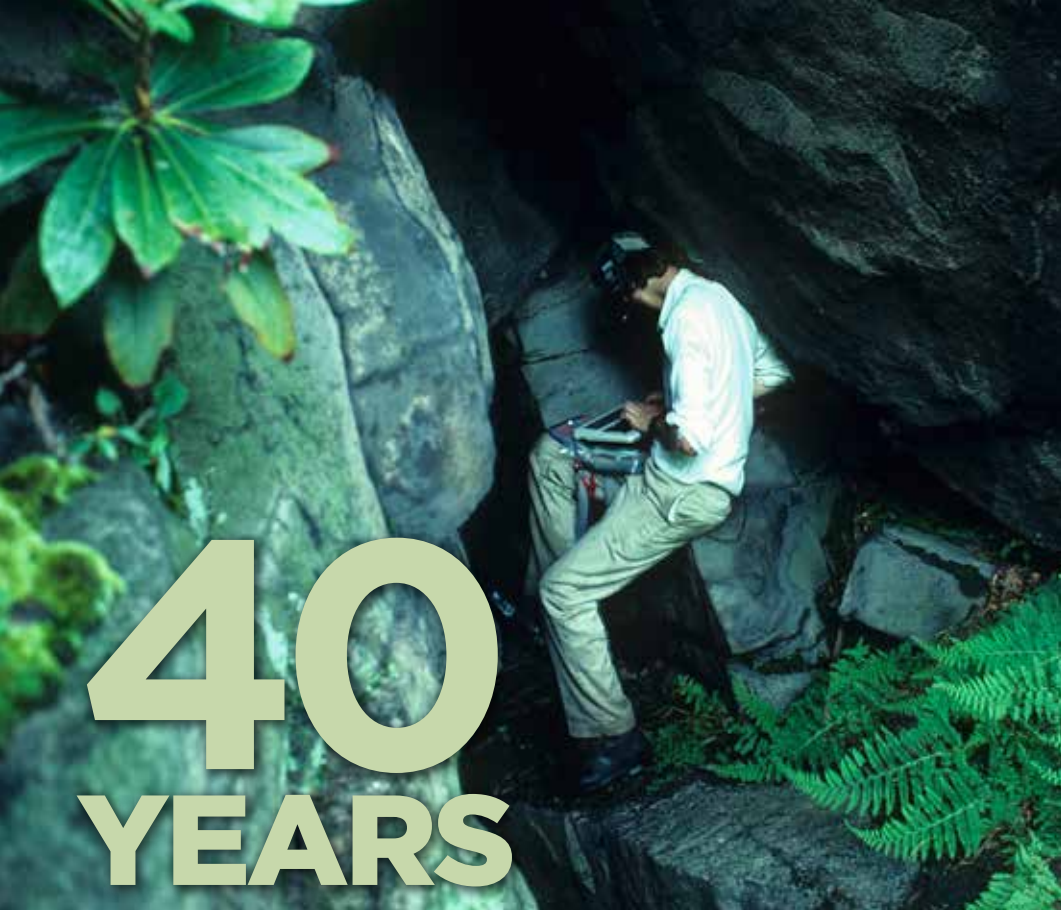
Limestone Habitats

EC Calcium-rich limestone environments include grasslands, fens and woodlands that exist in small, open patches and host various species. 10% of PA has limestone bedrock, found mostly in the ridge and valley regions of the state, where 200 rare native plant species can grow nowhere else.

CC Limited habitat and connectivity afford little opportunity for species dependent on limestone habitat to establish in new places.

VS Wild columbine • Wild limestone petunia • Yellow lady's-slipper

WPC Protecting and restoring land, assessing rare species and habitat connectivity, providing focused stewardship



Charles Bier, one of the original staff of scientists at PNHP, is photographed in 1987 on a rock outcrop above Dunbar Creek on Chestnut Ridge at State Game Lands #51 in Fayette County.

of Science Data Helps Now and INTO THE FUTURE

FORTY YEARS AGO, WHEN THE PENNSYLVANIA NATURAL HERITAGE PROGRAM WAS FOUNDED, CHARLES BIER, NOW THE WESTERN PENNSYLVANIA CONSERVANCY'S SENIOR DIRECTOR OF CONSERVATION SCIENCE, WAS ONE OF THE ORIGINAL STAFF OF SCIENTISTS.

"I wore many hats back then and worked as a botanist, zoologist and ecologist," Charles recalls. "We were young scientists just trying to understand and assess the flora and fauna of Pennsylvania and document as much of it as possible."

Since then, PNHP has evolved, along with its many projects and the data it manages. PNHP is a science-based partnership of staff from the Department of Conservation and Natural Resources' Conservation Science and Ecological Resources Division, PA Fish and Boat Commission's Biodiversity Section, PA Game Commission's Wildlife Diversity and Habitat Protection Sections, and the Conservancy's natural heritage program.

Through this partnership, scientists collaborate to provide information, expertise and assistance to support the

conservation of the state's biodiversity, ecosystems and natural plant and animal communities. We accomplish this work by documenting and assessing the state's rare, threatened and endangered wildlife species and their habitats, and establishing natural heritage areas, which are natural places that harbor rare species and important biodiversity. There are nearly 4,000 NHAs across the state.

"The collection of this data goes back four decades and is still being used today to help inform both development and conservation decisions, and informing how we work to identify vulnerable species likely to be threatened by climate change," says Jeff Wagner, who has been the director of PNHP for the past 10 years.

"The information we continue to collect helps to conserve species and can assist in tracking changes over time," says Jeff. The Conservancy's Heritage staff have the primary responsibility of managing and providing data and information for PNHP digital tracking tools and other conservation-focused products.

One of those tools is the Climate Change Vulnerability Index, a tool developed by NatureServe, to which PNHP staff contribute biodiversity

data and analysis to help inform conservation actions. The CCVI uses factors related to exposure, sensitivity and adaptive capacity to calculate a climate change vulnerability rank—from extremely vulnerable to insufficient evidence.

More than 100 plants and animals have been examined using the CCVI tool. An ongoing project is underway focusing on approximately 40 plant species that are mostly found at the extent of their northern or southern habitat range in Pennsylvania. There are some general vulnerability patterns emerging from this work that will continue to be tracked over time. The work will help inform land conservation, corridor connectivity and land management decisions related to climate change.

"We know it is likely that the state's plants, animals and landscapes will be altered by climate change, so these tools and our longstanding work will provide baseline and historical data to more effectively track pending changes as they arise," Jeff adds. 🌱



Through 15 focal points, "We Are Nature" highlights the connections between humans and the rest of nature. Visitors are invited to share hopes and fears for the future, transform relationships with the living world and learn how to work for a healthier, more equitable planet. Conservancy staff participated in the ongoing CRSP collaboration and their work was highlighted in online resources.



A placard in the "We Are Nature" exhibit features information about the Conservancy and a quote by Eric Chapman, director of aquatic science for the Conservancy, about the importance of connecting with nature.

Educational Partnership Sparks Dialogue, Connections and Hope Around Climate Change

"WE ARE NOT SEPARATE FROM NATURE. WE ARE NATURE," PROCLAIMS THE SUBHEADING OF THE "WE ARE NATURE: A NEW NATURAL HISTORY" EXHIBITION AT THE CARNEGIE MUSEUM OF NATURAL HISTORY. THE EXHIBITION IS SIMULTANEOUSLY HUMBLING AND HOPEFUL, INTROSPECTIVE AND INSPIRATIONAL. VISITORS ARE REMINDED OF HUMANS' WONDEROUS YET BRIEF EXISTENCE, THEIR INCREASINGLY DETRIMENTAL EFFECTS ON THE PLANET AND THEIR INCREDIBLE ABILITY TO HEAL THEIR ONLY HOME.

The exhibit shares the work of several conservation organizations working to address climate change in our region, including the Western Pennsylvania Conservancy, that participated in the Climate and Rural Systems Partnership (CRSP). A three-year project, CRSP was developed in 2018 by Carnegie Museum of Natural History and the University of Pittsburgh's Center for Learning in Out of School Environments, and funded by the National Science Foundation, with the goal of fostering community connections in rural areas to have open, science-based discussions about climate issues facing our region.

Although climate change impacts the world and nature broadly, not every person has the same experiences. CRSP participants, including scientists, artists, educators and community leaders, talked with people in rural communities to understand their perceptions about climate change. Concerns ranged from trout populations and the ski season to the food supply and flooding. The responses guided CRSP organizations in addressing climate change with rural residents in a way that is relevant to their experiences and concerns.

The museum considered those discussions when creating pamphlets, blogs and story maps that anyone can use to launch dialogue about climate change. "CRSP offered a learning community that generated public education tools around local examples of climate change adaptation and mitigation strategies," says Conservancy Education Coordinator Danielle Forchette.

Conservancy Senior Director of Conservation Science Charles Bier emphasizes the importance of humans recognizing their relationship with and responsibility to nature. "In the last few decades we have been developing a more sustainable perspective driven by a new vision that we are part of nature," he says.

For example, in a "We Are Nature" blog interview, Eric Chapman, the Conservancy's director of aquatic science, explains one way in which humans have to come to terms with this responsibility: "We've built houses right up to the edge of streams. Three hundred years ago, those streams had access to their floodplain and could disperse their energy," Eric says. "But now there's nowhere for the water to go but up—and into houses."

In the story map "Brook Trout in a Warming World," readers navigate climate change from the perspective of a brook trout, an indicator species whose health reflects the health of its stream habitat. Slideshows depict the Laurel Highlands' history of deforestation and its effects on ecosystems. But the message is hopeful, and the reader is inspired by the efforts of organizations such as Trout Unlimited, the Pennsylvania Fish & Boat Commission and the Conservancy, all key actors in restoring Pennsylvania's brook trout habitat.

CRSP brought people of different experiences together to bring understanding around climate change. "We were able to build both our toolkit of climate communication skills," Danielle says, "as well as a sense of hopefulness that we can share with our communities."

For more information on the "We Are Nature" exhibition and CRSP, visit carnegiemnh.org. 🌱



**View Brook Trout in
a Warming World**

GREEN INFRASTRUCTURE

Acting Locally to Mitigate STORMWATER'S EFFECTS



Volunteers smile after successfully planting a tree in Pittsburgh's Manchester neighborhood.

Flooding in communities such as Millvale is stressing infrastructure, disrupting emergency services, damaging homes and businesses and causing missed school and work. Even indoor air quality suffers due to mold growth.

Stormwater runoff, created when rain falls on roads, driveways, parking lots, rooftops and other paved surfaces, aggravates flooding. It carries litter, animal waste, fertilizers, automotive fluids and other pollutants to rivers and streams, compromising drinking water, harming aquatic species and flooding low-lying communities.

Our Community Gardens and Greenspace team has worked with communities like Millvale and partner organizations, agencies and foundations to install natural stormwater management projects, also known as green infrastructure, across Allegheny County to battle stormwater runoff. Together we've planted 39,000 street and park trees to reduce stream erosion and water pollution, designed and installed three bioswales and two rain gardens (in addition to those in our community

gardens) to reduce water flow, and built three green parking lots using permeable pavement to absorb stormwater. We've also installed one tree trench, which absorbs stormwater using trees, native vegetation, rocks and underground stormwater drainage. In addition, our watershed conservation team has planted 60,000 riparian trees along streams and rivers on farmland and other properties, further reducing erosion and pollution.

Not everyone is equally impacted by climate change—age, race or ethnicity, income and other factors determine how climate change affects a person.

Conservancy Senior Director of Community Forestry and TreeVitalize Pittsburgh Jeff Bergman, who also leads WPC's Diversity and Inclusion Council, says, "We're investing resources in low-income, over-burdened communities that suffer a greater share than wealthier communities of pollution, health impairments, urban decay and the effects of climate change, among other stressors." Through community partnerships, we're empowering residents and connecting their concerns to benefits

A bioswale's rocks and native plants store, filter and slowly release stormwater, such as this one at Mt. Alvernia in Millvale, Allegheny County. Shallow depressions and slopes prevent ponding, and drains guide the water that the ground does not absorb.



that can come from tree plantings, green infrastructure for stormwater management, park improvements and greater access to recreational amenities.

For example, at meetings of the Girty's Run Watershed Management Plan, a collaborative effort of which the Conservancy is part, local residents voice concerns and posit ideas about how they act locally to address a global concern.

Bioswales

To help Millvale reduce stormwater runoff and flooding, in 2013 we completed two bioswales on the property of the Sisters of St. Francis Mount Alvernia as part of the Millvale TreeVitalize project. A 400-foot-long bioswale on Hawthorne Road intercepts water from an 11-acre tributary area. Another bioswale, near a parking lot, captures water from a 1.2-acre area. Together, they capture nearly 90 percent of rainfall on the acreage.



Stormwater flows off streets and sidewalks into the Larimer rain garden's basin, where the plant roots soak up the water. If the water gets above a certain level, an overflow capture slows the flow. A drain and plants in a second basin further slow the water. Remaining water is filtered by rocks before exiting the garden on the far side.

Funded by a grant from PennVest in 2012, "These bioswales were the largest green infrastructure facilities ever constructed in Allegheny County," Jeff says. "They were engineered and constructed with locally based firms and then monitored for their effectiveness."

Rain Garden Systems

In Pittsburgh's Larimer neighborhood, we installed a rain garden system in an existing community garden in partnership with Pittsburgh Public Schools and



Learn About Our Natural Stormwater Solutions

Pittsburgh Community Services. Nine native trees and 262 native perennial plants help mitigate stormwater from 1.5-inch storm events. During a ribbon cutting ceremony in July to celebrate the installation, a heavy downpour soaked many shoulders, but the system stood the test. Stormwater flowed into the garden's natural basin, where the thirsty roots of black-eyed Susans, cardinal flowers, iris and other colorful, sturdy plants soaked it up.

A 585-linear-foot garden bioswale in Pittsburgh's Hill District neighborhood intercepts 882,800 gallons of stormwater annually. We have expanded two existing community gardens to include stormwater mitigation and were recently awarded a \$25,000 grant from American Water for a rain garden project in Kittanning, Armstrong County.

"We depend on volunteers to care for the community gardens," says Art DeMeo, senior director of community greenspace projects. "Volunteering is not only vital to the sustainability of the project, it allows community members to be involved in the planning and implementation of beautiful, functional and revitalized greenspace."

Trees

Since 2008, nearly 39,000 street and park trees have been planted in 73 City of Pittsburgh neighborhoods and 57 municipalities in Allegheny County at no cost to residents through TreeVitalize Pittsburgh, of which we are managing

partner. A partnership of PA Department of Conservation and Natural Resources, City of Pittsburgh, Tree Pittsburgh and WPC, TreeVitalize Pittsburgh is generously supported by grants by various foundations and companies. (And since 2001, we've planted 60,000 riparian trees along streams and rivers on farms and other land.)

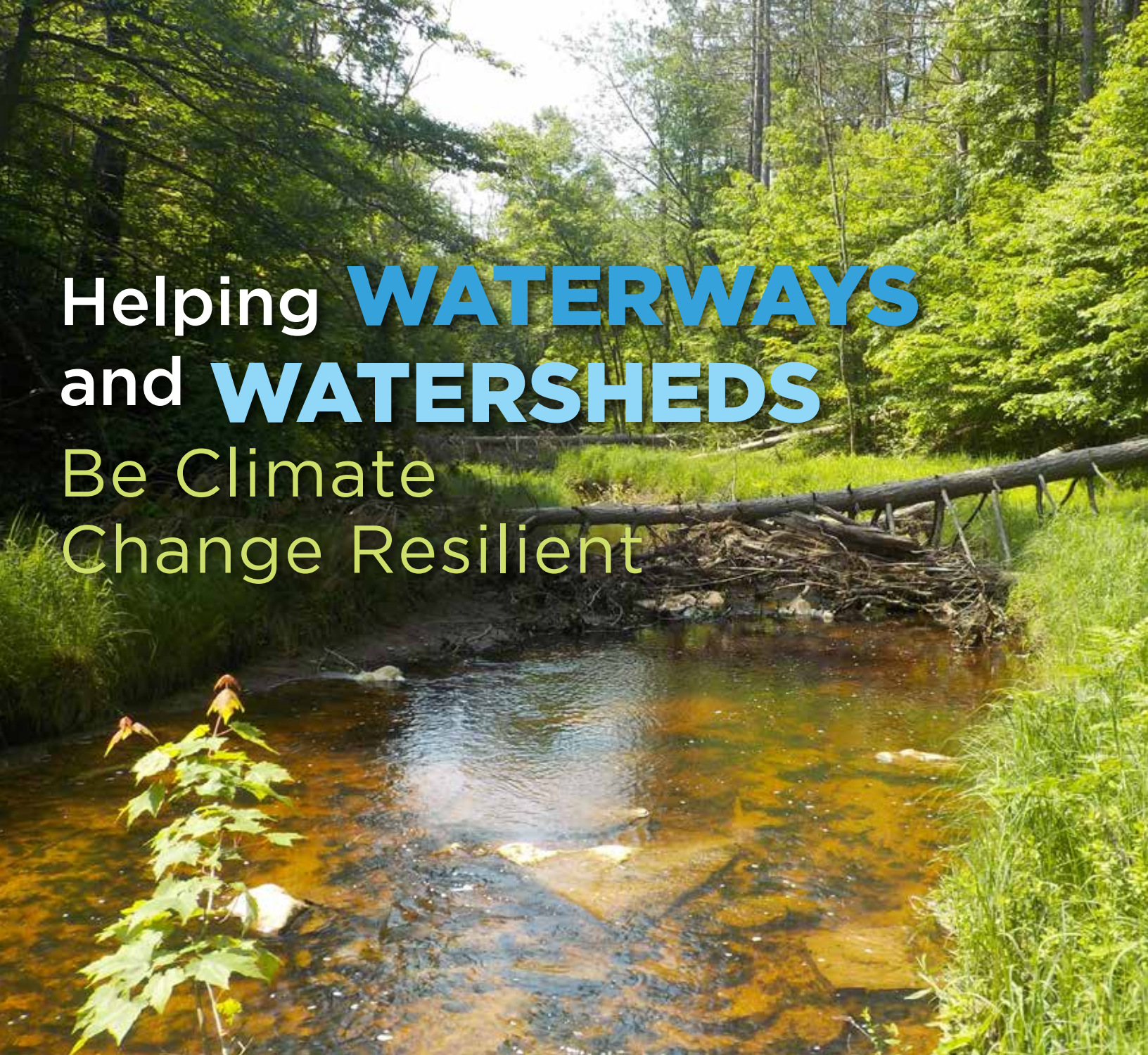
In 2018, Conservancy staff worked with Harrison Township to conduct street- and park-tree inventories, which evaluated existing public trees and identified potential planting locations. The findings also helped staff and the township create a plan for ongoing tree care.

The Harrison Township Tree Committee has engaged 258 community volunteers to work with the Conservancy to plant and care for 225 trees, including bald cypress, birch, elm and pine, and install a rain garden at Highlands Middle School.

"We have calculated about five tons annually of carbon dioxide absorbed by trees we planted," says Charles Dizard, a Harrison commissioner and resident who has worked to advance efforts to beautify the township's public parks, streets and school grounds with trees. "Residents have commented about the positive impact of the trees and the rain garden in terms of improving stormwater runoff, and the additional benefit of beautifying the treescape along Township streets. We could not have accomplished this without the incredible support from the Western Pennsylvania Conservancy." 🌿



Many trees have been planted in communities where residents want to improve their urban forest, address air pollution and decrease stormwater runoff, such as Harrison Township.



Helping **WATERWAYS** and **WATERSHEDS** Be Climate Change Resilient

Wetland restoration was part of a project Conservancy staff completed on Little Arnot Run in 2022. As nature's sponges, wetlands, by way of the vegetation contained within them, trap, filter and slowly release water as well as carbon.

RIVERS AND STREAMS HAVE LONG BEEN IMPORTANT TO OUR WAY OF LIFE IN WESTERN PENNSYLVANIA. USED AS TRANSPORTATION CORRIDORS, TRADING ROUTES AND COMMERCIAL HIGHWAYS DURING THE INDUSTRIAL REVOLUTION, OUR LOCAL RIVERS AND STREAMS ARE VITAL NATURAL RESOURCES THAT HOST IMPORTANT AQUATIC LIFE AND SOME OF PENNSYLVANIA'S RICH HUMAN HISTORY. THEY ARE ALSO ESSENTIAL TO THE REGION'S ICONIC LANDSCAPE, AND ECONOMIC CATALYSTS FOR MANY OF OUR COMMUNITIES AS DRINKING WATER SOURCES AND RECREATIONAL HUBS.

However, many of our rivers and streams need restoration due to streambank erosion, nutrient runoff and pollution from abandoned mine drainage and other human impacts. Since 2001, the Conservancy's watershed conservation team—in partnership with local watershed groups, landowners and various agencies—has worked to restore local waterways to improve water quality. The watershed staff uses scientific and natural approaches, including streambank stabilization, in-stream habitat restoration, riparian tree plantings, culvert replacements and dam removals, all in an effort to improve water quality and help aquatic species thrive. Jenifer Christman, vice president of watershed conservation at the Conservancy, says her team of watershed specialists

and scientists has a full plate of projects, keeping them diligently working in watersheds across the region year-round. She also is keenly aware that in the face of climate change the need for watershed restoration will only increase.

We're Removing More Dams

Warmer temperatures and unpredictable precipitation resulting from a changing climate will increase the frequency and intensity of storms, which will only add more sediment and nutrients in waterways. "Even the casual observer can see the increased intensity of some of our rainfall events. We know climate change is making flood events more frequent and intense, so we have to make streams more resilient," she adds. Usually flood events occur when water associated with a rain event flows over ground surfaces and reaches a stream channel too rapidly, causing the stream's levels to rise and overflow it banks. Flooding can also occur when culverts are not large enough to let the stream flow through them. Removing dams and replacing culverts within our waterways are effective methods to improve water quality and aquatic diversity, because migrating fish and other species have uninterrupted access within a stream to successfully reproduce. But for some streams, removing these structures can also present an opportunity to possibly reduce flooding. By removing dams and replacing undersized culverts with larger ones, the stream channel can properly accommodate the stormwater during large rain events. Most culverts are designed to last between 50 to 100 years under current stream conditions. So, replacement culverts can be designed to withstand future changes in stream conditions to reduce the risks of culvert failure. To date, the Conservancy has helped remove or replace 50 dams and culverts in streams across the region, connecting more than 164 miles of new habitat.

We're Planting More Trees Along Streams

Forested watersheds and streams with a dense riparian buffer, which is the land near the stream edge that includes trees and shrubs, stand the best chance in the fight against climate change. For example, mature trees reduce erosion and pollution, and cool and shade our waterways. Trees also help reduce the effects of flooding; mature trees intercept 25 to 35 percent of the rainwater that falls on them each year. With the help of volunteers and landowners, we will continue to plant trees and other native vegetation along streams to create riparian buffers to help filter fertilizers, chemicals and nutrients before they reach our streams and rivers. To date, we have planted more than 66,000 riparian trees since 2001. When riparian trees drop their leaves in the fall, those leaves turn into a food source for macroinvertebrates in the stream. When those aquatic bugs grow, they in turn serve as the food source for multiple species of fish and other wildlife. A fallen or decaying tree also has value. Older trees that would naturally fall near or into streams provide critical habitat conditions and ecological services. To mimic that natural occurrence, our watershed scientists have been working in partnership with the U.S. Department of Agriculture Forest Service in the remote headwater streams of the Allegheny National Forest on restoration efforts that strategically place



It takes a team effort of Conservancy staff and partners to remove dams and culverts, and reconnect streams, as demonstrated here on Johns Run in Tionesta Township, Forest County.

trees in streams to improve water quality and habitat for fish and other aquatic species. This type of work is called large woody material restoration (LWM). A project in Warren County on Little Arnot Run, which included LWM and wetland restoration, is helping mitigate flood risks downstream, ensure cool water during summer low flows, and improve in-stream connections for aquatic habitat and terrestrial ecosystems. As the deadwood releases carbon, the living trees in the forest capture and use that carbon, likely before it enters the atmosphere, says Ephraim Zimmerman, science director for the Conservancy's natural heritage program. Bacteria, fungi and aquatic macroinvertebrates eat the trees, which become food and habitat. "That's all part of a healthy and natural ecosystem service—so trees serve a critical purpose in the carbon cycle throughout their lifetime and beyond." Jenifer agrees and says no matter the approach, she and her team have one goal, "to restore watersheds by improving water quality in local rivers and streams, which are crucial to sustain aquatic wildlife and vital in the fight against climate change."



No trees were removed for the installation. The landscape is maintained as meadow habitat, which attracts a multitude of wildlife including native species, insects and pollinators.

Harnessing the POWER OF THE SUN at Fallingwater

FRANK LLOYD WRIGHT SPENT MANY HOURS OF HIS CHILDHOOD OBSERVING THE BEHAVIOR OF SUNLIGHT, SHADOWS AND THE SEASONS. THESE OBSERVATIONS INFLUENCED HIS ORGANIC DESIGN PHILOSOPHY, INCLUDING PLANNING OVERHANGING EAVES ON WINDOWS TO CONTROL LIGHT ENTERING SPACES, AND HIS SIGNATURE OPEN SPACE DESIGNS, WHICH ALLOW SUNLIGHT AND AIR TO WARM AND COOL AREAS.

Wright designed Fallingwater to welcome sunlight during every part of the day, in every season. The house, wrote author Robert McCarter, is “grown out of the ground and sits in the light.” Windows on the bedroom terraces, a wall of windows in the living room and even the front door face eastward to usher in the morning light. When the sun is at its zenith, its light streams down the hatch and reflects off the water below.

Nearly 90 years ago, Fallingwater’s design proved innovative in its integration with the landscape. As this and future generations combat climate change, Wright’s response to the patterns and principles of nature, and his belief that man could live in harmony with nature, continue to guide sustainability practices at Fallingwater and around the world.

Now, not only does the sun help warm the house, but a solar array is harnessing its power to offset 100 percent of electricity used by Fallingwater’s main and guest house. Vice President of the Conservancy and Director of Fallingwater Justin Gunther says the array, which began producing solar energy in late

spring 2022 at the Conservancy’s Bear Run Nature Reserve, “carries forward Wright’s ideals and continues the Conservancy’s commitment to preserve this beautiful landscape and the architectural principles that make Fallingwater unique.”

Located on a half-acre in an existing open field near Fallingwater, the array consists of 540 panels that annually produce 254,880 kilowatt hours of energy to offset the electric power supplied by West Penn Power. The array also offsets 25 percent of the overall facility’s electricity use.

Justin says Fallingwater undertook a detailed feasibility analysis before deciding on the solar array, one of many projects that advance the Conservancy’s commitment to sustainability practices. (See page 11.)

Fallingwater’s transition to clean, renewable energy was made possible through grant funding from the Pennsylvania Solar Center’s G.E.T. Solar Initiative and a power purchasing agreement with Ecogy Energy of Brooklyn, New York. PECO, an electric utility company based in Philadelphia, purchased the Solar Renewable Energy Certificates from Ecogy Energy to help meet renewable energy goals set forth by the Commonwealth of Pennsylvania. Groundhog Solar of Altoona, Pa., completed the installation.

“To be involved in a project for a conservation-minded organization like the Western Pennsylvania Conservancy and in such a beautiful location is an honor for Ecogy,” said Ecogy Energy CEO Jack Bertuzzi, noting that using clean energy to energize the site’s operations “truly represents the integration of sustainable solar technology with Wright’s architecture.”

Scan For Online Resources and Studies

WaterLandLife.org/
ClimateChange

View additional climate change information and resources, and learn more about how you can get involved in climate change actions locally and nationally.

Priorities for Climate Change Connectivity in PA

Some species may be able to move to more preferred climates and conditions, if they have the ability to move through connected natural habitat. The Conservancy’s natural heritage program scientists concluded a study in 2020 for the PA Department of Conservation and Natural Resources to help identify, map and prioritize where connected landscapes would be beneficial. This habitat connectivity work is helping to inform our land protection priorities and conservation science actions locally and across the state. (See pages 6-7 and 10-11 of this issue of *Conserve* for more info.)

Climate Change Vulnerability Index

Some species are more sensitive to climate change than others. The Pennsylvania Natural Heritage Program has completed climate change vulnerability assessments for 85 species in Pennsylvania using the Climate Change Vulnerability Index. Developed by NatureServe, the CCVI provides information on the exposure and sensitivity of a species to a series of risk factors associated with climate change.

Pennsylvania Climate Action Plan 2021

Everyone can play a role in reducing the effects of climate change! This state government-led plan provides guidance for and outlines a pathway to reaching Pennsylvania’s greenhouse gas reduction goals: 26 percent by 2025 and 80 percent by 2050.

Make a Difference by Donating

Thanks to our members, our region’s cities and towns are becoming more resilient against climate change. Learn more and donate to help continue climate change work and other local conservation efforts.

The Conservancy’s Forests and Climate Change

In a sense, Western Pennsylvania Conservancy has been working on the issue of climate change mitigation for decades. Early Conservancy land protection projects, such as McConnells Mill State Park and Fernciff Peninsula Natural Area, had primary components of preventing the conversion of old growth forests. I’m reminded of this as I hike on the upper trails at Bear Run Nature Reserve past large tulip trees, red and white oaks, and then into groves of old growth eastern hemlocks. All of these forests are involved in addressing climate change.

As we know, the largest issue with our climate change predicament is the amount of carbon dioxide in the atmosphere. We also know carbon dioxide is pulled from the air by green plants during photosynthesis and is used to build stems, leaves and fruit, a process known as carbon sequestration. Forests are not the only habitats that provide this sequestration “service,” but they are the best at it. The U.S. Forest Service estimates that 16% of the nation’s annual carbon dioxide emissions are captured by the country’s forests, and that this is the equivalent to the annual emissions of 50 million gas- or diesel-powered vehicles.

But carbon sequestration is just the beginning. After forests capture carbon, they store it. Much of the carbon is stored in tree trunks and branches, but significant amounts are also stored in roots, soil, coarse woody debris (fallen logs) and all of the other components of forest ecosystems. Carbon sequestration and storage is an ongoing function of forests, and the carbon stores found in the various sinks (soil, tree trunks) increase each year. Even the largest craggy old growth trees continue to participate in the forest carbon process. There is some forest carbon loss at the same time, but overall, the change is a net positive.

Another aspect of sequestering and storing forest carbon has to do with the type of forest management. Of the Conservancy-owned preserves, the majority are largely forested and require the determination of a management approach. On a number of preserves, the stewardship staff has been working to expand forests where there are opportunities to plant more trees.

But, the main management for most of the Conservancy’s forested preserves is an approach known as “wild carbon.” This is basically a type of management used for natural areas, where native trees are never cut and soils are not disturbed. There is also some focus on invasive species control so that the forest ecosystem does not become degraded, thereby losing its potential to capture and store carbon. This approach maximizes carbon sequestration and long-term storage.

I have enjoyed expansive forests and respected old trees for a long time. My relationship with trees is many faceted. I started making backyard maple syrup as a teenager and have eaten everything from acorns and black cherries to butternuts. I have recognized trees as renewable resources. I cut down spongy moth-killed oaks that are now the floor boards in my house. I have cut, split and burned a lot of cord wood as a carbon neutral energy source. Now this concept of wild carbon expands my endearment for trees and old growth forests. It is definitely one of the tools that we need for climate change mitigation.

Scan for more information on “wild carbon.”

Wild Works 1.1: Wild Carbon Supplement

field notes
by Charles Bier



An old-growth tree at a WPC natural area

Wild Carbon, A Synthesis of Recent Findings

Western Pennsylvania
Conservancy



800 Waterfront Drive
Pittsburgh, PA 15222

412-288-2777
info@paconserve.org

WaterLandLife.org

**note to printer:
FSC placement**

Make An Impact With Your IRA's Required Minimum Distribution

Are you deciding what to do with your 2022 Required Minimum Distribution (RMD) from your IRA? If you are 70 ½ or older, you may be able to give up to \$100,000 of your RMD directly from your IRA to the Western Pennsylvania Conservancy (and may designate Fallingwater or any other WPC program)—without having to pay income tax on the money. This type of gift could satisfy all or part of your 2022 RMD if made before December 31.

If you have questions, please contact Julie Holmes at **412-586-2312** or jholmes@paconserve.org.

You can find more information on gifts from your IRA at WaterLandLife.org/IRA.