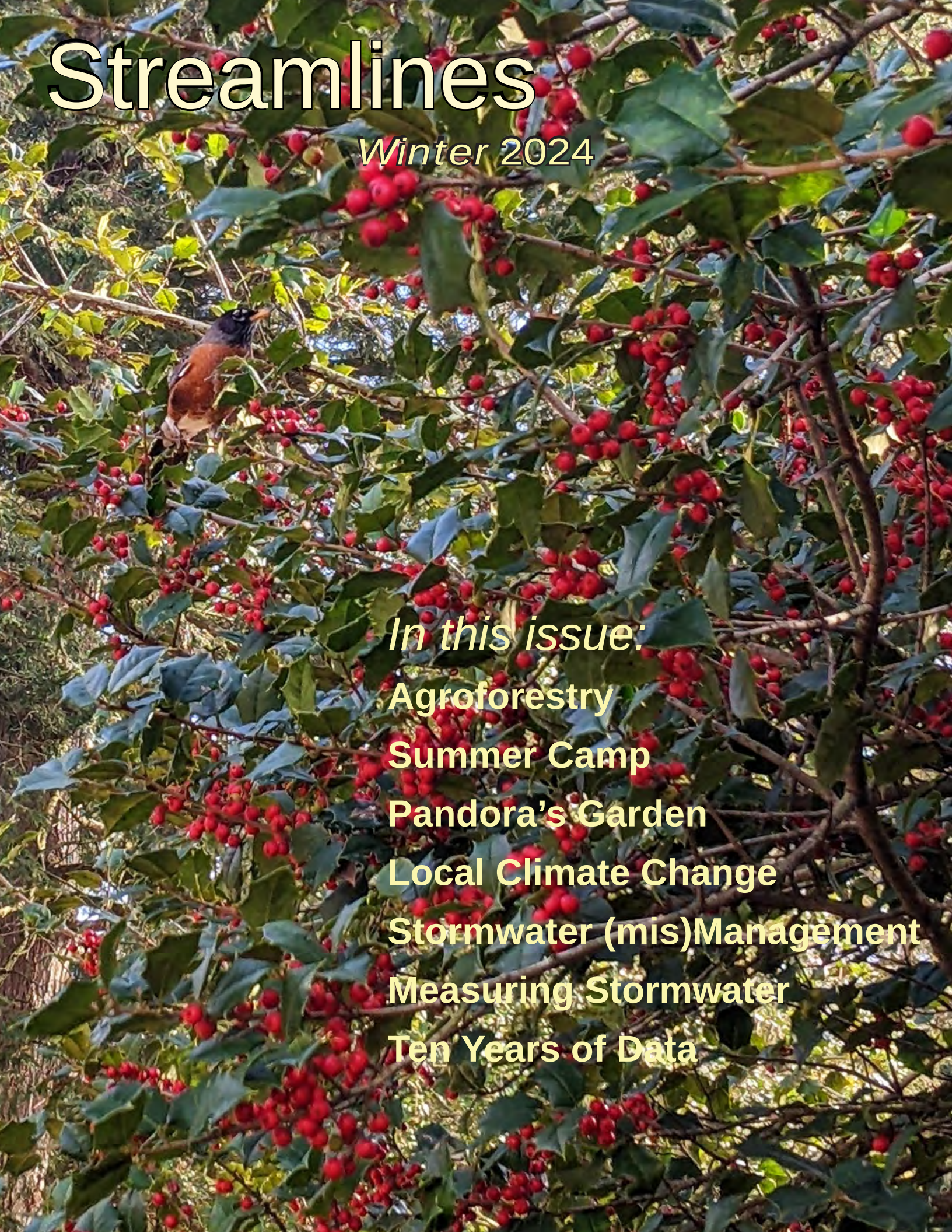
Streamlines

Winter 2024



In this issue:

Agroforestry

In 2022, with generous funding from the William Penn Foundation, Green Valleys hired Trees for Graziers (TFG) to implement agroforestry demonstration projects in the Active River Area (ARA) zone of working agricultural lands at the nonprofit Lundale Farm, along the French Creek. This demonstration project, resulting in the addition of nearly 8,000 new trees, uses both passive restoration and agroforestry principles to transition the land cover in the ARA away from simple pasture toward increasing diversity and biomass, and providing forage for grazing to meet the farmer's needs.

So what is "agroforestry"? The USDA defines agroforestry as: the intentional integration of trees and shrubs into crop and animal farming systems to create environmental, economic, and social benefits. There are many benefits to agroforestry - increasing farm profitability, preserving and protecting natural resources by controlling soil erosion, creating habitat for the wildlife, and managing animal waste.

At Lundale, two parcels were selected for the project. On the land adjacent to French Creek, a traditional riparian forest buffer, using trees and shrubs to filter farm runoff while the roots stabilize the banks of the stream and support wildlife (a type of linear agroforestry), TFG used a hybrid model for restoration. Combining passive, using the trees and shrubs already growing on site, they then supplemented with additional native trees and shrub plantings, adding to and strengthening the riparian buffer. The benefit of this technique is cost savings – trees and shrubs are already regenerating in the field but to be a more effective as a buffer, additional plantings were added.

The second area is closer to the actively grazed and farmed area. This is a silvopasture demonstration, an agroforestry technique combining trees with livestock and forage on one piece of land. The trees may provide timber, fruit, fodder, or nuts as well as shade and shelter for livestock and their forages, reducing stress on the animals from the hot summer sun, cold winter winds, or a downpour.

Victoria Fairbank

Community Nature Walks at Welkinweir

Welkinweir's diverse habitats – gardens, forests, meadows, ponds and stream – offer a home for wildlife. Join us on one of planned nature walks to learn about the flora and fauna that make this 224-acre property home. Walks are led by knowledgeable volunteers. Open to all ages (children must be accompanied by an adult).

Sunday, March 24, 7:30 a.m. – Bird Walk with Valley Forge Audubon Society
TBD - Friday evening in April – Amphibian & Frog Talk /Walk
Friday May 24, 6 p.m. - Bird Walk with Valley Forge Audubon Society
Saturday, June 22, 9 a.m. – Butterfly & Pollinator Walk – led by Kelsey Stanton
Friday, September 13, 6 p.m. - Bird Walk with Valley Forge Audubon Society
Sunday, September 22, 9 a.m. – Fall Wildflower Walk – led by Kelsey Stanton
Sunday, October 6, 8:30 a.m. – Walk in Penn's Woods
Friday, November 8, 7 p.m., Owl Prowl – Indian Run EE; Fee charged and registration is required.
Saturday, December 14, 8 a.m. - Bird Walk with Valley Forge Audubon Society.

ECO Summer Camp Enrollement Open

Green Valleys Watershed Association has provided nature oriented summer camps in northern Chester County for over 50 years, connecting young stewards ages 6-12 to the natural environment. Held at our 224-acre Welkinweir preserve, our summer 2024 ECO (Every Child Outside) camp programs are designed to instill awareness, understanding, and respect of the natural world through outdoor activities, exploration, scientific inquiry and discovery, creative expression and play, while having fun!

We offer a Counselor-In-Training program for students 13 to 15 years' old who enjoy being outside and spending time with others. CITs train with the camp counselors and help campers learn about our natural environment, native plants and animals, how to be caring stewards of the earth. Students ages 16 + looking for a summer job, outside, working with kids – become a camp counselor! We are hiring for our 2024 ECO Camp – email Vicki for an application – victoria@ greenvalleys.org Registration for GVWA members will open in mid-February, with registration opening for everyone else in March. Please check the camp page at www.greenvalleys.org for more information.

Connie Nye, longtime Downingtown resident, is returning from Florida this summer to run GVWA's 2024 summer camp! She has worked with children in the fields of science teaching, summer camps, and environmental education for decades. Connie loves her work with kids of all ages in the outdoors, especially when that work leads to others' deeper understanding and respect for our natural environment. Connie's BA is in Special Studies (Environmental Science) from Franklin and Marshall College and her MA is in Education with an Emphasis on Social and Emotional Learning from Neumann College. Connie is also the author of several books including children's books: Can He Keep It?; W is for Watershed, and the novel Sweet Water Hunt.

Back for Spring – Pandora's Garden! Pandora's Garden is a nature-based play class for toddlers aged 18 months to 5 years old. Each week we explore a nature theme with songs, stories, creative activities and outdoor play. Through nature play children learn about the world around them, using their imagination, improvising with natural objects, and developing creativity and enjoyment. Being outdoors at Welkinweir's 224-acres encourages physical activity, balance and strength. Having the opportunity to explore and discover the natural world stimulates the child's senses! Be sure to register at https://pandorasgardenblog.com/register/

Pa Master Naturalist Training Program The 2024 program is filled! Be sure to check our Fall newsletter for 2025 programs.

Green Valleys Watershed Association mission is to protect, preserve, and restore the natural waterways of northern Chester County. We inspire, educate, and involve our community to make a difference for this generation and for generations to come.

Our headquarters is located in the French Creek watershed in East Nantmeal Township at Welkinweir, the former home of founding members Everett & Grace Rodebaugh. It is from here that the organization fulfils its purpose of watershed protection, environmental education, and land stewardship.

Open for visiting Monday to Friday 9 a.m. to 4:30 p.m.

1368 Prizer Road
Pottstown, PA 19465
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Email gva@greenvalleys.org
Web www.greenvalleys.org

Cover Image:
American Robin in American Holly in the Holly Grove
plants donated by Peg Welcomer

Climate: Past, Present & Future

Everett Rodebaugh at Welkinweir

A Closer Look at Local Climate Change

Last summer's smoke-filled skies brought a new level of awareness that our local climate is changing. 2023 was the planet's hottest on record--probably the warmest in the past 100,000 years. The severe jump in temperatures surprised scientists, and brought unprecedented signals of global warming to places around the globe, including the extreme Canadian wildfires which blanketed our area with smoke and severely impacted our summer camp.

Local Climate Past

Looking back into the middle of the last century, greenhouse gases were at near normal levels, and the seasons were more predictable. On winter nights, the land would lose infrared heat skyward into space while ponds, lakes, streams, rivers and soils froze deeply. Skating was a common activity in winter. In spring, a steady progression of blustery storms alternating with brisk clear days would cross our region, from west to east, like clockwork. Summers had hot days, but the nights were cooler, heat waves less likely, and few used air conditioning. Fall was magical, and most years there was a week or ten days of "second summer" that everyone knew was the last of the warm weather for the next 5-6 months.

Changing Jet Stream

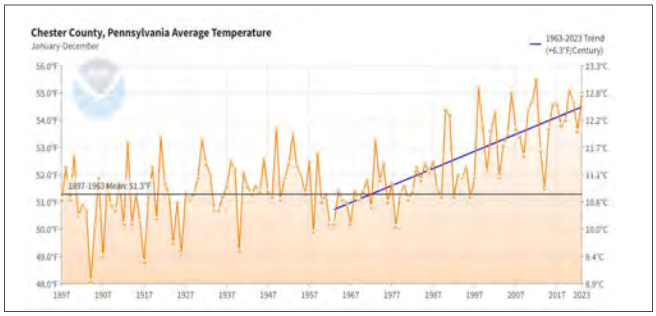
In the past ten years scientists have realized that the polar jet stream has been dramatically altered from the historical norm. This is an unanticipated result of the North and South Poles warming much faster than the rest of the planet. The abnormal jet stream is creating chaotic and harmful weather events across the northern hemisphere. Stationary air masses called blocking highs can now persist for days and even weeks, creating static weather patterns that result in severe heat waves, droughts and torrential rain events. In the winter, the chaotic jet stream may bring us spring weather in one week, and a polar vortex the next.

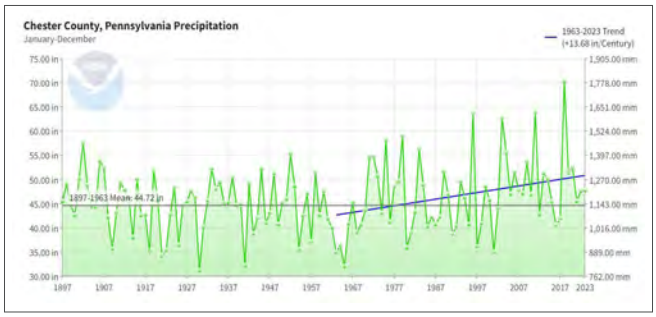
Local Climate Present

Today's levels of greenhouse gases have slowed the escape of infrared heat into space, with several results. Average temperatures locally are about 3 degrees Fahrenheit warmer, with nighttime temperatures warming even faster due to how greenhouse gases slow the upward movement of infrared radiation at night. Locally we are warming at a faster pace than the world overall because around the world land is warming faster than the ocean, and the northeast U.S. is warming more rapidly than the global average for land.

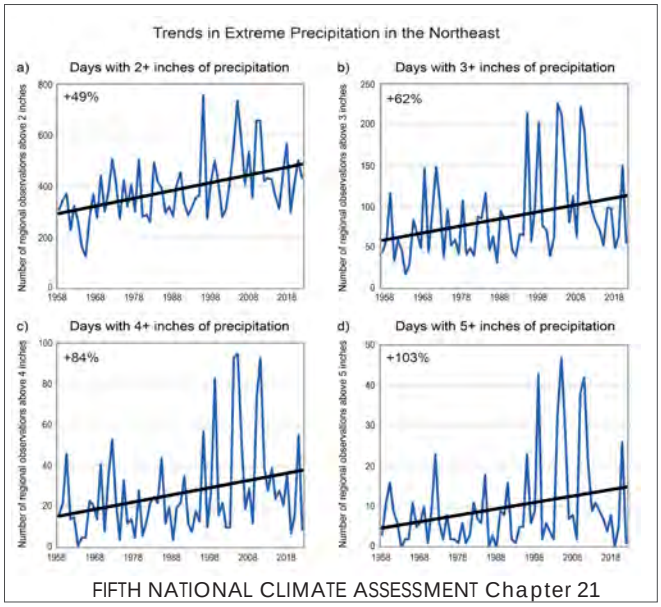
Precipitation patterns and amounts have changed as well. The increases in the intensity, duration and frequency (IDF) of heavy precipitation events locally is some of the highest in the US. Trends over the past 75 years show a 49% increase in days with 2" of precipitation, a 62% increase in days with 3" of precipitation, an 84% increase in days with 4" of precipitation, and a 103% increase in days with 5" of precipitation. **High resolution climate models are becoming available for the northeast US, predicting that +5" precipitation events may be six times more likely by the end of this century.**

Note: the online version of this article provides more information via web links





NOAA Climate at a Glance



FIFTH NATIONAL CLIMATE ASSESSMENT Chapter 21

Local Climate Future

There are two general categories of climate futures. In one, reducing greenhouse gas pollution and preserving our current climate are top priorities. In the other, these are not top priorities and climate change proceeds or even accelerates from 2024 forward. Publications like *Climate Impact Assessments* (PADEP), *The Fifth National Climate Assessment* (US Global Change Research Program) and *Climate Change and Children's Health and Well-Being in the United States Report* (USEPA) do a generally good job at presenting climate futures and the climate risks, impacts and losses we face. These losses are broken down by category, for example: human health; environmental justice and equity; economy; agriculture; recreation and tourism; energy and other economic activities; forests, ecosystems, and wildlife; and built infrastructure. But there are two things publications like these cannot do.

First, publications like these cannot provide assurances that future climate change and impacts will be limited to those we understand today. On the contrary, it is a virtual certainty that on our current climate trajectory ***future impacts will exceed projected impacts***, just as current impacts do now, due to unanticipated synergies and feedbacks. An example of that is last summer's code red air quality conditions. When the changing climate in eastern Canada increased the likelihood of fires, an area of forest greater than the entire state of Pennsylvania burned, sending several hundred million tons of carbon dioxide into the atmosphere in the process. In hindsight, the entire event fits within our understanding of climate change impacts, but predicting this was outside of the science resources we have now.

Second, these publications cannot awaken a genuine understanding of what life would be like in these climate futures--the kind of understanding one would have if one were living day to day with the sum of all these losses. Locally, we are on track for unprecedented heat waves, droughts, extreme precipitation, and snowless winters in this century. This track brings unprecedented stresses on our forests and streams, with numerous negative impacts and accelerating biodiversity losses--many of which cannot be anticipated at this time. With respect to watershed ecosystems, and Green Valleys' Mission, the current climate trajectory is simply devastating by the end of this century. With respect to children growing up today, and future generations, living day to day in a world with all of these losses is impossible to comprehend--but it is in everyone's interests to try. We need to look ahead, and try to fully comprehend where our current climate trajectory is taking us, and decide on priorities.

Water Quality Impacts

Stream temperatures track air temperature closely, which means that our cold water Exceptional Value (EV) and High Quality (HQ) streams are inevitably warming. Cold water fish habitat is shrinking, and is projected to disappear completely across the entire eastern U.S. by the end of this century if we do not achieve wide-ranging reductions in greenhouse gas emissions. It is difficult to imagine a more comprehensively destructive event for our streams than losing the cold water habitat of our EV and HQ watersheds.

Extreme precipitation events continue to be a major cause of sediment pollution and nutrient pollution in many of our streams, directly causing water quality degradation and impairment listings. The sediments smother the stream bottom habitat, increase nutrients to damaging levels, and create ideal habitat for the growth of pathogens like E. coli. Our current climate trajectory will only worsen the severity of these precipitation/sedimentation events, making once clear streams brown and muddy.

Climate Adaptation

Encompassing a vast array of responses to climate change impacts, ***climate adaptation does not address the causes of climate change***. Locally, options for climate adaptation are severely limited to actions such as enlarging stormwater facilities, raising bridges over streams, increasing forests and using more air conditioning--actions which will have very little measurable effect on the myriad losses we are on track for in the coming decades.

Climate Mitigation

Sharply reducing our greenhouse gas emissions through climate mitigation is a simple and effective response to climate change. The technological and economic details of phasing out greenhouse gas sources have been exhaustively researched and documented over the past two decades. The projected economic costs vary from study to study, but are mainly positive--i.e. phasing out greenhouse gases results in a stronger more robust economy as compared to attempting to live with continued greenhouse gas emissions and climate chaos. The main challenge to implementing a rapid phase out is that we have yet to make this a top priority. ***In order for climate mitigation to become a top priority we must give full support to the organizations and political candidates who are committed to prioritizing a healthy climate future.***

Stormwater (mis)Management

Retention Basin at Capacity after Storm

That 100 year storm? It's now a 10 or 20 years storm. The stormwater management community has in recent years become aware of multiple shortfalls with current stormwater management designs which result in undersized stormwater management systems. The result is excessive stormwater impacts to streams. This design shortfall is ongoing now and will likely continue for at least the next several years--leaving us with decades worth of undersized installations.

What is stormwater management? *Stormwater* is the runoff from rain and melting snow. Ideally, our watersheds would capture and infiltrate this runoff at the same extent that occurred centuries ago when forests dominated, protecting our streams in the process. However, the conversion of forests to farms, buildings, and roads prevents the runoff from infiltrating and instead we have runoff/stormwater, which is a major cause of sediments and nutrient impairments in our streams. Stormwater management involves designing systems that intercept stormwater at the source, and either infiltrates the stormwater, or releases it slowly. The purpose is to protect water quality and aquatic life.

What are the design shortfalls? The design shortfalls arise from problems in NOAA's Atlas 14, the "authoritative source" for precipitation statistics. Atlas 14 provides estimates of Intensity, Duration and Frequency (IDF) of precipitation events at any given location, which are used to size stormwater retention and infiltration facilities for new construction. There are multiple issue with Atlas 14.

Issue #1 Atlas 14 assumes that weather over the past 100 years or more has not changed, while in fact precipitation has increased in recent decades in our region. Atlas 14 treats all historical data as equal, arriving at estimates that do not reflect recent decades of weather data, and recent increases in IDF, leading to significantly undersized designs.

Issue #2 Atlas 14 does not incorporate adjustments for future increases in extreme precipitation resulting from future climate change. Even if issue #1 did not exist, building stormwater facilities that have multi-decade lifespans to meet today's IDF results in facilities that will be undersized in the near future.

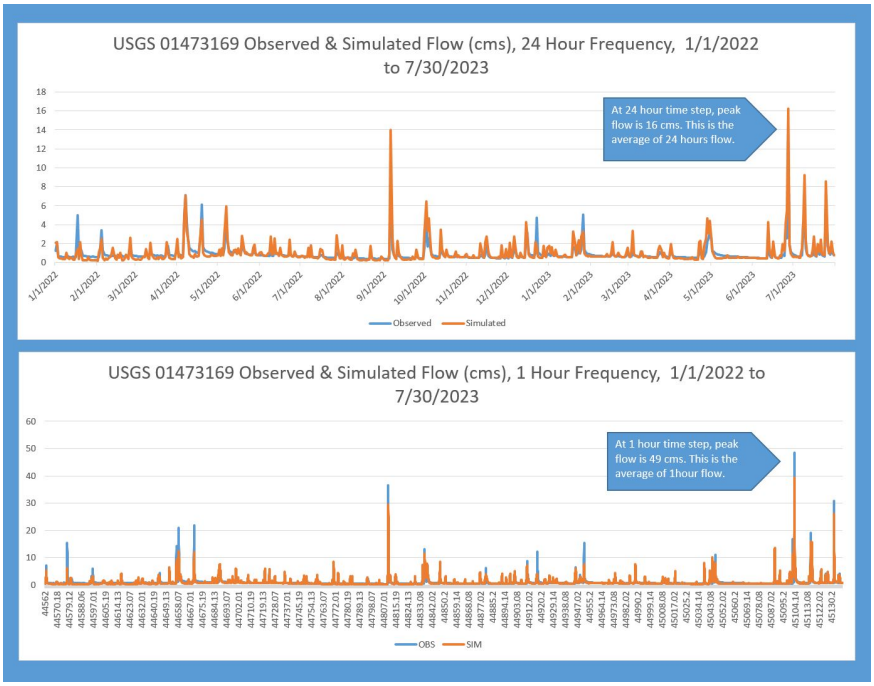
Issue #3 Atlas 14 was developed by taking historical rainfall records at a limited number of locations across the U.S. and creating complete coverage of the nation. Inherent in this process is interpolation and smoothing which will not fully represent the variations present in the real world. For some parts of the U.S., Atlas 14 over-estimates IDF, resulting in over-design of stormwater (southwest U.S.), but in others, including eastern PA, Atlas 14 significantly underestimates IDF. Even in the absence if Issues #1 and #2, Atlas 14 is underestimating IDFs for our region.

NOAA acknowledges issues #1 and #2 and are addressing them in the next versions of the Atlas; issue #3 will also likely be addressed as well. However, even after these issues have been resolved, critical questions remain. How inadequate are existing systems with respect to the intended design goals? Are the current design goals even sufficient for the task of protecting EV and HQ stream health? If the goal is to protect water quality, how good do these systems need to be?

Current stormwater management designs are intended to manage up to the 2-year storm; the 2-year storm is that which has a 50% chance of occurring in any year. Precipitation beyond this in not managed. Better performance is easily achieved. For example, the new construction at Welkinweir has to date achieved 100% infiltration of stormwater--although this level of design was a voluntary choice by GVWA. For streams which are already heavily burdened with stormwater, such as Valley Creek, should new development be required to manage up to the 3-year, or even 5-year storm? What is appropriate in the sensitive headwaters of EV and HQ streams? These are not rhetorical questions, but starting points for conversations with local and state permitting authorities. One approach could be to incentivize higher performance stormwater designs, under the same type of financing model currently in place for land conservation.

Modeling and Measuring Stormwater Events

For over a decade, GVWA has been working with flow modeling to improve our understanding of where stormwater runoff is occurring and how the stormwater flow is impacting our streams. This work is occurring in tandem with our legacy sediment research; erosion at legacy sediment sites is driven by peak flow events and flow models provide peak flow information at broad geographic scales. We are also integrating the ongoing data collection at instream monitoring stations built with Stroud's EnviroDIY technology. Six years ago the modeling work shifted from daily flow to hourly flow in order to better resolve short-lived stormwater events, and that work has been successful in providing high spatial and temporal resolution flow models across multiple watersheds.



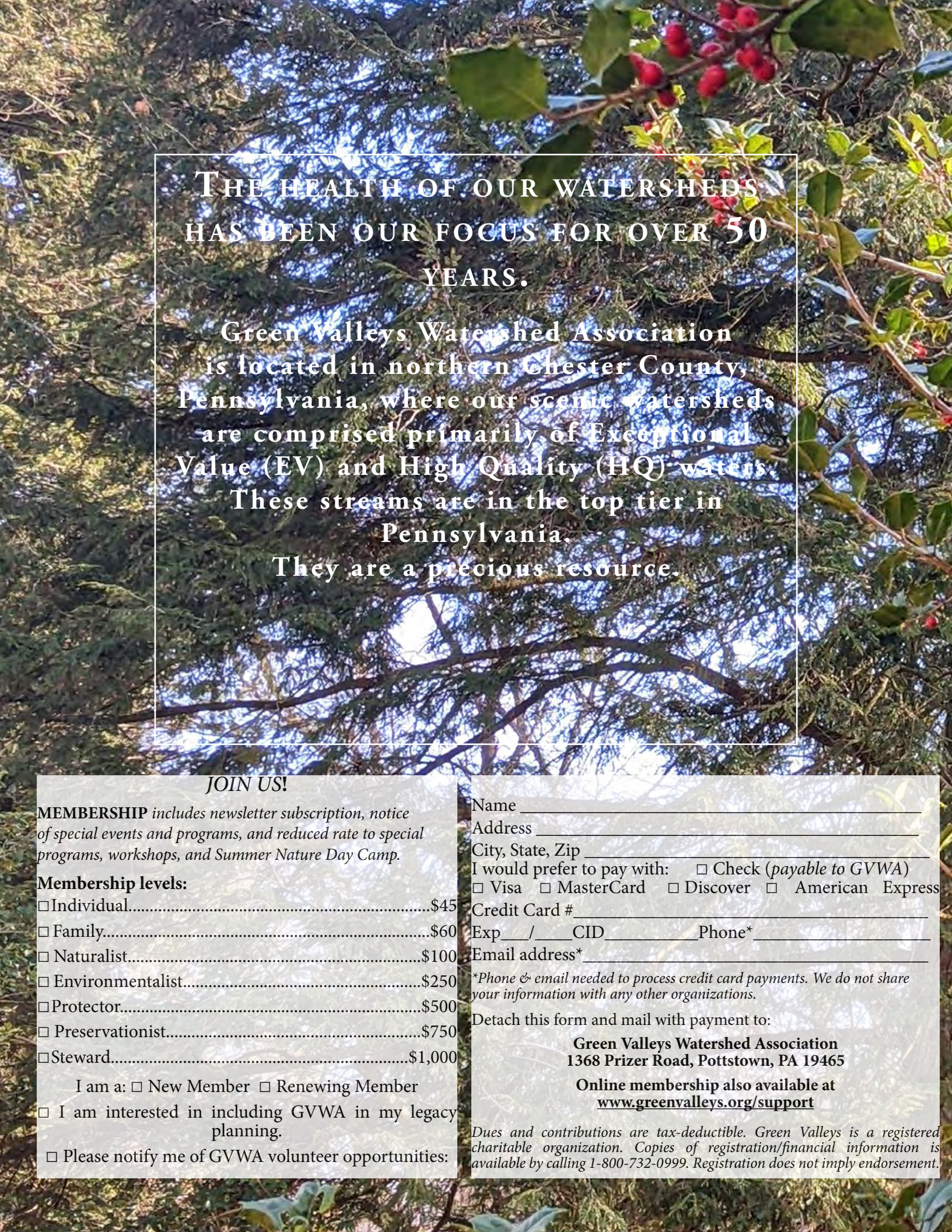
Comparing Hourly with Daily Flow Observations & Simulations in Valley Creek

The process of simulating stormwater runoff events requires good precipitation data and a watershed model to able to process this data. NEXRAD hourly precipitation data is processed by the Soil and Water Assessment Tool (SWAT) watershed model to simulate stormwater runoff in this way. To learn more about GVWA's flow modeling visit https://arcg.is/1fL1fv0 and https://arcg.is/0eyWbK

10 Years of Data Collection

From 2014 through 2023 GVWA has been working with our partners in the Delaware River Watershed Initiative (DRWI) to collect water quality data at over 100 sites in the French, Pickering, Pigeon and Hay Creeks. Our Schuylkill Water Stewards (SWS) have had a significant role in this data collection effort.

Data delivery products are in the works from GVWA and the Academy of Natural Science and will be available soon. The DRWI data collection program is is winding down, and GVWA will continue our monitoring program and working with SWS volunteers to collect water quality data. Our emphasis to date has been on dry weather sampling to establish baselines and trends for nutrient, chlorides and fecal coliform, but we have new roles opening up which involve working with the instream monitoring stations and hosting weather stations. Look for updates in GVWA's e-Streamlines Newsletter!



The health of our watersheds has been our focus for over 50 years.

Green Valleys Watershed Association is located in northern Chester County, Pennsylvania, where our scenic watersheds are comprised primarily of Exceptional Value (EV) and High Quality (HQ) waters. These streams are in the top tier in Pennsylvania. They are a precious resource.

JOIN US!

MEMBERSHIP *includes newsletter subscription, notice of special events and programs, and reduced rate to special programs, workshops, and Summer Nature Day Camp.*

Membership levels:

☐ Individual.....$45
☐ Family.....$60
☐ Naturalist.....$100
☐ Environmentalist.....$250
☐ Protector.....$500
☐ Preservationist.....$750
☐ Steward.....$1,000

I am a: ☐ New Member ☐ Renewing Member

☐ I am interested in including GVWA in my legacy planning.

☐ Please notify me of GVWA volunteer opportunities:

Name _____
Address _____
City, State, Zip _____
I would prefer to pay with: ☐ Check (*payable to GVWA*)
☐ Visa ☐ MasterCard ☐ Discover ☐ American Express
Credit Card #_____
Exp___/____CID_____Phone*_____
Email address*_____

**Phone & email needed to process credit card payments. We do not share your information with any other organizations.*

Detach this form and mail with payment to:

Green Valleys Watershed Association
1368 Prizer Road, Pottstown, PA 19465

Online membership also available at
www.greenvalleys.org/support

Dues and contributions are tax-deductible. Green Valleys is a registered charitable organization. Copies of registration/financial information is available by calling 1-800-732-0999. Registration does not imply endorsement.