

2025 Annual Report

A Year in Review

UNDERSTANDING WATER AND EACH OTHER

Published Titles

Galella, J.G., M.M. Rahman, A.M. Yaculak, **M. Peipoch**, **J. Kan**, M. Sena, B. Joshi, S.S. Kaushal, and S. Inamdar. 2025. Evaluation of soil properties and bulk $\delta^{15}\text{N}$ to assess decadal changes in floodplain denitrification following restoration. *Restoration Ecology* 33(1): e14327.

Sena, M.G., **M. Peipoch**, B. Joshi, M.M. Rahman, E. Peck, A.J. Gold, **J. Kan**, and S. Inamdar. 2025. Seasonal variation and key controls of groundwater ammonium concentrations in hypoxic/anoxic riparian sediments. *Journal of Geophysical Research Biogeosciences* 130(2): e2023JG007900.

Oviedo-Vargas, D., J. Anton, S. Coleman-Kammula, and X. Qin. 2025. Quantification of PFAS in soils treated with biosolids in ten northeastern U.S. farms. *Nature Scientific Reports* 15: Article 5582.

Peipoch, M., **M. Daniels**, and **S. Ensign**. 2025. Concentration-discharge relationships of chlorophyll describe the origin and fluxes of river algae across ecoregions. *Freshwater Science* 44(2): 143–158.

Myers, D.T., **L. Zgleszewski**, R. Bier, J.R. Price, S. Morgan, **J.K. Jackson**, **D. Oviedo-Vargas**, **M. Daniels**, **D.B. Arscott**, **J. Kan**. 2025. High fecal indicator bacteria in temperate headwater streams at baseflow: implications for management and public health. *Water Research X* 29: 100347.

Sullivan, S.N., J.C. Bowen, **L.A. Kaplan**, R.M. Cory, and P.G. Hatcher. 2025. Seasonal and longitudinal dynamics of DOM within headwater streams of a tropical evergreen forest. *Water Research* 281: 123668.

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Yaculak, A.M., **J. Kan**, **M. Peipoch**, J.G. Galella, E.K. Peck, S.S. Kaushal, T.L.E. Trammell, and S.P. Inamdar. 2025. Biogeochemical recovery and role of ancient hydric soils in contemporary floodplain restorations. *Ecological Engineering* 220: 107733.

Price, J.R., **D. Oviedo-Vargas**, **M. Peipoch**, **M.D. Daniels**, and **J. Kan**. 2025. Reduction in nitrification during the early transition from conventional to organic farming practices. *Ecosphere* 16(8): e70375.

Halls, J.N., **S.H. Ensign**, and E.K. Peck. 2025. A decision-support framework for evaluating riverine sediment influence on U.S. tidal wetlands. *Remote Sensing* 7(18): 3130.

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Stroud Center scientist Mike Broomall collects benthic macroinvertebrate samples from Lake Blackshear, Georgia, as part of a monitoring project that has tracked the health of the Flint River watershed annually since 1983. Studies like this provide the decades of data needed to identify emerging threats and guide effective watershed management.

MESSAGE

FROM THE EXECUTIVE DIRECTOR



Photo: Jennifer Foster

WATER CONNECTS US across landscapes, communities, and generations. It also reflects us: What we value, what we use, and how we choose to live all shape the health of our streams and rivers.

At Stroud Water Research Center, our work begins with understanding. By studying freshwater systems, we uncover how water moves, how it changes, and how human actions influence its course. But understanding water is only part of the story. Lasting solutions require understanding one another – listening, collaborating, and working together toward shared goals.

In this report, you'll see how science, partnership, and stewardship come together to protect freshwater systems and strengthen the communities that depend on them.

Executive Director, President, and Research Scientist

what you
can do

To learn about our latest work and to share it with others, sign up for our newsletter at stroudcenter.org/subscribe and follow us on social media.

RESEARCH

“The power of science is that it can show us not only what’s gone wrong in our fresh water but also how to fix it. We just have to work together.”

– SENIOR RESEARCH SCIENTIST JOHN JACKSON, PH.D.



PRIORITIES



Left: Diana Oviedo Vargas, Ph.D., collects samples from a Pennsylvania farm where biosolids had been applied on crop fields.

The Next Frontiers of Freshwater Science

From PFAS to Road Salt, Science Helps Us Discover What's Lurking in Our Water and Find Solutions

By Diane Huskinson

At daybreak, the sun's warmth gives rise to mist above cornstalks and a nearby stream that flows toward homes, schools, and businesses not far away. From farm fields to city streets, water connects us all – and so do the remnants of how we live on land.

The cleaning products, fertilizers, and other substances that make modern life easier (at least in some ways), don't disappear after use. They run down our drains, roads, and landscapes and end up in our water. Certain chemicals and microorganisms are increasingly detected in fresh water. They are often invisible, poorly understood, and not yet fully regulated, but they may threaten human health and ecosystems. Scientists call them emerging contaminants.

To protect clean water and healthy streams, Stroud Water Research Center studies how freshwater systems work from headwaters to mouth and across entire watersheds. Scientists then explore how these systems respond to human actions, providing answers that guide communities toward stewardship.

UNDERSTANDING PFAS

Among the emerging contaminants that the Stroud Center is investigating are per- and polyfluoroalkyl substances (PFAS). More commonly called forever chemicals, their stability makes them highly desirable for use in food packaging, water-repellent fabrics, and much more. Once released into the environment, however, they become stubborn contaminants. They stick around, and they don't break down easily. Worse, they have been linked to adverse health effects, including certain cancers. In aquatic organisms, PFAS exposure can lead to stress, diminished growth and reproduction, and mortality.

Complicating matters is the ever-evolving regulation of PFAS. In November of 2025, the Environmental Protection Agency approved the use of two new pesticides that qualify as PFAS.

One known source of PFAS that's gained widespread attention is biosolids, or sewage sludge – a human waste product used as fertilizer. It's cheap and effective, but its agricultural use has led to questions about food and groundwater safety.



To understand the potential for biosolids to contaminate farm soils and nearby surface waters, the Stroud Center embarked on a study in collaboration with the Center for PFAS Solutions. Comparing soil samples from treated and untreated fields on 10 U.S. farms, researchers found much higher concentrations of PFAS in the treated soils, indicating biosolids can be a significant source of PFAS contamination. They also found PFAS in nearby streams, raising concern for the freshwater ecosystems that surround farm fields and for anyone living downstream.

In a new study, the team is working to better understand when, how, and how much of these contaminants are transported from farm fields to streams.

UNDERSTANDING PESTICIDES

Pesticides too can travel from farm to stream. Stroud Center studies have examined how the world's most commonly used insecticides – neonicotinoids – impact water quality and stream health.

Starting in 2019, researchers collected stormwater runoff and stream samples from farms that used neonicotinoid-coated seeds. They found all the fields produced contaminated samples. One field stopped using the coated seeds at the start of the study; yet it still produced contaminated samples four years later, though concentrations slowly declined.

The study also examined the toxicity of neonicotinoids to aquatic life and confirmed what other research has shown: that exposure to neonicotinoids results in mayfly death.

Other Stroud Center research yet to be published indicates neonicotinoids lead to freshwater biofilms that are less diverse, suppressing the growth of sensitive species and interfering with essential microbial processes. Though more research is needed, these changes could in theory slow a stream's ability to maintain water quality, regulate climate, and sustain the fish, insects, and tadpoles that feed on biofilms.

Together, these studies show how water-soluble pesticides move from soils to surface waters, where they can harm aquatic life. They also underscore a

larger truth: emerging contaminants are rarely the result of one decision, but of many choices shared across society.

UNDERSTANDING THE HUMAN ELEMENT

Contaminants become pervasive because despite their potential failings, they offer some benefit – often to society at large. Biosolids, for example, become contaminated because industry produces or uses PFAS, and humans consume PFAS-laden products. Those chemicals end up in wastewater. Treatment plants process it into biosolids, a material that must be managed, reused, or disposed of.

"There are no easy solutions, but research can help guide us," Diana Oviedo Vargas, Ph.D., said about PFAS. She leads the Stroud Center's biosolids research.

As an independent, nonadvocacy research institution, the Stroud Center's role is to illuminate the pathways that connect human activity to freshwater ecosystems – not to assign blame, but to inform better decisions.

TURNING KNOWLEDGE INTO ACTION

With improved understanding of how contaminants impact fresh water, and of the human role in their emergence, comes shared responsibility – a torch that many have chosen to carry in response to another challenge: salt pollution.

The use of road salt has risen dramatically in recent decades, and so has the saltiness of freshwater streams, rivers, and groundwater. In 1940, the United States spread 164,000 U.S. tons of road salt each year, according to the U.S. Dept. of Interior, Bureau of Mines. Today, U.S. Geological Survey data shows the country uses closer to 28 million tons – 171 times more per year.

Salt, measured in streams as chloride, is found in freshwater ecosystems naturally. In the Delaware River basin, natural chloride levels are in the range of 5 to 10 milligrams per liter. In excess,



John Jackson, Ph.D., speaks with people about road salt pollution during a public event in West Chester, Pennsylvania.

however, salt degrades drinking water, corrodes infrastructure, and threatens aquatic life.

To document the emergence of salt as a contaminant, identify patterns and hotspots, and empower people with the data and knowledge needed to tackle salt pollution in their communities, the Stroud Center launched a community science project.

Kicking off with Winter Salt Week in January 2025, more than 700 people and 30 partners answered the Stroud Center's call to measure the growing salt problem by wading into their local creeks and sampling about 600 sites in 18 states and five countries.

The Stroud Center provided guidance, tools, data analysis, and communications support, but it was the volunteers and the data they collected that showed how widespread and severe the problem has become, finding more than 70% of sampled stream sites exceeded one or more safe chloride concentration limits for aquatic life.

They also found something greater: community. Together, with help from the Stroud Center and its conservation partners, volunteers discovered an issue they could understand, a cause they could get behind, and collective actions they could take. Many chose to use the data they gathered and what they learned as a result to advocate for change, speaking with neighbors, HOAs, local businesses, and municipal and state leaders about wise salting practices.

Building on that momentum, the Stroud Center asked its network to monitor streams for road salt contamination during another snapshot window in October 2025. While the winter snapshot revealed elevated salt levels during winter conditions with active salting, the baseflow snapshot during the fall season showed the lingering impact of road salt long after winter salting had ended. Once again, community scientists stepped up – this time, in even greater force: nearly 100 partner organizations and their volunteers sampled more than 1,200 stream sites in the mid-Atlantic and beyond.

They found more than 700 locations, or 58% of sites, surpassed aquatic life thresholds. There were 61 hotspots, and 51 of them exceeded



**Reducing Contaminants.
Strengthening Community.**

CUT THE salt

Launched in January 2025, **Cut the Salt** is the Stroud Center's public awareness campaign highlighting the hidden impacts of winter road salt on freshwater health. Created by the Stroud Center's communications and marketing team in connection with the Winter Salt Snapshot, the campaign earned an Anthem Award – an honor for mission-driven work that supports positive social change.

Challenge: Road Salt Pollution

1940	TODAY	
		
164,000 tons	28 million tons	171x more/year

Photo: Julie Prey, courtesy of Delaware County Office of Sustainability

Pennsylvania's drinking water standard for chloride.

Volunteers were energized. The majority of those who responded to a survey about the fall snapshot said their participation motivated them to share what they had learned with others.

"Road salt is not a 'them' problem. It's our problem. All of us. We asked for it, and we paid for it. It's been highly effective and reasonably inexpensive, but it's come at a cost," said Senior Research Scientist John Jackson, Ph.D., who leads the Stroud Center's salt pollution research. "The power of science is that it can show us not only what's gone wrong in our fresh water but also how to fix it. We just have to work together."

**see
the
results**

For both snapshots, volunteers shared their data with the Stroud Center, which added them to a live map at stroudcenter.info/saltmap.

EDUCATION

“Watching the growth of the teachers and students throughout these two years has been rewarding and reminds us that if we want our students to grow as responsible, Earth-minded citizens, then we must take the initiative and time to make these experiences and lessons available to our students. Our partnership with the educators at Stroud Water Research Center has made this possible.”

— SONIA SAUNDERS, ENVIRONMENTAL EDUCATION SPECIALIST,
RED CLAY CONSOLIDATED SCHOOL DISTRICT



PRIORITIES





Left: Students throw tennis balls onto a watershed tapestry to model how water flows on land into low-lying areas. Right: Steve Mohapp, watershed education specialist, guides students through the mapping of runoff patterns. *Photos: Sonia Saunders*



Building Environmental Literacy Infrastructure

How Science and Partnership Help Communities Understand and Protect Their Water

By Diane Huskinson

A CRITICAL MOMENT FOR IMPLEMENTATION

Across the country, science standards increasingly emphasize investigation and real-world problem solving in an effort to increase environmental literacy. Yet for many schools, meaningful outdoor science experiences remain difficult to implement. They require coordination, funding, trained educators, and community partners.

At the same time, freshwater challenges are accelerating. Stormwater runoff and water pollution affect communities across watersheds. But through watershed science education, it's possible to build the systems understanding that today's standards demand and help students discover how their communities are connected through shared waters.

Forty-eight states and the District of Columbia have adopted the Next Generation Science Standards (NGSS) or similar standards, many incorporating Meaningful Watershed Educational Experiences (MWEEs). Yet standards alone do not ensure environmental literacy. Alignment across teachers, administrators, scientists, state agencies, and community partners is also needed. Without that connective infrastructure, implementation stalls. Stroud Water Research Center, through a robust environmental education program, works at that very crossroads.

RESEARCH AS FOUNDATION, PARTNERSHIP AS STRATEGY

With more than 50 years of research on streams and rivers, the Stroud Center brings scientific rigor to environmental education. Its education team translates science into watershed learning experiences for teachers, students, and communities. From watershed dynamics to stream ecology, these translations are grounded in peer-reviewed science and field-tested methodologies. The team brings students into



Teachers revel in new pollinator gardens they planted with hundreds of students in the Red Clay Consolidated School District.

the watershed to learn how water moves through landscapes, land use and climate affect streams, and evidence informs decisions.

Rather than delivering only one-time teacher workshops, Stroud Center educators form multiyear partnerships that bridge the gap between research and understanding. Curricula are co-developed with schools and their teachers. Professional development unfolds over multiple sessions, with demonstrations, co-teaching, and iterative refinement. The goal is independent teacher leadership embedded within district systems.

"Co-developing something with a teacher is much better than just handing them something, because it's really going to their students, their community, their curriculum, and that's really critical," says David Christopher, marine education specialist with Delaware Sea Grant, a Stroud Center partner on a NOAA B-WET grant. "The idea is that when teachers are implementing the curriculum, we're there to support them."

PLACE-BASED, LEARNER-CENTERED DESIGN

Because curricula are co-developed rather than prescribed, districts and educators deliver place-based education tailored to their students and communities – rural or urban, inland or coastal, affluent or economically disadvantaged. Instruction

begins with students' lived experiences and connects directly to local landscapes, helping students see how their own communities fit within larger watershed systems.

"A key part of our work is translating freshwater research into experiences that students can investigate themselves," says Tara Muenz, interim director of education at the Stroud Center. "When students explore their own schoolyards, streams, and neighborhoods, they begin to see how the science of water connects directly to their communities."

In some schools, students investigate stormwater runoff on asphalt- or turf-heavy campuses. In others, they examine agricultural drainage patterns or coastal watershed connections. Through the National Park Foundation Open Outdoors for Kids grant, students participate in learner-centered field experiences at the Stroud Center and at White Clay Creek State Park, expanding access to outdoor science learning.

This approach reflects the core of learner-centered education: lessons shaped around students' needs, backgrounds, and community context while meeting NGSS standards. Place-based design strengthens engagement and supports long-term adoption at the district level.

DELAWARE: A SYSTEMS-LEVEL ILLUSTRATION

The Stroud Center's education team works in multiple states and internationally, but Delaware illustrates the full partnership model that helps schools build both scientific understanding and community connections around shared water resources.

Since 2021, across four funded projects, the Stroud Center has empowered approximately 122 teachers in Delaware through sustained professional development, and those educators collectively reach an estimated 4,680 students. Among those teachers that completed surveys, 94% reported increased confidence teaching watershed science. By year three, approximately 92% will independently lead core lessons, demonstrating durable capacity building.

In the Red Clay Consolidated School District, engagement began with seven fifth-grade schools and has expanded to 12 across three consecutive years of partnership. Together with district leaders, the

Stroud Center co-developed a three-lesson watershed unit aligned with NGSS and the MWEE framework.

The first lesson introduces watershed function through a hands-on tapestry model and campus investigations. The second moves students into field research – rotating through watershed modeling, runoff and infiltration labs, and stream habitat studies using bilingual field notebooks.

“Students absolutely loved it both years,” one teacher shared. “The first year it was a little rainy and cold, but the kids didn’t complain, and they loved being immersed in the field and moonlighting as a scientist for a day!”

The third lesson returns students to their campuses to map runoff patterns and propose solutions. In one school, students selected and installed a rain chain to reduce erosion and pooling. The progression from classroom to field to action translates freshwater science into applied, community-rooted learning.

COLLABORATION IS THE INFRASTRUCTURE OF UNDERSTANDING

Environmental literacy at scale cannot be built by a single institution. Understanding water requires people, communities, and institutions to work together.

Through a NOAA B-WET-funded partnership initiated in 2021 (with Stroud Center funding through 2026), the Stroud Center works alongside Delaware Sea Grant and the Delaware Nature Society to support teacher professional development, environmental literacy planning, and MWEE implementation across districts.

“These partnerships are the only way to move forward. There’s so much work to be done. I think the more people we have working together, the more we can advance environmental literacy in Delaware,” says Christopher.

The Stroud Center frequently serves as convener and connector – linking districts to field experiences, partners, and research tools such as WikiWatershed that support watershed education.

Scientific independence strengthens this role. As a nonadvocacy research institution, the Stroud Center

builds trust across diverse stakeholders, enabling collaboration grounded in shared evidence rather than ideology.

Recognition reflects that collaborative impact. In 2025, the Delaware Association for Environmental Education honored the Stroud Center education team with its Exemplary Partnership Award for Excellence.

A REPLICABLE MODEL AT A PIVOTAL MOMENT

The partnership model integrates research, standards alignment, teacher capacity building, and cross-sector collaboration. It builds internal district expertise rather than temporary programming.

Demand continues to grow as word of mouth spreads, and with greater, longer-term support, the Stroud Center could serve more schools and increase the compounding return on investment.

By combining rigorous research with sustained collaboration, the Stroud Center strengthens educational systems while equipping communities to better understand both the freshwater resources that connect them and their shared responsibility to care for them.



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To learn how you can support environmental literacy infrastructure, email development@stroudcenter.org.

WATERSHED RESTORATION

“If we can all work together, trust each other, stop talking at each other, and just listen to each other, that’s how we make progress. That’s how we protect our water.”

— JEREMY WEAVER, WEAVER ENVIRONMENTAL CONSULTING LLC



PRIORITIES



Left: Heather Titanich, watershed restoration coordinator at the Stroud Center, meets with farmer David Smucker to discuss tree plantings. With help from conservation partners, he and his neighbors have formed an unbroken stretch of buffer along a tributary to Little Conestoga Creek in Lancaster County, Pennsylvania. Photo: Jennifer Foster

Right: David Smucker cares for the trees on his property. Photo: Jennifer Foster



From Forest to Conestoga

A Small Watershed's Big Lesson in Restoration, Resilience, and Shared Stewardship

By Diane Huskinson

HOPE SPRINGS

One summer day, while walking along the stream that runs through his farm, Curvin Shirk spotted something he'd never seen before. *Could it be?* He dug around the bank, and sure enough, there it was: water emerging from the earth, flowing down toward the stream. The spring's pulse was steady and strong. The water, cool. After Curvin cleared away some of the sediment, watercress (an aquatic edible plant) soon began growing around it.

Curvin was excited. The trees he'd planted were doing their job, cooling the stream with sprinkled shade and providing a healthy dose of leaf litter. And now this. The spring had likely been there all along, but not until the livestock were fenced out and the forest buffer planted could this muddy patch reveal its true form.

The transformation happened neither by accident nor overnight nor at the hands of one person. Decades in the making, it's the result of one community's grand plan to restore its land and water.

Curvin is one of seven landowners along the unnamed tributary that joins their properties. They're friends and neighbors. Most are members of the Plain community. And together, with help from conservation partners, they've created an unbroken stretch of forest buffer that connects the forested hills to Little Conestoga Creek in Lancaster County, Pennsylvania.

Without even a name, it's an unassuming little stream. But it's got a great big story.



Left: Lamonte Garber, watershed restoration coordinator, speaks to farmers. Photo: Greg Heigel. Right: Hammertown Run flows through farmland. Photo: Lancaster County Conservation District



CHANGING FATE

Curvin's stream connects a watershed, nicknamed Hammertown (after a nearby road), that stretches a mere 1.5 square miles. Any pollution here might seem like a drop in the river it eventually flows into. But the drops add up across Pennsylvania's headwater streams, which account for 80% of the state's stream miles. Across the United States, the picture is similar: Most U.S. streams are headwater streams. And so, the fate of American rivers and their wildlife begins here in this Lancaster County stream and in thousands of others like it.

Forty or so years ago, Hammertown's fate started to change, as conservation groups cultivated relationships with some of the farmers. The Natural Resources Conservation Service (NRCS) was the first to reach out, offering free well-water testing. As the farmers got to know conservation workers, like Greg Heigel from the Lancaster County Conservation District and Ashley Spotts from the Chesapeake Bay Foundation (CBF), trust and friendship grew. One farmer, Raymond King, even invited Heigel and Spotts to join the preparations for his daughter's Amish wedding.

That early work laid the foundation for NRCS, CBF, the conservation district, and Stroud Water Research Center to help the watershed's landowners and farmers protect their soil and restore their stream. The first trees were planted in 2009 on Benuel Zook's farm. Fifteen years later, the unbroken stretch of buffer was finally complete. Some trees came via

the U.S. Department of Agriculture's Conservation Reserve Enhancement Program. Some, via CBF's Keystone 10 Million Trees Partnership. And some, via the Stroud Center's Farm Stewardship Program.

Two thousand trees across 13 acres make up this forested corridor that cools and feeds the stream, adds vital habitat, stabilizes streambanks, and reduces runoff. It makes the stream more resilient to a changing climate, pollution, flooding, and drought.

The scale of the buffer in such a small watershed is significant and so are the other improvements that make up the restoration effort: Manure and fertilizer management, livestock fencing, and soil conservation practices reduce land-use pressures on the stream.

"All of us who grew up in Lancaster got used to brown, muddy streams. If you wanted to see cleaner water, you went north," says Matt Ehrhart, director of watershed restoration at the Stroud Center. "This idea that if we do it right, we can have productive, economically viable farms growing food and also have wild trout in our streams is just such a huge deal, but it's not possible without a lot of work."

Doing it right means following the science of what works to restore freshwater ecosystems and clean water, and that requires aggregation and partnership.

UNDERSTANDING WATER

Stream degradation is often the result of multiple pressures: Chemical and thermal pollution, stormwater runoff, erosion, deforestation, physical disturbance, and climate change are all common culprits. It makes sense, then, that removing only one or two in isolated parcels of land will yield disappointing results. In recent decades, states like Pennsylvania have tried and failed to remove more streams from impairment lists than they add – lists that tell us which streams aren't healthy enough for fishing, swimming, and drinking. Why the struggle?

Stroud Center scientists and restoration experts argue progress has languished because of too much investment in strategies that don't restore functional stream ecosystems (reengineering of channels and floodplains) and not enough investment in ones that do (changing how people use their land and water).

Hammertown is an investment in the latter. An intensive array of practices aimed at reducing runoff and physical disturbance, producing ecological uplift, and restoring natural stream function combine across an entire watershed – though small it may be – to make a big impact: conditions that, in time, allow the stream to heal itself.

UNDERSTANDING EACH OTHER

Lancaster County, like much of rural America, holds many conservative values and rich cultural and religious traditions: family farming, fiscal responsibility, communal worship, love of God and creation.

But development continues all around, inching closer with every new shopping center and residential neighborhood. Budgets keep shrinking. And the streams that supply drinking water keep getting dirtier.

So, to preserve their way of life, Hammertown's farming community recognized the need for progress. Some began serving on Caernarvon Township's Ag Advisory Committee.

"There's an openness among the farmers to new ideas and different viewpoints, in part because of the Ag Advisory Committee," says Lamonte Garber, watershed restoration coordinator at the Stroud Center. "They're used to getting together and talking with each other about priorities for their local community. They want to be involved because they recognize this place is special."

When conservation groups offered to help, farmers stepped up, agreeing to make changes on their farms. And now, the township's broader community has joined the effort, extending the forest buffer even further downstream.

Jeremy Weaver, who consults on nutrient management planning, says, "If we can all work together, trust each other, stop talking at each other, and just listen to each other, that's how we make progress. That's how we protect our water."

Spotts explains what that looks like: "It's really important that they know we are here to help. If there are maintenance concerns or any questions, there are all of these organizations working together and trying to make this easier for the landowners and farmers."

A STREAM REBORN

Since before the start of the project, Stroud Center scientists have been monitoring the health and transformation of the stream. Early data look promising, and anecdotally, Garber has observed the presence of new life, including mayflies (a hallmark of healthy streams), which he hadn't seen there before. If research can confirm what he suspects, it will not only show the effectiveness of a whole-watershed approach to restoration; it will also demonstrate a restoration timeline.

Terry Martin, who oversees clean water projects for the township, says, "Testing is so important. It helps to verify our successes."

In the meantime, the farmers are enjoying their stream. David Smucker happily mows his buffer. Then, there's the rock in Raymond King's stretch of the creek, where he sits and thinks and watches his grandchildren play. And on hot summer days, Curvin Shirk walks down to the newfound spring on his property and marvels at the cool air rising above the creek. "The trees are making that happen," he says.

If there's new life to be found, it's here, in Hammertown.



The Stroud Center and Lancaster Clean Water Partners

More than 90 organizations, including the Stroud Center, are working together through the Lancaster Clean Water Partners to improve water quality in Lancaster County. Hammertown Run is one focus area, with efforts aimed at restoring ecosystems, improving water quality, and removing local streams from Pennsylvania's impaired waters list.

Photo: Rebecca Lauver

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To learn how you can partner with the Stroud Center on community-led land and stream stewardship, email buffers@stroudcenter.org.

Research Projects

Note: Research, education, and watershed restoration projects listed were active in 2025. Stroud Water Research Center scientists and staff are indicated in bold.

Stream Health



Assessment of Environmental Conditions in Bennett's Run, Brandywine Creek

Funded by: Phoebe A. Driscoll and the Phoebe Internship Fund

Scientists are monitoring water chemistry, temperature, aquatic macroinvertebrates, and fish in Bennett's Run, a small tributary to Brandywine Creek in southern Chester County, Pa., to provide critical data in support of a watershed conservation plan.

Principal Investigator: John K. Jackson



Focus on Delaware River Watershed Initiative

Funded by: William Penn Foundation, National Fish and Wildlife Foundation, and Open Space Institute

Since 2013, the Stroud Center has played a vital role in the Delaware River Watershed Initiative, a collaboration of more than 50 organizations working to protect drinking water for 15 million people across four states. Through research, monitoring, restoration, and community science, the Stroud Center and its partners are helping communities better understand and protect streams across the Delaware River watershed.

Principal Investigators: Matthew J. Ehrhart, John K. Jackson, David B. Arscott, Diana Oviedo Vargas, Melinda D. Daniels, Jinjun Kan, and Marc Peipoch

Collaborators: David Bressler and Steven C. Kerlin

Collaborating Organizations: Academy of Natural Sciences of Drexel University, Audubon Pennsylvania; Berks Nature; Brandywine Conservancy; Brandywine Red Clay Alliance; French and Pickering Creeks Conservation Trust; Green Valleys Watershed Association; LimnoTech; Musconetcong Watershed Association; Natural Lands; Open Space Institute; Partnership for the Delaware Estuary; Rutgers University; The Nature Conservancy in Pennsylvania and Delaware; The Nature Conservancy in New Jersey; New Jersey Audubon; North Jersey Resource Conservation & Development Council; South Jersey Land and Water Conservancy; Trout Unlimited; University of Delaware, and many others.

Brandywine Stream Stewards: Community Action in Support of Healthy Waters

Funded by: William Penn Foundation and Stroud Water Research Center

Engaging adults and youth from Wilmington, Del., the Stream Stewards Program monitors water resources in the 1,100 acres of open space in the First State National Historical Park. The Stroud Center supports the program through community science training and resources that lead to conservation and improved management of land and water resources.

Principal Investigators: John K. Jackson, and Matthew J. Ehrhart

Collaborators: Jinjun Kan, Melinda D. Daniels, and David B. Arscott

Collaborating Organization: The Nature Conservancy in Pennsylvania and Delaware

Consortium for Scientific Assistance to Watersheds

Funded by: Pa. Department of Environmental Protection's Growing Greener Program

Education, research, and watershed restoration staff are providing technical assistance to statewide conservation groups in effective watershed assessment, monitoring, and restoration.

Project Leads: Scott H. Ensign, David B. Arscott, Steven C. Kerlin, and Tara K. Muenz

Collaborating Organizations: Alliance for Aquatic Resource Monitoring at Dickinson College, Conemaugh Valley Conservancy, Del. Riverkeeper Network, Pa. Lake Management Society, U.S. Geological Survey, and Pocono Northeast Resource Conservation and Development Council

Evaluating and Updating Data Collection Protocols in National Parks of the National Capital Region

Funded by: National Park Service

The National Park Service has monitored stream water quality and quantity for more than 15 years in shallow streams located in 10 parks of the National Capital Region Network. This project analyzes the complex dataset for trends and watershed health while suggesting updates to methods deployed in the field and during analysis.

Principal Investigators: Diana Oviedo Vargas, Marc Peipoch, Melinda D. Daniels, Jinjun Kan, and Scott H. Ensign



Long-Term Recovery of Stream Health Following Watershed-Scale Implementation of Agricultural Restoration Practices

Funded by: Stroud Water Research Center

Across six agricultural watersheds draining to the Chesapeake Bay, scientists are measuring changes in stream temperature, water chemistry, and aquatic macroinvertebrates in response to forested buffer restoration and better barnyard and field/pasture management.

Principal Investigators: John K. Jackson, Matthew J. Ehrhart, and Lamonte Garber

Macroinvertebrate Monitoring at Sites in White Clay Creek, Pa., Flint River, Ga., Susquehanna River, Pa., and Delaware River, Pa.

Funded by: Various public and private sources

These projects use aquatic macroinvertebrates such as mayflies, stoneflies, and caddisflies to provide assessments of current water quality in these streams and rivers. Where

long-term data are available, the most recent conditions are compared to historical conditions

Principal Investigator: John K. Jackson

ENDOWMENT **Revisiting Stream Health for Major Tributaries of the Schuylkill River, Pa.**

Funded by: Stroud Water Research Center

This project uses water chemistry and aquatic macroinvertebrates such as mayflies, stoneflies, and caddisflies to provide assessments of current water quality at 19 sites in the Schuylkill River. Scientists are combining the recent data with long-term data to assess environmental trends since 1996.

Principal Investigator: John K. Jackson

ENDOWMENT **Watershed Research for Buck and Doe Runs, Pa.**

Funded by: Private sources and Stroud Water Research Center

These projects use water chemistry and aquatic macroinvertebrates such as mayflies, stoneflies, and caddisflies to provide assessments of current water quality in streams. Where long-term data are available, the most recent conditions are compared to historical conditions.

Principal Investigator: John K. Jackson

Collaborators: David B. Arscott and Melinda D. Daniels

Food and Agriculture



Agriculture Viromes in Farming Systems: Effects on Microbiome Assembly, Function, and Crop Production

Funded by: U.S. Department of Agriculture

This research explores how viruses function within the microbiomes of agricultural soil and investigates their impact on soil health and crop productivity.

Principal Investigator: Jinjun Kan

Collaborating Organizations: College of William and Mary and University of Georgia

Anthropogenic Legacies: How Riparian Soils Respond to Human Disturbance

Funded by: U.S. Department of Agriculture

This study investigates the physical, biogeochemical, and microbial characteristics of novel anthropogenic soils that have accumulated in the valley bottoms of the mid-Atlantic U.S. due to the coupled effects of historic soil erosion and sediment trapping by milldams. Scientists are also studying responses following milldam removal.

Principal Investigators: Jinjun Kan and Marc Peipoch

Collaborating Organization: University of Delaware

Biochar as a Nutrient Removal Tool on Farms

Funded by: William Penn Foundation and Lancaster Clean Water Partners

Researchers are studying how well biochar works in engineered structures to remove excess nutrients from runoff on agricultural fields. Results will help determine to what degree, if any, biochar can prevent surface water pollution.

Principal Investigator: Diana Oviedo Vargas

Collaborating Organization: Brandywine Conservancy

Exploring the Link Between Soil and Human Health: Protein, Protein Quality, and the Nutraceutical Amino Acid Ergothioneine

Funded by: Foundation for Food and Agriculture Research

Ergothioneine, an amino acid that has scientifically proven benefits to human health, is exclusively biosynthesized by fungi and certain bacteria in soils. With coupled field testing and lab incubation experiments, this project investigates how soil microbes synthesize and transform ergothioneine from soil to products under different farming practices.

Principal Investigator: Jinjun Kan

Collaborating Organizations: Rodale Institute, University of Delaware, and U.S. Department of Agriculture

The Microbial Calendar: When Do Farmers See the Effects of Cover Cropping on Soil Functions, Crop Performance, and Microbial Communities?

Funded by: U.S. Department of Agriculture

Stroud Center scientists and restoration professionals are partnering with farmers to examine how soil health changes over time after cover crops are implemented.

Principal Investigators: Jinjun Kan, Diana Oviedo Vargas, and Matthew J. Ehrhart

Collaborating Organization: Ursinus College

Soil Microbes and Bean Nutrients in Organic and Conventional Systems

Funded by: Pa. Department of Agriculture

Little is known regarding soil microbes and nutrition levels in vegetables under various farming practices. This project measures soil microbial community structure, extracellular enzyme activity, and nutrient density in green and black beans cultivated using conventional versus organic farming methods.

Principal Investigators: Jinjun Kan and Diana Oviedo Vargas

Collaborating Organizations: Purdue University and Rodale Institute



Stroud Center scientists are partnering with communities to better understand flood risks and identify practical, science-based solutions. In 2025, the Stroud Center joined the Brandywine Conservancy and other regional partners in releasing the final report from a two-year study of worsening flooding in the Brandywine watershed. The research is helping guide restoration and land-management decisions that can reduce impacts on homes, infrastructure, and waterways alike. Photo: "Hurricane Ida flooding in Wilmington, September 2, 2021" by Army National Guard Spc. Alyssa Lisenbe, (CC-BY-2.0), via Wikimedia Commons

Changes in Soil Health Indicators as a Result of Long-Term Management Practices and Cropping Systems in the Vegetable Systems Trial

Funded by: Pa. Department of Agriculture

This project is studying soil microbial community structure and activities in Vegetable System Trials at Rodale Institute in order to understand how microbial soil health relates to management practices and produce quality.

Principal Investigator: Jinjun Kan

Collaborating Organizations: Rodale Institute

Temporal Dynamics of Biosolids-Derived PFAS in Agricultural Soils and Receiving Agro-Fluvial Ecosystems

Funded by: U.S. Department of Agriculture

Scientists are studying PFAS transport and transformation at a Pennsylvania farm with a history of biosolid use to better understand the environmental fate of these contaminants and guide policies.

Principal Investigators: Diana Oviedo Vargas and Melinda D. Daniels

Collaborating Organization: PFAS Solutions (New Castle, Del.)

Climate and Flooding



Brandywine Flood Study

Funded by: Chester County Resources Authority and Delaware County Council

The study focuses on reducing flooding along the main stem of the Brandywine Creek. It will identify areas prone to chronic flooding and develop hydrologic and hydraulic watershed models using the U.S. Army Corps of Engineers' Hydrologic Engineer Center's River Analysis System. The study will offer recommendations for both structural and nonstructural solutions to reduce flooding.

Principal Investigators: Brandywine Conservancy, University of Delaware Water Resources Center, Melinda D. Daniels, and David B. Arscott

Collaborating Organizations: Chester County Water Authority, West Chester University, Meliora, Biohabitats, and CDM Smith

A Rapid Deployment Water-Level Logger

Funded by: U.S. Geological Survey

The Stroud Center is developing a solar-powered, low-cost water-level monitoring system for the U.S. Geological Survey to enhance flood warnings and infrastructure management. Using EnviroDIY technology, the system will relay real-time data to the Monitor My Watershed portal, both part of the Stroud Center's WikiWatershed Toolkit. Its open source design is more cost-effective than conventional systems, aiming to inspire innovation and adaptation across the open source community.

Principal Investigator: Scott H. Ensign

Resolving Sediment Connectivity Between Rivers and Estuaries by Tracking Particles With Their Microbial Genetic Signature

Funded by: National Science Foundation and Stroud Water Research Center

This project explores how the molecular characteristics of microbes attached to sediment particles can help identify the sources of sediment in estuaries. The broader impacts include the creation and pilot of high school curricula.

Principal Investigators: Scott H. Ensign and Jinjun Kan

Collaborators: Steven C. Kerlin and Tara K. Muenz

Collaborating Organization: Shore Rivers and Assateague Coastal Trust

Clean Water



Dynamics of Phytoplankton Growth and Transport in River Networks From Local to Continental Scales

Funded by: National Science Foundation

Researchers examine how fluctuations in river algae levels during river floods can help identify the impact of nitrogen and phosphorus on the Delaware River and other rivers in the United States.

Principal Investigators: Marc Peipoch, Scott H. Ensign, and Melinda D. Daniels

Mayflies, Stoneflies, and Caddisflies for Ecotoxicity Studies

Funded by: Eurofins

Aquatic insects have long been essential in assessing stream health and setting water quality standards based on aquatic ecotoxicity studies. This project uses field collections and laboratory rearing to provide specimens for acute and chronic ecotoxicity experiments.

Principal Investigator: John K. Jackson



Microbial Population Dynamics of Periphyton Biofilms in White Clay Creek

Funded by: Stroud Water Research Center

Under natural conditions, this project grows biofilms at three different stream reaches to understand how differences in stream vegetation affect microbial community assembly and their distribution.

Principal Investigator: Jinjun Kan



Emerging Contaminants and Their Interactions With Stream Biofilms

Funded by: Stroud Water Research Center

Led by a Stroud Center scientist, interns conduct scientific investigations of emerging contaminants (including pesticides and microplastics) and how they impact the structure and function of microbial biofilms in streams.

Principal Investigator: Jinjun Kan

Water Quality and Bacteria Monitoring in Red Clay Creek

Funded by: Nyssa Foundation

Scientists monitor fecal indicator bacteria on a monthly basis in the East and West branches of the Red Clay Creek Watershed.

Principal Investigator: Jinjun Kan

Recovery of Nutrient Processes and Microbial Communities in Relict Hydric Soils Following Restoration

Funded by: U.S. Department of Agriculture

“At Trail Creek, our business is built around time spent outside, and much of that depends on healthy freshwater systems. The work the Stroud Center does to research and protect our waterways helps preserve the natural places that make this region so special. Through our annual film festival, we’re proud to support their mission and help invest in the health of our local waters.”

– KYLE HAVERTINE, CO-OWNER, TRAIL CREEK OUTFITTERS

Brothers Kyle and Brett Havertine are the co-owners of Trail Creek Outfitters.



This research explores how microbes and biogeochemical processes in buried relict soils change after floodplain restoration and how these organisms and processes can be harnessed to remove nitrogen before it pollutes streams. This will help practitioners design restoration projects with conditions that fast-track microbial recovery and nitrogen processing.

Principal Investigators: Jinjun Kan and Marc Peipoch

Collaborating Organization: University of Delaware

Saturated, Suffocated, and Salty: Hotspots of Dissimilatory Nitrate Reduction in Anoxic Riparian Soils

Funded by: National Science Foundation

Riparian soils above low-head dams (mildams) usually contain large amounts of bioavailable nitrogen that could impair the adjacent streams if it becomes mobilized. This project investigates the origin of the nitrogen stored in the riparian soils above mildams, the dominant processes controlling its transformation, and its risk of being released into the stream.

Principal Investigators: Marc Peipoch and Jinjun Kan

Collaborating Organizations: Berkeley National Laboratory and University of Delaware

Monitoring Harmful Algal Blooms in Two Reservoirs Serving the City of Wilmington, Del.

Funded by: City of Wilmington

Researchers are deploying and maintaining two sampling buoys to gather real-time data on algae populations in two Wilmington, Del., reservoirs. Data will be used to predict and prevent the development of algal blooms.

Principal Investigator: Marc Peipoch

Using Microbial Source Tracking to Identify Potential Bacterial Sources in White Clay Creek

Funded by: City of Newark, White Clay Watershed Association, and White Clay Creek Wild and Scenic River Program

Scientists are monitoring fecal indicator bacteria in White Clay Creek during summer and identifying potential bacterial

contamination by molecular microbial source tracking. The goal is to determine where the bacteria likely come from and which best management practices and implementation strategies are most effective.

Principal Investigator: Jinjun Kan

Collaborating Organizations: White Clay Creek Wild and Scenic River Program and City of Newark

Restoration Research Linking Farming Practices, Soil Health, and Water Quality

Funded by: Foxwynd Foundation, Blue Yak Foundation, and Marshall-Reynolds Foundation

Principal Investigators: John K. Jackson, Charles L. Dow, and David B. Arscott

Collaborating Organizations: Alliance for the Chesapeake Bay, Alliance for Aquatic Resource Monitoring at Dickinson College, and Isaak Walton League of America

Land Use and Restoration Impacts



Carbon Stock Assessment of Planted Riparian Buffers

Funded by: Pennsylvania Department of Agriculture

This project quantifies carbon storage in restored riparian forests of varying ages across eastern Pennsylvania.

Principal Investigators: Melinda D. Daniels and Diana Oviedo Vargas

Long-Term Research in Environmental Biology: River Ecosystem Responses to Floodplain Restoration

Funded by: National Science Foundation

After 25 years of litigation, a large-scale ecological restoration is transforming Montana’s Upper Clark Fork River. Over 70 kilometers of floodplains are being restored, with metal-laden soils removed and floodplains reconnected to river floods. Using long-term data, the project explores how ecosystems respond to changing nutrients and restoration, advancing ecological theories to guide future efforts.

Principal Investigator: Marc Peipoch

Collaborating Organizations: Montana State University and University of Montana

Literature Review: Building Climate Resilience in Stream Restoration Practices

Funded by: Chesapeake Bay Trust

This review of published peer-reviewed research identifies river restoration techniques that effectively mitigate climate change impacts.

Principal Investigators: Melinda D. Daniels, Marc Peipoch, and Steven C. Kerlin

Model My Watershed and Monitor My Watershed Enhancements

Funded by: Amazon Web Services Inc.

Enhancements to Model My Watershed and Monitor My Watershed, two applications within the Stroud Center’s WikiWatershed initiative, will expand global land use and stream network coverage while improving functionality across both platforms.

Principal Investigators: Element 84, LimnoTech, David B. Arscott, and Scott Ensign



Watershed-Scale Evaluation of Restoration Practices on Water Quality Improvement

Funded by: Pa. Department of Community and Economic Development and Stroud Water Research Center

To evaluate how watershed restoration practices improve stream health and water quality, scientists are monitoring nutrient and sediment loads and macroinvertebrates before, during, and after watershed-scale restoration.

Principal Investigators: Diana Oviedo Vargas, Jinjun Kan, Melinda D. Daniels, John K. Jackson, Marc Peipoch, and Matthew J. Ehrhart

Tropical Ecosystems



Forest Restoration on Indigenous Lands: Restoring Biodiversity for Multiple Ecosystem Services, Community Resilience, and Financial Sustainability Through Locally Informed Strategies and Incentives

Funded by: Global Centre on Biodiversity for Climate
Panama contains vast Indigenous territories of mixed land use. This project seeks to facilitate development of economically sustainable reforestation approaches to expand contiguous forest cover and improve Indigenous livelihoods.

Principal Investigator: Melinda D. Daniels

Collaborating Organization: Smithsonian Tropical Research Institute and Cornell University



Forest Restoration and Tropical Watershed Hydrology in Central Panama

Funded by: Smithsonian Tropical Research Institute and Stroud Water Research Center

Tropical watershed land use strongly controls hydrologic response and delivery of fresh water to population centers and critical infrastructure like the Panama Canal. This project evaluates long-term watershed hydrologic response to forest restoration and other land cover treatments in the Agua Salud experimental watersheds.

Principal Investigator: Melinda D. Daniels

Collaborating Organization: Smithsonian Tropical Research Institute

Knowledge and Stewardship of Freshwater Ecosystems in Costa Rica and Around the World

Funded by: Tupper Family Foundation

This project contributes to ongoing operations, monitoring, and synthesis of long-term research at Maritza Biological Station in Costa Rica. Seed funding advances collaborations between the Stroud Center and the Smithsonian Tropical Research Institute. In partnership with locally-based nonprofit partners such as ConnectOcean, it also expands education opportunities for youth in the Área de Conservación Guanacaste.

Principal Investigators: David B. Arscott, Diana Oviedo Vargas, John K. Jackson, and Steven C. Kerlin

Silk Grass Farms Water Resources Assessment

Funded by: Cabot-Kjellerup Foundation

This project evaluates water resources at Silk Grass Farms in Belize through physical, biological, and chemical indicators and identifies potential activities at the farms that may be degrading or improving the quality of the water resources.

Principal Investigators: Diana Oviedo Vargas, Melinda D. Daniels, John K. Jackson, Jinjun Kan, and Marc Peipoch

Biodiversity and Wildlife Habitat



Evaluating the Effects of Invasive Mud Snails on the Delaware River Basin

Funded by: National Fish and Wildlife Foundation

Scientists are evaluating the negative effects of an invasive species, the New Zealand mud snail, on trout and shad populations in the Delaware River basin by combining laboratory tests and extensive field work monitoring.

Principal Investigators: Marc Peipoch and John K. Jackson

Monitoring Fish Populations and Stream Habitat Quality for the National Park Service

Funded by: National Park Service

This project monitors biological conditions, water quality, habitat integrity, and fish at 37 sites in 10 national parks in the National Capital Region Network around Washington, D.C. The National Park Service will use the findings of this project to inform conservation and management decisions in the parks.

Principal Investigators: Marc Peipoch, Melinda D. Daniels, Diana Oviedo Vargas, John K. Jackson, Jinjun Kan, and Scott H. Ensign

North American Macroinvertebrate Taxonomic Certification Program

Funded by: Society for Freshwater Science

This program coordinates and executes the taxonomic certification program for the Society for Freshwater Science, conducting family- and genus-level tests throughout the year.

Principal Investigators: John K. Jackson and Bernard W. Sweeney

Collaborator: Michael C. Broomall

White Clay Creek Fish Passage Assessment

Funded by: White Clay Creek Wild and Scenic

This project examines whether the lower White Clay Creek in Delaware provides suitable habitat for migratory fish like American shad.

Principal Investigator: Melinda D. Daniels



For the past four years, the Stroud Center has partnered with Wilmington, Delaware, to monitor the city's reservoir in real time, streaming data directly to the water treatment facility. In 2025, researchers reported findings that help identify the sources of harmful algae blooms and the pollution fueling them in connected waterways, helping protect the city's drinking water.

Education Projects

Community Outreach



Leaf Pack Stream Ecology Kit and International Network

Funded by: Stroud Water Research Center and the Consortium for Scientific Assistance to Watersheds

This bilingual international program engages students, teachers, families, and the public in water quality monitoring through the lens of aquatic macroinvertebrates.

Project Lead: Tara K. Muenz

Collaborator: Steven C. Kerlin

On-the-Water Watershed Education Programs

Funded by: National Park Foundation, Pa. Educational Improvement Tax Credit Program, Pa. Fish and Boat Commission, and program fees

To provide equitable access to safe outdoor aquatic recreation, raise awareness of related careers, and foster environmental awareness, Stroud Center educators take Scouts, school groups, and public audiences on the water for fishing and canoeing programs. The project includes the creation of a new National Park Service Junior Ranger Angler family activities booklet and award.



Caln Elementary students engage in hands-on science with Stroud Center educators, exploring the forest, learning to fish, and uncovering the hidden world of stream life.

STEM Education for Youth

With ongoing support from our donors, Stroud Center educators deliver programming to underserved populations in environmental STEM. Partnerships with Mighty Writers El Futuro, The Garage Community & Youth Center, Scouting America, and Girl Scouts of the USA extend the reach of these programs to marginalized communities. Working with communities of color, socioeconomically disadvantaged populations, women and girls, English language learners, and others disproportionately harmed by environmental injustice, the Stroud Center is building long-term relationships that meet the environmental education needs of diverse audiences.

Project Leads: Steven C. Kerlin, Kathryn Difo, and Tara K. Muenz

Collaborators: David Kline and Steve Mohapp

Collaborating Organization: White Clay Creek Preserve (Pa. Department of Conservation and Natural Resources)



Source to Sea Explorer Curriculum

Funded by: Stroud Water Research Center and Anonymous Stroud Center educators are collaborating with ConnectOcean to create a Source to Sea curriculum that will be distributed internationally to schools and scuba diving centers.

Project Leads: Ernst van der Poll (ConnectOcean) and Kathryn Difo

Collaborators: David B. Arscott, Steven C. Kerlin, Tara K. Muenz, and Mary Paxton-Boeni

Educator Professional Development and Curriculum



Environmental Literacy and MWEE Capacity Building in Delaware School Districts

Funded by: National Oceanic and Atmospheric Administration

This project strengthens state and school district capacity to integrate environmental literacy (E-Lit) and Meaningful Watershed Educational Experiences (MWEEs) into student learning in Delaware. Collaborators create a Delaware MWEE Facilitator Guide and work directly with the Caesar Rodney and Appoquinimink school districts and the Sussex Montessori Charter School in Delaware to expand environmental education and develop E-Lit plans that serve as models for other districts.

Project Lead: David Christopher (Del. Sea Grant)

Collaborators: Steven C. Kerlin and David Kline

Collaborating Organizations: Del. Department of Education, Del. Nature Society, and Del. Association for Environmental Education

Sustainably and Systemically Supporting the Pennsylvania Environmental Literacy Network

Funded by: National Oceanic and Atmospheric Administration and Pa. Department of Education

This statewide project expands and strengthens the Pa. Environmental Literacy Network and its six regional hubs. It provides statewide professional development in Meaningful Watershed Educational Experiences and the new state standards, and it revitalizes the Pa. Pathways to Green Schools program.

Project Leads: Tamara Pepper (Pa. Department of Education), Steven C. Kerlin, and Michelle Niedermeier (Pa. Sea Grant Program)

Collaborators: Steve Mohapp, Heather Brooks, Millersville University, Pa. Association of Environmental Educators, Pa. Bureau of State Parks, Pa. Department of Agriculture, Pa. Department of Education, Pa. Department of Environmental Protection, Pa. Intermediate Units, and Penn State Extension

Professional Development of MWEEs in the Pa. STEELS Standards at Avon Grove and Octorara Area School Districts

Funded by: National Oceanic and Atmospheric Administration

This project provides training and assistance in developing Meaningful Watershed Educational Experiences (MWEE) curricula. Pilot MWEE lessons are implemented with students

from the Avon Grove and Octorara Area school districts.

Project Leads: Tara K. Muenz and Steven C. Kerlin

Collaborator: Chester County Intermediate Unit

GIS-Based Professional Development: Helping K-12 Teachers Overcome Obstacles Due to COVID-19

Funded by: Pa. Sea Grant, National Oceanic and Atmospheric Administration, and Pa. Dept. of Education

This project builds capacity and advances environmental literacy by helping educators in the Lake Erie, Susquehanna River, and Delaware Estuary watersheds integrate geospatial technology into their teaching. Partners develop, implement, and research a professional development module that uses GIS to support watershed-based inquiry practices during physical distancing and limited mobility.

Project Leads: Tamara Pepper (Pa. Department of Education), David Kline, and Michelle Niedermeier (Pa. Sea Grant)

Collaborator: Steven C. Kerlin

Expanding the Lancaster Outdoor Learning Network

Funded by: Lancaster Clean Water Partners

This project expands outdoor watershed education in Lancaster schools through teacher training, student projects, Pa. standards alignment, and water stewardship skill building.

Project Leads: Tara K. Muenz; Sallie Gregory (Lancaster Conservation District)

Collaborator: Steven C. Kerlin

Watershed and Wildlife Improvement Projects for Plain Communities

Funded by: Lancaster Clean Water Partners

This project delivers watershed and wildlife conservation education to Amish and Mennonite youth and families in rural eastern Lancaster County by building environmental literacy, supporting teachers, promoting stream health and habitat, and creating culturally informed tools for future conservation work.

Project Leads: Tara K. Muenz; Lamonte Garber, and Heather Titanich

Collaborator: Kay Moyer

Education Research



Improving Student and Teacher Engagement With National Parks of the Potomac River Watershed

Funded by: National Park Service (NPS)

Using a mixed-methods research design, Stroud Center educators provide recommendations for the future of NPS watershed education. Data is gathered from surveys of schools in the D.C. metro region, interviews with school and NPS staff, and site visits to national parks.

Project Lead: Steven C. Kerlin

Collaborators: Nanette Marcum-Dietrich (Millersville University); David Kline; Kathryn Difo

Collaborative Research: Developing and Testing Innovations: Environmental Education via Integrated Spatial Computing for STEM in Elementary Schools (ENVISION)

Funded by: National Science Foundation

This four-year project develops and studies new spatial computing tools to enhance a watershed curriculum for fifth-

grade students in West Virginia and Delaware. Teachers receive professional development and then implement the curriculum with new features, including augmented reality, virtual reality, a new Runoff Simulation web app, and AI career avatars

Project Leads: Steven C. Kerlin; Nanette Marcum-Dietrich (Millersville University); Tamara Smith (West Virginia University Institute of Technology)

Collaborators: Kathryn Difo, Tara K. Muenz, and David Kline

Collaborating Organizations: Millersville University and WVU Institute of Technology

Research, Develop, and Evaluate New Ocean, Great Lakes, and Watershed Curricula for the New Pa. Standards

Funded by: Pa. Sea Grant, National Oceanic and Atmospheric Administration

Researching the most engaging ways to design watershed curricula to the new Pa. standards, Stroud Center educators and partners create three model curricula, recommendations for designing Meaningful Watershed Educational Experiences units of study to the new state standards, and evaluation rubrics for curricula units. They also facilitate review panels for additional curricula.

Project Leads: Nanette Marcum-Dietrich (Millersville University); Kathryn Difo

Collaborators: Tara K. Muenz, David Kline, Mary Paxton-Boeni, and Steve Mohapp

Collaborating Organization: Pa. Sea Grant and Pa. Department of Education

Student Programs



Costa Rica Study Abroad

Funded by: Virginia Wesleyan University

Virginia Wesleyan University students joined the Stroud Center for one week in the Área de Conservación Guanacaste region of Costa Rica for an immersive study-away experience.

Project Leads: Kathryn Difo, Steven C. Kerlin, and Diana Oviedo Vargas

Collaborator: Virginia Wesleyan University HerStory in STREAM and independent student projects

Water Quality Monitoring and Education Enrichment

Funded by: Fair Play Foundation

Educators partner with The Lawrenceville School to study water quality on their campus and support the Leopold Scholars Program.



At the Stroud Center, Elk County teachers explore aquatic macroinvertebrates, unpack new state education standards, and practice real science to bring back to their classrooms.

Project Leads: Tara K. Muenz, David Bressler, and Stephanie Bernasconi; Stephen Laubach (The Lawrenceville School)

Independent Student Research

Funded by: The Fund for Women and Girls of Chester County and Auman Family Foundation

Students explore careers, individual research, and service projects related to watershed education, such as graduation, honors, and Eagle Scout projects.

Project Leads: Tara K. Muenz and Kathryn Difo

Collaborators: Steve Mohapp and Steven C. Kerlin

Meaningful Watershed Investigations of the NPS White Clay Wild and Scenic River

Funded by: National Park Foundation

A three-session model of watershed lessons is delivered to fifth-grade students and teachers within the Red Clay Consolidated School District and White Clay Creek Watershed.

Project Leads: Steven C. Kerlin, Tara K. Muenz, Brian Mattix and Sonia Saunders (Red Clay Consolidated School District)

Collaborators: White Clay Watershed Association, National Park Service, and White Clay Creek Wild and Scenic River Program

Environmental Education for the Oxford Area Community

Funded by: Anonymous

Stroud Center educators partner with schools, community groups, Glenroy Preserve, a local library, and others to expand environmental education for the Oxford area community.

Project Leads: Steven C. Kerlin and Kathryn Difo

Collaborators: Tara K. Muenz, David Kline, and Steve Mohapp

Watershed Education Programs in Parochial Schools in the Greater Philadelphia Region

Funded by: Connelly Foundation

Teachers within the Archdiocese of Philadelphia engage in professional development and K-12 field study experiences in watershed education.

Project Leads: Steven C. Kerlin and Steve Mohapp

Collaborators: Kathryn Difo and Tara K. Muenz

Watershed Education for After-School Programs

Funded by: North American Association for Environmental Education eeBLUE and 21st Century Community Learning Centers

Stroud Center educators design and deliver a set of 10 after-school programs with Avon Grove School District, Harambee Institute for Science and Technology, and West Chester Area School District for its summer enrichment programming.

Project Leads: Kathryn Difo and Steve Mohapp

Collaborators: Steven C. Kerlin, David Kline, and Tara K. Muenz

Watershed Education School Programs

Funded by: Meridian Bank, PECO, First Resource Bank, Brown Brothers Harriman, Rush Order Tees, Ninja Transfers, PPL, First Citizens Community Bank, CCRES, Aqua Pa. Environmental Education Council, Pa. American Water, Kimberton Whole Foods, National Bank of Malvern, and White Clay Watershed Association

“I am convinced that clean, adequate water supplies are the most valuable resource for our future. Stroud Water Research Center is addressing this through education, scientific research, and by increasing community awareness. I enjoy volunteering for the Stroud Center, especially in the pollinator gardens, and seeing directly how my donations are put to good use.”

– JANET FASSBENDER



Prioritizing environmental justice communities, educators deliver meaningful and inclusive environmental STEM programs that are tailored to meet the needs of participating schools. Programming supports middle school students at the Stroud Center, online, and through the Watershed Education Mobile Lab.

Project Leads: Steven C. Kerlin and Tara K. Muenz

Outdoor Learning Spaces



Habitat Restoration and Outdoor Education in the Red Clay Consolidated School District (Del.)

Funded by: National Fish and Wildlife Foundation

Underutilized space on six school campuses within the school district is restored through student-led Green Teams, district staff, and a network of community partners. The project benefits wildlife and water quality, and it enables meaningful outdoor learning opportunities for teachers, preK-12 students, and parents.

Project Lead: Brian Mattix (Red Clay Consolidated School District)

Collaborators: Steven C. Kerlin and Tara K. Muenz

Collaborating Organization: Del. Nature Society

Improving Schoolyards for Outdoor Environmental Education and Stewardship Across Southeast Pa. (Cohorts 3 and 4)

Funded by: Pa. Department of Environmental Protection

Educators collaborate with local schools and their districts to design and construct outdoor learning spaces on school grounds and to create lessons tailored to each space.

Project Leads: Tara K. Muenz and Steven C. Kerlin

Streamside Forests Curriculum

Funded by: Pa. Department of Environmental Protection

Stroud Center educators design forestry lessons to meet Pennsylvania's new Science, Technology & Engineering, and Environmental Literacy & Sustainability Academic (STEELS) Standards for K-12 schools. The project also pilots the learning activities with schools.

Project Lead: Steve Mohapp



(A) NFL Hall of Fame Coach Dick Vermeil believes in investing in the future – both in people and clean water. After erosion and runoff began threatening the creek on his Pennsylvania ranch, he partnered with the Stroud Center to restore streamside forests that filter pollution, stabilize streambanks, and improve water quality. In 2025, Vermeil brought that commitment to the Stroud Center’s Follow the Rivers campaign, encouraging others to take action for healthy rivers and clean water. Learn more at stroudcenter.org/rivers. *Photo: Jennifer Foster* (B) In 2025, the first farmers joined a new partnership among the Stroud Center, Penn State, and the Pennsylvania Soil Health Coalition to evaluate the financial returns of soil health practices. By documenting benefits for both farms and water quality, the project aims to support wider adoption across the watershed. *Photo: Andrew Lefever, Penn State University*

Water Restoration Projects

Streamside Forest Restoration



Riparian Buffer Planning, Planting, and Maintenance

Funded by: National Fish and Wildlife Foundation, Pa. Department of Conservation and Natural Resources, and Pa. Department of Environmental Protection

The Stroud Center works with landowners, agricultural producers, and local partners across Pennsylvania to accelerate the planning, installation, and long-term success of riparian forest buffers that protect streams and improve water quality. Projects in Lancaster, Chester, and other counties throughout the Susquehanna River basin, Chesapeake Bay watershed, and Delaware River watershed include buffer design and planting, livestock exclusion practices, post-planting establishment and maintenance, and landowner outreach and engagement. This work supports locally led clean water plans, County-Wide Action Plans, and targeted watershed restoration initiatives by reducing polluted runoff, restoring streamside habitat, and strategically expanding buffers in priority areas where they can deliver the greatest water quality and ecological benefit

Project Lead: Matthew J. Ehrhart

Collaborating Organizations: Lancaster Clean Water Partners, Mowery Environmental, TeamAg, Weaver Environmental Consulting, Weaver Environmental Partners, Alliance for the Chesapeake Bay, Bradford County Conservation District, Chester County Conservation District, The University of Pennsylvania Veterinary School New Bolton Center, Western Pennsylvania Conservancy

Conservation Outcomes and Return on Investment



Advancing Markets for Producers

Funded by: U.S. Department of Agriculture

The Stroud Center partners with the Conservation Innovation Fund Mid-Atlantic Partnership to connect regenerative farming practices with new market opportunities for agricultural producers from New York to North Carolina.

Through farmer outreach and project implementation, this work helps producers adopt practices that improve soil health and water quality while enhancing the economic viability of their operations.

Project Lead: Matthew J. Ehrhart

Collaborating Organizations: Conservation Innovation Fund, Maola Local Dairies, Alliance for the Chesapeake Bay, Alliance for the Shenandoah Valley, Lancaster Clean Water Partners, and Ecosystem Services Market Consortium

Soil Health



Improving Soil Health and Water Quality

Funded by: National Fish and Wildlife Foundation, Amazon Web Services, and Pa. Department of Environmental Protection

The Stroud Center works with farmers and conservation partners across Pennsylvania, the Chesapeake Bay watershed, and the Mid-Atlantic region to advance regenerative farming practices that improve soil health, reduce nutrient and sediment loss, and strengthen farm resilience. Projects support the adoption of cover crops, no-till systems, enhanced nutrient management, and other soil health-focused practices through technical assistance, outreach, implementation support, and improved tracking of conservation outcomes. This work helps agricultural producers improve productivity, long-term sustainability, and market opportunities while protecting freshwater resources through science-based conservation practices.

Project Lead: Matthew J. Ehrhart

Collaborating Organizations: Alliance for the Chesapeake Bay, Pennsylvania No-Till Alliance, Penn State University, and U.S. Geological Survey

Stakeholder Engagement



Building Partnerships and Engagement for Watershed Restoration

Funded by: National Fish and Wildlife Foundation, High Foundation, and U.S. Department of Agriculture

The Stroud Center works with landowners, farmers, conservation professionals, and regional partners across Pennsylvania and the Chesapeake Bay watershed to strengthen collaboration and expand participation in watershed restoration efforts. Projects include stakeholder engagement, landowner outreach, conservation education, professional training and mentorship, funding coordination, and facilitation of regional advisory groups and technical roundtables focused on riparian restoration and agricultural conservation practices. This work helps build local capacity, increase awareness and adoption of conservation solutions, and support long-term stewardship of freshwater resources and working landscapes.

Project Lead: Matthew J. Ehrhart

Collaborating Organizations: Penn State University, Virginia Tech, University of Maryland, Utah State University, Ohio State, Washington State, and James River Association

Citizen Science



William Penn Foundation CitSci Monitoring Year 3

Funded by: William Penn Foundation

This project strengthens the capacity of Delaware River Watershed Initiative (DRWI) partners and volunteer monitoring programs to support watershed restoration and conservation efforts. Through training in stream ecology and water quality monitoring, partners gain the knowledge and tools needed to assess watershed conditions, measure conservation outcomes, and evaluate changes in water quality over time. Data collected through this effort informs restoration planning, guides management decisions, and helps partners communicate the impact of conservation investments across the region.

Project Lead: Matthew J. Ehrhart

Whole-Farm Stewardship



Whole-Farm Conservation and Riparian Restoration

Funded by: Pennsylvania Department of Environmental Protection and National Fish and Wildlife Foundation

Working with agricultural producers across Lancaster and Chester Counties and other regions of Pennsylvania, the Stroud Center advances whole-farm conservation systems that improve water quality, reduce nutrient and sediment runoff, and strengthen stream health. Projects include the design and implementation of agricultural best management practices (BMPs), nutrient management planning, streambank stabilization, and on-farm conservation practices identified through farm conservation plans. Across multiple watersheds, including the Chesapeake Bay and Delaware River basins, this work helps accelerate adoption of science-based conservation practices that support regional water quality goals and healthier freshwater ecosystems.

Project Lead: Matthew J. Ehrhart

Collaborating Organizations: Propagate Ventures, Chester County Conservation District, Team Ag, Mowery Environmental, and Weaver Environmental Consulting



The first American kestrel to occupy a nest box installed on one of the Stroud Center's farmer partners' properties successfully raised her first brood in spring 2025. The return of this declining grassland bird shows how the Stroud Center is helping create lasting benefits for wildlife, water quality, and future generations. *Photos: Steve Eisenhauer*

Conserving Farmland Raptors in the Chesapeake Bay Watershed

Funded by: National Fish and Wildlife Foundation

This project builds on existing riparian forest buffer investments across the Chesapeake Bay watershed by expanding their value for wildlife conservation. In partnership with Hawk Mountain Sanctuary, the Stroud Center works with landowners to create nesting opportunities for priority bird species, including the American barn owl and American kestrel, at established buffer sites. Wildlife monitoring helps assess habitat use and demonstrates how watershed restoration projects can generate benefits beyond water quality, supporting both biodiversity and healthy freshwater ecosystems.

Project Lead: Matthew J. Ehrhart

Collaborating Organization: Hawk Mountain Sanctuary

The Robin L. Vannote Watershed Restoration Program

The Robin L. Vannote Watershed Restoration Program turns research into real-world impact, working across the landscape to protect fresh water. By coordinating federal, state, local, nonprofit, and private resources, our restoration experts partner with farmers and landowners to implement customized solutions – from livestock fencing to streamside forests. This map showcases 2025 project locations and key annual metrics, with total impact continuing to expand as multiyear projects progress.



— Watersheds ● 2025 Projects

Bradford COUNTY

-  **28 acres** of Buffers
-  **3,500 ft** of Fencing
-  **1** Stream Crossing
-  **5** Healthy Water Sources For Livestock
-  **5** Townships

Lebanon COUNTY

-  **2 acres** of Buffers
-  **1** Township

Chester COUNTY

-  **62 acres** of Buffers
-  **955 ft** of Fencing
-  **1** Stream Crossing
-  **10** Townships

Lancaster COUNTY

-  **46 acres** of Buffers
-  **8,175 ft** of Fencing
-  **1** Stream Crossing
-  **16** Townships



From left to right: Bill and Helen Elkins; Volunteers plant trees in a new riparian buffer at Buck Run Farm in 2016; Bill Elkins and Bern Sweeney, former executive director.

It is with deep gratitude and sadness that Stroud Water Research Center remembers and celebrates William “Doc” Elkins, M.D., whose unwavering dedication shaped the Stroud Center’s trajectory and legacy.

When the Stroud Center separated from the Academy of Natural Sciences of Philadelphia (now Drexel University) and embarked on a path to become an independent nonprofit, Bill was one of the first to step forward. He volunteered to serve as a founding board member, bringing with him a rare combination of scientific expertise, practical land-based insight, and genuine devotion to our mission.

From those earliest days onward, Bill was all in. He attended nearly every board meeting and became one of the few to participate consistently in senior staff meetings, offering thoughtful guidance and encouragement at nearly every turn.

Buck Run Farm, his nearly 300-acre grass-fed Angus cattle farm on the old King Ranch in Chester County, became an invaluable site for Stroud Center research. He generously offered his land for experimental plots and riparian forest restoration, helping translate freshwater science into practice.

He also strengthened the Stroud Center’s network by introducing key supporters and facilitating significant donations. Bill encouraged family, friends, and connections to invest their time and resources and persuaded many to allow the Stroud Center to plant trees and restore streams on their properties. In doing so, he helped advance best practices for watershed health across the region.

Bill earned a medical degree from Harvard University and had a distinguished career as a scientist, researcher, and professor

at the University of Pennsylvania before retiring to run the cattle ranch with his wife, Helen. His background made him uniquely equipped to appreciate the rigor and relevance of freshwater science.

He had a deep understanding of soil health, ecology, and restoration and was an enthusiastic reader of *Science*. His thoughtful feedback helped shape the Stroud Center’s communication style, making presentations more accessible to non-scientists and more compelling to landowners and community partners.

Bill served as a trustee of the Stroud Foundation and as a board member after the Stroud Center’s separation from the academy, participating on the executive, science, and governance committees. Even after reaching his board term limit, Bill continued attending staff meetings and events. His devotion to the Stroud Center never waned.

A lifelong outdoorsman who loved sailing and fishing, Bill carried a personal appreciation for land and water. That love shaped everything he gave to the Stroud Center – time, resources, land, insight, and heart.

Bill Elkins leaves a legacy woven into the very fabric of the Stroud Center. We remain profoundly grateful for his friendship, his guidance, and his belief in what this center for freshwater science could become.

GIFTS IN MEMORY OF DR. WILLIAM ELKINS

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Keith R. Straw
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Bern and Andrea Sweeney
Kate Zernike



Photo: Jennifer Foster

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2025

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Nanette Marcum-Dietrich, Ph.D.
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The Stroud Center gratefully acknowledges the many years of dedicated service of Margaretta Brokaw and Charles Porter Schutt III, who reached their term limits for board service on December 6, 2024.

It is with great sadness that we acknowledge the loss of Frederick L. Meserve Jr. and Rodman W. Moorhead III, both staunch advocates for the Stroud Center as board members and board emeriti.

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‡ The Maritza Biological Station staff is employed by the Asociación Centro de Investigación Stroud, a nongovernmental organization in Costa Rica that serves as the umbrella organization for all of the Stroud Center's research and education activities in Central and South America.

Gifts and Contributions

We gratefully acknowledge the 564 donors who contributed \$866,366 to the 2026 annual fund. Your generosity gives us the stability to pursue all the questions that matter, not just the ones that are funded. On behalf of all of us at the Stroud Center, thank you for supporting science today for water tomorrow!



Corporate Matching Gift

Double your donation with an employer match. Email development@stroudcenter.org to find out if your employer participates.

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The Water's Edge gala brings together the community to celebrate an individual making a global impact for clean fresh water.
Photo: Jana Bannan Photography

Care has been taken to ensure the accuracy of this listing. We regret any omission and ask that you bring any corrections to our attention.

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The Water's Edge is always a great place to connect with old friends and meet new ones.



Guests enjoy celebrating the 2025 Stroud Award for Freshwater Excellence recipient, Paul O'Callaghan, Ph.D., at The Water's Edge.

Mr. Cuyler H. Walker
Robert Wendelgass
White Clay Fly Fishers Club
Holly Wolfe and Brian Lee

\$100 TO \$249

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John Jackson*
Mr. George Xakellis
Connie Zehr *as a gesture of
support from Canada*
Kate Zernike
Laura* and David Zgleszewski
Steven Zook

UP TO \$99

*We are very grateful to 171
donors for their contribution.*



Open Water provides a plastic-free water option for golfers during the "Fore" Fresh Water Golf Invitational.

SPECIAL GIFTS
Preserving the Past, Building the Future - Cabin Restoration Project

- Franny and Franny Abbott
- Bryan and Jayme Colket
- E. Kneale Dockstader Foundation
- Libby Gregg
- The Laffey-McHugh Foundation
- Longwood Foundation
- The McLean Contributionship
- Sally Peirson and John Baker
- David C. Richardson
- Mr. and Mrs. Raymond P. Sarnacki
- Anne Stroud
- Welfare Foundation



- Barry and Therese Bentley - Watershed Restoration Projects
- Keith A. Bentley - 2026 Class of Interns
- Blue Yak Foundation - Operational Funds for the Maritza Biological Station in Costa Rica and Restoration Research
- Martin and Cathy Brown - Future of Fresh Water Initiative in honor of Roddy Moorhead and the Rodman Moorhead III Family
- Foxwynd Foundation - Restoration Research
- High Foundation - Expanding Outreach for Forested Buffers throughout Lancaster County
- Michelle Duval and Scott Ensign - Future of Fresh Water Initiative
- Susan Ensign - Future of Fresh Water Initiative
- The James Family Charitable Trust - Communications and Marketing Strategy
- Marshall-Reynolds Foundation - Forest Seedling Buffer Care and Restoration Research
- Moorhead Family Foundation - Future of Freshwater Initiative
- John and Mary Pepe - Future of Fresh Water Initiative

- Mr. and Mrs. Stephen Stroud - Operational Funds for the Maritza Biological Station in Costa Rica

EDUCATIONAL IMPROVEMENT TAX CREDIT PROGRAM

The Education Department gratefully acknowledges these businesses for their support through Pennsylvania's EITC program. These dollars are used specifically to subsidize costs associated with field trips from Pennsylvania public schools.

- Brown Brothers Harriman
- First Resource Bank
- Meridian Bank
- M&T Bank
- The National Bank of Malvern
- PECO
- PPL



First Resource Bank continues to be a great supporter of EITC programming for students.

Financials

Operating Statement

for the year ended December 31, 2025

Revenues and Support

Watershed Restoration Program	\$4,053,351
Endowment	2,771,948
Research Programs (Grants and Contracts)	2,020,586
Annual Fund	866,366
Education/Public Programs	705,141
Other Contributions and Income	630,387

Total Revenues and Support \$11,047,779

Expenditures

Watershed Restoration Program	\$3,745,186
Research	2,951,437
Facilities	1,206,471
Finance and Administrative	892,951
Education	694,341
Information Services	573,900
Development/Outreach	492,986
Communications	315,008
Other	175,499

Total Expenditures \$11,047,779

Financial Information

Stroud Water Research Center is a 501(c)(3) nonprofit organization registered with the Pennsylvania Bureau of Charitable Organizations. Gifts to Stroud Water Research Center are tax deductible on a U.S. return as allowed by law. The Stroud Water Research Center Employer Identification Number (EIN) is 52-2081073. The fiscal year is January 1 to December 31. The annual audit is performed by Belfint, Lyons & Shuman P.A. Investment assets are managed by The Colony Group, Passive Capital Management, and Brown Advisory. The Stroud Center is also the beneficiary of the Morris W. Stroud 3rd Pennswood No. 2 Trust managed by the Glenmede Trust Company.

Privacy Statement

Stroud Water Research Center donor records are not sold, bartered, leased, exchanged, or otherwise provided to any outside organizations.



join
us

We hope you'll join us for fabulous events, either virtually or in person, this year. Go to stroudcenter.org/events to learn more.

Sponsors and Volunteers

World Water Day

SPONSORS

Eurofins

IN-KIND DONORS

PA American Water

VOLUNTEERS

Students from the Oxford Area High School Environmental Club

"Fore" Fresh Water Golf Outing

SPONSORS

Founding Greens Sponsor

Moorhead Family Foundation

Eagle Sponsor

Mr. and Mrs. Michael Moran

SWAG Sponsor

Brown Brothers Harriman Trust
Company of Delaware

Water Sponsor

Open Water

Beverage Sponsor

Tito's Handmade Vodka

Putting Green Sponsor

PS & Daughters

Golf Cart Sponsor

Bryn Mawr Trust

Silent Auction Sponsor

Radnor Racquet Club

Hole Sponsors

Belfint, Lyons & Shuman

BNY Wealth

Brown Advisory

The Commonwealth Group

Constellation

CR Meyer

DavidsonNilda

DS Pipe & Steel Supply

First Resource Bank

Janssen's Market

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Montchanin Builders

Mowery Environmental

The National Bank of Malvern
Passive Capital Management
Patterson Schwartz Real Estate
Riley Riper Holin & Colagreco
Dawn & Bill Schieffer
The Tamora Group
USI
Warren Clayor Architects
Zurich

IN-KIND DONORS

Dogfish Head Craft Brewery
Herr Foods Inc.
Landhope Farms
Tito's Handmade Vodka
Wegmans
Plus the many donors to our silent auction!

VOLUNTEERS

Lee Casey
Susan Fitzpatrick
Kelly Kelly
Theresa Kovak

Above: Enjoy snapshots from the year! Whether we are in the stream, on the golf course, at a tree planting, or at any event in between, the Stroud Center is grateful to all of the people and businesses that make our events and volunteer days so successful.

Stuart Lueders
Kim MacCauley
Molly Meneicke
Debbie Royer
Thomas Scott
Donnan Sharp
Melanie Thomas
Steve Wilson

*A special thank-you to our
hardworking golf committee.*

Science Seminar Series

SPONSOR

Xylem

IN-KIND DONORS

Giant Food Stores
Herr Foods Inc.

The Water's Edge

SPONSORS

Lead Sponsors

Blue Yak Foundation
Brown Brothers Harriman Trust
Company of Delaware, N.A.
Fresh Start Development Company
Landhope Farms
Moorhead Family Foundation
M&T Bank | Wilmington Trust
Runnymede Sanctuary

Key Sponsors

Franny and Franny Abbott
BNY Wealth
Brown Advisory
Phoebe Driscoll
Fair Play Foundation
Glatfelter Insurance Group
Hankin Group
Herr Foods Inc.
Johnson Family Charitable Trust
Mr. and Mrs. Richard I.G. Jones Jr.

Mr. and Mrs. Michael Moran
W.A. Speakman Family Foundation
Morris and Boo Stroud
Mr. and Mrs. Stephen Stroud
Mr. and Mrs. D. Scott Wisman

VOLUNTEERS

Franny Abbott
Katherine Bucklin
Robert DiFilippo, Ph.D.
Evie Dutton
Janet Fassbender
Dale Frankel
Diane Herr
Robert F. Johnston
Brooke Moorhead
Trish Scott
Donnan Sharp
Boo Stroud
Bonnie Van Alen
Nancy Wood

Wild & Scenic Film Festival

Hosted by Trail Creek Outfitters

*We are grateful to the many
sponsors and in-kind donors
that make this event possible
each year. Thank you for your
continued support.*

Special Projects Volunteers

*Special thanks to the following
companies and individual
volunteers who helped at
various activities and events
throughout the year:*

INDIVIDUALS

Asmaa Abdelbary
James Ambrose
Laurel Dunning
Janet Fassbender
Betsy Pinsky

Vânia Pereira
Brian Preston
Martha Ryan
Clare Shearman
Aeowyn, Brynna,
and Holly Sokira Smith

CORPORATIONS

Brown Brothers Harriman Trust
Company of Delaware
Constellation
Dansko
Exelon
Handi-Crafters
Oxford Area High School
Environmental Club
Resolution Life
PECO
USI Insurance Services
Wegmans
Wilmington Trust



Dansko volunteers help plant and maintain forests throughout the year.



Golfers had a great time teeing off "Fore" Fresh Water at Bidermann Golf Course for the 10th annual event.

The Future of Fresh Water Initiative

Five Pillars of the Initiative Make Up Our \$20 Million Goal:

1 | RESEARCH

Empower renowned scientists to further their work and recommend ways to deliver fresh, healthy water around the world for generations to come.

2 | EDUCATION

Enable educators to utilize technology to enhance and expand education beyond the classroom.

3 | RESTORATION

Implement collaborations and partnerships necessary to achieve the highest level of freshwater conservation and restoration.

4 | BERNARD W. SWEENEY, PH.D., EXECUTIVE DIRECTOR'S FUND

Honor the legacy of Bern Sweeney's 40+ year career and provide critical funds for centerwide initiatives.

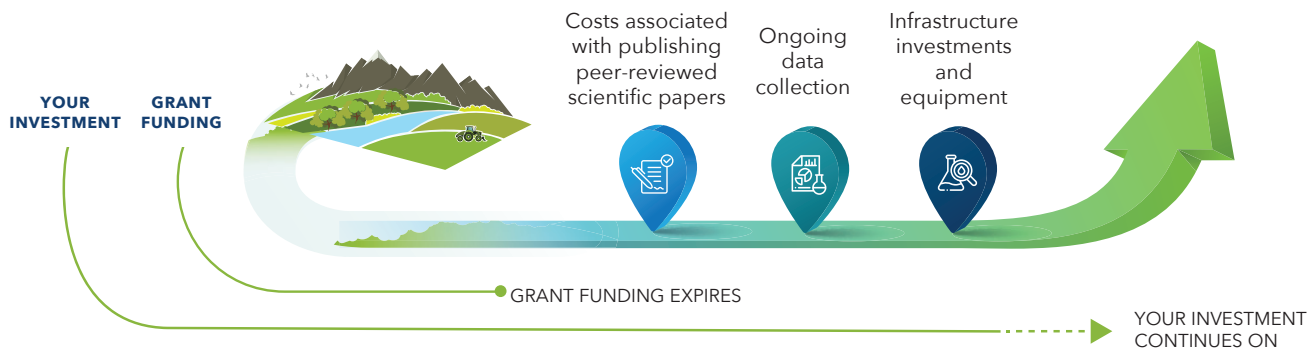
5 | UNRESTRICTED PROJECTS

Afford institutional leadership the flexibility to apply funds where they are needed most.

The Future of Fresh Water Initiative provides vital support that allows the Stroud Center to advance world-class freshwater science – regardless of funding interruptions or changing grant cycles. Research is the backbone of our watershed restoration and environmental education work, and this initiative ensures that our commitment to scientific integrity remains unwavering.

We are grateful to the donors who have already invested in the Future of Fresh Water and invite you to join them with a gift or multiyear pledge to help secure independent, unbiased freshwater science for the future. Please contact the Development Department at 610-910-0049 or development@stroudcenter.org to learn about making a gift.

The essential impact of your gift to the future of fresh water



Securing the Future

Your continued generosity through annual, endowed, and planned gifts is vital. Below is a list of ways to make your gift. If you have questions or need further details, please contact the Development Department at development@stroudcenter.org or 610-910-0049.



Online: stroudcenter.org/donate



Cash or Check



Credit Card or Digital Wallet

Stroud Water Research Center accepts PayPal, Apple Pay, Google Pay, and Venmo.



Stock

A gift of appreciated securities can be a tax-savvy way to support fresh water.

Your broker can use this information: Charles Schwab & Co.; DTC Clearing Number: 0164 - Code 40 Account name: Stroud Water Research Center; Account number: 1749-3778.



Wire Transfer

Funds may be wired directly to Stroud Water Research Center's financial institution.



Planned Giving

A planned gift can meet your short-term or long-term charitable and financial goals.



Corporate Matching Gift

Double your donation with an employer match.



Memorial and Honor Gifts

Remember a friend, neighbor, or loved one with a gift in their name.



970 Spencer Road
Avondale, PA 19311-9514
USA

610-268-2153 Telephone
610-268-0490 Fax

stroudcenter.org

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Learn more and make
a difference today!



Please recycle or share this annual report with someone you know.

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Our Priorities and 2025 Impact

The science we produce drives measurable change for clean water worldwide.



**We are dedicated
to clean water and
healthy streams.**

Understanding and protecting
freshwater ecosystems.

176

acres of land reforested



**We recognize
water moves
beyond boundaries.**

Fostering stewardship across
communities and landscapes.

5,283

people reached through
watershed restoration outreach



**We are globally
active and
globally relevant.**

Sharing science that informs
water protection worldwide.

16

peer-reviewed scientific
publications



**We integrate research
into all our actions.**

Applying science through field work,
education, and restoration.

297

active research sites monitored



**We have seen change
for the good.**

Delivering measurable impact for
ecosystems and communities.

11,946

people engaged through education and training