



Streamlines

Volume 48 Issue 4
Fall/Winter 2012

from Green Valleys Association at Welkinweir

GVA's Watershed Assessment Program

In order to develop a good assessment of a watershed's health status, we need to collect data of different kinds. And, since water quality varies significantly from stream to stream we need to do it at many places throughout the watershed.

There are many kinds of data we can collect and use as indicators of the health of a watershed. GVA is currently collecting four of these:

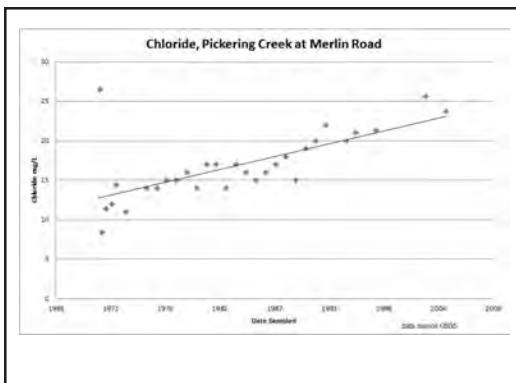
1. In the stream: Chemical and Microbiological Water Quality Data
2. In the stream: Indexes of Biotic Integrity (IBIs).
3. In and along the stream: Habitat Assessments (HAs)
4. Along the stream and throughout the watershed: Land Cover

Each watershed typically is made up of many waterways. For example, the Pickering Creek Watershed is 38.8 square miles. Within it is the main stem of the Pickering Creek, plus there are additional named streams—such as Pigeon Run—that are tributaries to the Pickering. As mentioned above, water quality data and other indicators vary significantly from stream to stream, making it necessary to define smaller study areas called *subwatersheds*.

Subwatershed mapping begins with “first order” streams—streams which do not have any other streams flowing into them. Where two first order streams join, they form a “second order” stream. The point where they join is called an exit point and the subwatershed above this exit is *delineated* in GIS (see example of a subwatershed in the north part of the Birch Run Watershed). GVA has delineated 68 subwatersheds in the Pickering. Each subwatershed is unique and can be quite distinct from its nearest neighbors.

Using Geographical Information Systems (GIS) is the most effective way to organize and view all the data available about a watershed. It is also the most effective way to carry out planning, convey vital watershed information to the public, and show the need for projects and funding.

1 - Chemical and Microbiological Water Quality Data



Water samples from a stream are analyzed for a variety of parameters. These samples yield a “snapshot” of the water quality at the time the sample was taken; long term testing is needed at permanent sites to build up baseline and trend information.

Historical Data: The USGS, Pennsylvania Department of Environmental Protection (DEP), and other organizations have been sampling and

See “Watersheds,” page 10

Martin Challenge

We have received a \$25,000 challenge grant from the George and Miriam Martin Foundation in support of our watershed programs. Please take advantage of the Martin Challenge and support GVA and the enduring work we are doing for our beautiful Chester County Watersheds, by making a special gift to Green Valleys.



Children's Health and Nature Education: A Natural Fit

As a friend of GVA, you may already know that nature education and free time in natural, outdoor settings are highly beneficial to children's health and well-being. In the growing trend toward technology as both an educational tool and as a primary source of recreation, it is important to remember that nothing can replace the hands-on experiences children gain by playing and participating in nature. No matter how technologically advanced we become, the fact remains that humans are part of the natural environment, not separate from it. And it is important to involve our children in the natural world, beginning in the early years of their development.

See “Nature,” page 6

**GREEN VALLEYS ASSOCIATION at
WELKINWEIR**

Green Valleys Association's mission is to protect and preserve the quality and quantity of water resources in northern Chester County through advocacy and education.

Welkinweir

Our Welkinweir headquarters in East Nantmeal Township, Chester County, is a spectacular property which showcases GVA's Mission. Originally home of GVA founding members Everett and Grace Rodebaugh, the 197-acres of permanently preserved land features a 55-acre arboretum, ecologically diverse wetlands, forested riparian buffers, meadows, and forest habitats. The property hosts our many environmental education programs and features an ever-growing collection of projects that demonstrate sustainable practices. See hours p. 4.

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Streamlines, our quarterly newsletter, high-
lights local and regional activities focusing
on water resource conservation and preser-
vation. Available through membership or
online at our website.

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community

GVA Hosts PHS Tree Tenders Program

This past September, 20 participants came to Welkinweir to learn about trees from the Pennsylvania Horticultural Society (PHS) and the Society's partners. In a series of three Tuesday evenings, the group learned about tree biology, the benefits of trees to urban and suburban environments, proper tree siting and planting, stress factors for trees, and the principles of good tree care.

This "Tree Tenders" training program is part of a PHS initiative to replenish the tree populations of 13 counties in southeastern Pennsylvania, southern New Jersey, and Delaware. The umbrella project is aptly called "Plant One Million," and is the nation's largest multi-state tree campaign. Its goal is to restore the tree canopy cover in the greater Philadelphia area to 30 percent. The program supports the goal of GVA's Watershed Restoration Program to reforest open lands and waterways within our stewardship watersheds.

The "TreeVitalize" program (part of Plant One Million) has provided funding for trees and tree shelters for GVA's reforestation projects. We thank PHS for bringing the Tree Tenders program to us, and look forward to future collaborations.

Nominate a Stream for Some TLC

Have you seen "trashy-looking" stretches of streams here in Chester County? Green Valleys Association wants to organize a stream clean-up in Spring 2013! As stewards of our watersheds we need to protect and connect with the streams and rivers around us. But we need your help to find areas where the need is greatest. Do you know of a local streamside park or stretch of road bordering a creek that is littered with bottles, cans, or even car tires? Please help us identify candidate clean-up sites in your neighborhood. Call the Green Valleys staff at 610-469-2218 to let us know, or e-mail us at Kelsey@greenvalleys.org.

Pipeline Proposed for Northern Chester County

This fall a new pipeline was proposed for transporting natural gas from the Marcellus Shale region in northern Pennsylvania to existing pipelines in Chester County. A Federal Energy Regulatory Commission application is expected soon for this "Commonwealth Pipeline." The map of the pipeline currently being circulated shows a potential of 15 crossings of Exceptional Value and High Quality streams in northern Chester County. Additionally, the pipeline will impact many tracts of conserved land and open space.

Just a few years ago, new pipelines were being proposed to bring gas up from the south to markets in the northeast. There were also proposals for new liquefied natural gas (LNG) terminals, where foreign gas would be unloaded and put into the network of natural gas pipelines. With the introduction of the controversial natural gas extraction technique known as "fracking," there is now a glut of gas on the market and drillers are looking to move gas the other way, from north to south. There are even proposals to operate existing LNG terminals in reverse—where domestic natural gas will be compressed into a liquid and shipped overseas.

Concerns over the likely environmental impacts of this pipeline proposal are high. GVA is collaborating with some of the other groups that are working on this issue, and we will keep our members updated.

Naturalized Stormwater Basins: Enhanced Stormwater Filtration

How GVA is using new mapping software to identify watershed protection opportunities

As a reader of *Streamlines*, you are no doubt aware of the many issues surrounding stormwater runoff. In areas where development has replaced forested land, stormwater runoff carries more pollutants and sediment from streets, rooftops, and lawns to local streams. This damages habitat and can compromise roads, bridges, and buildings through increased flooding and streambank erosion. This leads to costly expenditures for stormwater management and drinking water treatment.



Green, but not so clean: the torn and muddy bottom of this basin suggests that it does little to slow and infiltrate stormwater and the pollutants it contains.

Since the creation of the Clean Water Act in 1972, several stormwater management design strategies—called Best Management Practices—have attempted to address these problems. One of the most common of the practices has been the design and construction of stormwater detention basins. These are man-made depressions designed to capture runoff from developments, allow sediments to settle out, and prevent nearby bodies of water from being inundated¹. They are typically sown with lawn grasses, and contain concrete outlet structures that convey excess runoff either to another basin, or to a convenient stream or lake, through a series of pipes and culverts.

Conventional detention basins add to the problem

You have probably seen detention basins proliferating on the edges of parking lots,

the periphery of corporate campuses, and the stretches of lawn bordering your kids' sports fields.

While the basins do capture stormwater runoff, almost all of them fail at protecting and improving the water quality of our rivers. This is due to a number of factors: a manicured turf surface does little to slow water entering the basin and is ineffective at filtering out pollutants; heavy machines used to excavate the basins compact the soil, preventing much of the precipitation

from infiltrating into the ground (regular mowing by heavy riding mowers adds to the problem); and the concrete outlet structures may allow too much rainfall to leave the basin before it can infiltrate into the ground.

The case for naturalization

Recent evaluations of conventional detention basins have generated a movement to retrofit them in order to increase their ability to capture rainwater. One basin retrofit method is naturalization. In a natu-

ralized basin, the lawn on the basin slopes and bottom is replaced with a variety of meadow plants that simulates a wetland system. These plants have deeper roots that are more efficient at aiding rainwater infiltration and pollution removal than turf grass.

There are many benefits to this naturalized approach. Naturalized basins

- have been found to remove between 40% and 90% of non-point source pollutants found in stormwater runoff², greatly enhancing overall water quality in nearby waterways.
- can be planted with trees and shrubs to further increase rainwater infiltration. With this increase in infiltration, there is no standing water that would encourage the breeding of mosquitoes.
- do not require fertilizers, are drought tolerant once established, and need mowing only once or twice a year to control non-native weeds. The most maintenance these basins require is during the first year of meadow establishment, when weeding and/or spot treatments with herbicides are needed to control non-native weeds.

After the basin meadow has established itself, mowing once or twice a year to control weeds and maintain a tidier appearance is all that is required. This reduction in mowing can save communities and businesses thousands of dollars per year in maintenance.

With their variety of native grasses and wildflowers, these naturalized stormwater basins offer beautiful neighborhood park space and provide important habitat areas for wildlife. The plantings also discourage nuisance populations of Canada

See "Basins," page 9

¹ Sediment Basins and Rock Dams. Stormwater Menu of BMPs. United States Environmental Protection Agency. 24 May 2006. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=57&minmeasure=4>

² "Naturalized Detention Basins". City of Chicago Department of Stormwater Management. 2010-2012. https://www.cityofchicago.org/city/en/depts/water/supp_info/conservation/green_design/naturalized_detentionbasins.html

welkinweir

Update on Emerald Ash Borer in PA

The Emerald Ash Borer (*Agrilus planipennis* Fairmaire) (EAB) kills unprotected ash trees and therefore represents an important threat to North American forests, especially in southeastern Pennsylvania, where about 20% of the tree canopy is comprised of ash (*Fraxinus* spp.). This dangerous insect pest is not quite here yet, but it is quickly approaching. This year (2012) the EAB was detected in Warrington, Bucks County. This is about 100 miles east of previous detections in the state (2010 Cumberland County) and much closer to our area. (See *Streamlines*, Summer 2011).

What can owners of ash trees (including us at Welkinweir) do? Fortunately, there are treatments available to protect ash trees, but it is important to learn about EAB before proceeding with any method. So, first off, we recommend that you *bookmark this site* on your computer: www.emeraldashborer.info/index.cfm. The site contains the most current information about this invasive insect, including where it has been detected, and also has links to other information sources.

Conduct an inventory of the ash trees on your property and decide whether they are worth protecting with treatment or if you will remove the trees if they become infested. For example, we have a fairly good-sized ash located on the hillside north of the estate house. Factors we considered included the age of the tree (it was likely planted by the original Welkinweir owners, Everett and Grace Rodebaugh), the prominence of its location (close to the house) and the aesthetic value it provides (high). All these make this a tree we want to protect. It would be too cost prohibitive however, to treat all the ashes on our property.

See "Borers," page 6



Rental Update

Recognizing that Welkinweir would make a spectacular venue for weddings and other events, twelve years ago we began a rental program as a source of additional income to support GVA's mission. A certain percentage of this type of income is allowed under IRS rules, and many nonprofits who own suitable real estate conduct rental programs to supplement income.

Building on the success with these rentals, during 2012 we embarked on a major overhaul of our services, selecting as exclusive caterer Robert Ryan Catering & Design in Phoenixville, and identifying upgrades to the estate house. Our emphasis is on quality over quantity.

Of special note, Nancy Wodell and Nancy Locilento (The Butterfingers), have opted for a very well deserved retirement as our wedding coordinators. Their talent, enthusiasm, and professionalism have been greatly appreciated and will be sorely missed.

*Planning a Wedding?
Members receive a discount on
wedding rentals
based on the number of years
they have been members.*

A Bridge in the Woods

Trail improvements have been underway at Welkinweir, including two new water crossings. The spillway between the two largest ponds now boasts new stepping stones which allow a safe and dry passage



The new bridge, installed at the site.



Bridge building in Pavilion.

across this formerly slippery spot. Above the chain of ponds the aging pole and plank crossing has been replaced with a sturdy bridge. Building the bridge in place would have required a whole complement of power tools plus a generator being hauled down there for the several days it took to build it, so a better solution was sought. It turns out that the Ralph D. Heister Pavilion makes a great place for a wood shop, with plenty of power and all the "sawhorses" (picnic tables) one could want for building a 24-foot long bridge. Once complete, the structure was disassembled, tied into a bundle, dragged out to the site, and installed.

Welkinweir Fall/Winter Hours

Welkinweir's arboretum and surrounding natural lands are open M-F, 9:00 a.m. to 4:00 p.m. Weekends by advance registration only. Call 610-469-7543. Please respect the privacy of our residents by parking away from the house and observing business hours. Our Visitor Parking area will be closed the month of January.

www.welkinweir.org

A Time for Conifers

When the lushness of summer is gone and the colors of autumn are a memory, conifers rule the garden. The varied textures and shapes—and the eternal color they provide—are indispensable. Conifers should not be thought of as green, unchanging plants. Conifers come in nearly every shade of green imaginable, from near-blue to approaching yellow. There are countless variegated forms for striking focal points. In spring, the colorful new growth and cones are a sight for winter-sore eyes.

Conifers offer bold, medium, or fine textures in the winter garden. The boldest come from trees with well-defined, stout outlines and few gaps in their silhouettes. Like our favorite *Thujaopsis* they lend solidity to the garden. Medium textures come from outlines softened by upward arching branches ending in fine tips. Many spruce and fir have medium texture. The fine textures come from conifers with long or very small needles and open forms. The long needles of some pine, like white pine, create a very fine-textured appearance. Hemlock, due to its small needles, is also fine-textured.



Using a mixture of textures creates the most visual depth in a garden, as bold textures appear to be in the forefront, and fine textures appear to fade into the distance. Using color wisely can produce similar results. Yellow will draw the eye and work as a focal point. Dark green can provide a backdrop to accent variegated forms. Blue-green will seem to fade into the distance, creating visual depth.

With conifers, I have definite favorites. Consider ‘Gold Rider’ Leyland cypress (*Cupressus leylandii* ‘Gold Rider’) or ‘Dragon’s-eye pine (*Pinus densiflora* ‘Oculus Draconis’) for striking focal points. For a nice bold texture with a hint of gold, Golden Hinoki falsecypress (*Chamaecyparis obtusa* ‘Crippsii’) appears unmatched. The blue-green hues of a young Deodar cedar (*Cedrus deodar*) or Oregon Blue falsecypress (*Chamaecyparis lawsoniana* ‘Oregon Blue’) recede from the eye. All of these plants are part of the Pinetum collection at Welkinweir located on the hill above the house. Their colors really pop with a dusting of snow. We hope to see you here soon!

Beth Moosman

Moving Forward

Good news! Green Valleys Association has received another Stanley Smith Horticultural Trust grant, which will continue to fund the nine-month Horticultural Fellow position at Welkinweir. Under the grant, the Fellow is chiefly responsible for the upkeep of Welkinweir’s grounds and plant records, and provides crucial help for the Executive Director. I was able to help with the application for the new grant and am very excited that Green Valleys has received it.

It is through this grant that I have been the Horticultural Fellow for the past year and a half. It has truly been a once-in-a-lifetime opportunity, and I cannot think of a more beautiful place to work. I have also enjoyed my interactions with so many of the people involved with GVA. I am sad to leave Welkinweir, which has been my home, but I know that the skills I have obtained here will be very beneficial as I move on to new horticultural adventures in Arizona.

Beth Moosman

New Kiosks at Visitor Area

As we work to improve public access to the arboretum, natural areas, and the Horseshoe Trail, it is becoming steadily more important to provide visitors to Welkinweir with brochures, maps, and other site information.



Two new kiosks built this summer will provide a lot of space to house all of this. For the kiosk design elements, we owe this vintage photo of the former Anselma train station. For the craftsmanship and finish we thank Matt White for his work on this and other structures this summer.



Save the Dates

Winter Workshop:

Managing Stormwater as an Asset by
Modeling Natures Design

Saturday, March 23, 2013
10 a.m. to 2 p.m.

Mother’s Day Tea

Sunday, May 12, 2013

Green Expo

July 2013

education

Nature, from p. 1

We know that outdoor play for today's children is different from when their parents were kids and computers were not mainstream devices. In a 2011 study by the Nature Conservancy, it was found that "88% of children polled reported using a computer almost every day; while [only] 11% of the children reported visiting a local area park or natural area almost every day."

A 2009 Kaiser Family Foundation study of more than 2,000 American children between 8 and 18 years of age, found that children spent an average of "7.38 hours per day with electronic media", a jump from an already amazing 6.21 hours per day in 2004. This is time they are not spending out of doors.

Many factors influence where and how much time children spend in nature. These factors include not only the increase in electronic media, but also a major shift in the where children play (from outdoors to indoors), less free time due to structured activities such as sports, socio-economic status, locations of neighborhoods, and parents' fears of outdoor hazards such as crime and insect-borne diseases.



There are numerous studies that demonstrate the benefits of play and exploration in natural settings to children's physical, social, emotional and cognitive development, including combating attention deficit disorder and obesity.

There is more than health benefits to be gained. Free play in nature, as well as participating in nature education programs, creates awareness and understanding of natural resources, thus fostering future environmental stewards. This is ultimately the goal of those of us in the environmental education field. But I believe we must also become part of the movement to address the ever-growing health problems in children.

As an environmental educator for 15 years, I firmly believe that every child has an innate desire to explore and play in nature. They need nature to foster good health and behaviors. I see the shift toward indoor activities, as well as too many structured outdoor activities, as a threat to children's well-being. This is why I teach children. This is why I continue to learn new concepts and methods of educating them and their parents about the natural world and their connection to it.

At GVA, our nature education programs continue to grow, thus strengthening our environmental education mission and beckoning children to get outside and get involved in exploring, appreciating and protecting their community's natural resources.

Dawn White

REFERENCES

1. "Children in nature Worldwide: An Exploration of Children's Experiences of the Outdoors and Nature with Associated Risks and Benefits", pages 6-7, 15 By the Children and Nature Network and the IUCN's Commission on Education and Communication <http://www.childrenandnature.org/documents/C118/>
2. "Health Benefits to Children from Contact with the Outdoors and Nature" By the Children and Nature Network <http://www.childrenandnature.org/documents/C118/>

Borers, from p. 4

It is important to note that the insecticides used for treatment only provide one to two years of protection and that smaller trees are more easily protected than larger trees. Also, due to the inherently toxic nature of insecticides, it is best to hire a professional certified applicator to treat any trees you want to protect.

Be an informed consumer: One of the most common insecticides used for treatment—a soil injection that provides systemic control—has been linked to Colony Collapse Disorder in honeybees. Ash are wind-pollinated, so this particular pesticide may not impact local bee populations. However, the pesticide could affect other nectar-producing plants located close to the treatment site. A far better choice, which we use at Welkinweir, is "Tree-Age," which is injected into the trunk.

Inspect your trees: The best way to detect EAB is by observation. For example, woodpeckers are especially fond of the EAB and will create a large hole to extract the insect. Thus, sudden increases in woodpecker activity on an ash tree may be an indicator of a potential problem. Other trouble signs include vertical fissures on the bark, D-shaped exit holes, and serpentine "galleries" under the bark. (EAB larvae weave back and forth as they feed under the bark, leaving tell-tale S-curves.)

Periodically access the website given above for updates on EAB detection in our area. The cooperative extension service recommends treatment of ash trees within a 10 to 15 mile radius of where EAB is found.

EAB is closely related to two borers that are native to North America, which are not as devastating because natural predators keep them from proliferating. Research is focusing on whether biological control (parasitism by a wasp) of EAB will help to keep this pest in check, the same way that biological controls have been successful in preventing the gypsy moth from being as damaging as it once was.

ALL PROGRAMS ARE AT WELKINWEIR unless noted.

For all program information and registration, please contact Dawn at 610-469-8646, or dwhite@greenvalleys.org.

Green Valleys Association Community Nature Programs January through April 2013

Nature Walks

Saturdays, 8:00 a.m. **March 23, April 6, April 20**

Enjoy guided walks with volunteer naturalist to observe a wide variety of plants, and search for resident birds and other wildlife. Bring binoculars and field guides if you have them. Programs run rain or shine. Appropriate for ages 6 and up with adult. FREE. No registration required.

Little Sprouts — For ages 3-6 with an adult. FREE.

Little ones and their parents can learn about nature together through stories, interactive demonstrations, animal artifacts and crafts.

At the Henrietta Hankin Library

Mondays from 10:30 to 11:15 a.m.

Advanced, online registration required, www.ccls.org
Contact the library at 610-321-1724.

January 14 – Animal Tales
February 11 – Birds in Winter
March 11 – Backyard Bugs
April 8 – Egg-citing Eggs

At the Phoenixville Public Library

Fridays from 9:30 to 10:15 a.m.

Advanced registration required. Contact the library at 610-933-3013. *Dates to be determined. Please call Dawn for information.*

Kinder Nature Classes

Tuesdays from 10:00 to 11:00 a.m.

Children ages 3 to 5 can discover the wonders of nature with their parents during these fun and educational programs. Each class includes age-appropriate activities based on the theme, including a nature discovery walk, story, craft, and other activities. A snack is also included.

For ages 3-5 with an adult. Non-participating siblings are welcome. Fees for children only: \$8 GVA members, \$10 nonmembers. Advanced registration required.

(All classes are independent of one another.)

March 26 - Finding Furry Friends
April 2 - Growing a Garden
April 9 - Tracking Turtles and Toads
April 16 - Discovering Nature's Gnomes and Fairies
April 23 - Creating Art from Nature

Little Wonders Class

Wednesdays from 10:00 to 11:00 a.m.

Little ones ages 2 and 3 can discover the wonders of nature with their parents during these fun and educational programs. Each class includes age-appropriate activities based on the theme, including a short nature discovery walk, story and craft. A snack is also included.

For ages 2-3 with an adult. Non-participating siblings are welcome. Fees for children only: \$8 GVA members, \$10 nonmembers. Advanced registration required.

(All classes are independent of one another.)

March 27 - Finding Furry Friends
April 3 - Growing a Garden
April 10 - Tracking Turtles and Toads
April 17 - Discovering Nature's Gnomes and Fairies
April 24 - Creating Art from Nature

Nature at Night - Hike and Campfire

Friday, January 25 7:00-8:30 p.m.

(Severe weather date, Friday, February 1)

Search for nocturnal animals and test your own senses of sight and hearing in the darkness during a leisurely walk at Welkinweir. Listen for great horned owls calling for mates during the cold January nights; look for animal tracks and examine pelts, feathers and other natural objects. Help house our local bats by entering a *free raffle* to win a bat box, then warm up by the campfire with refreshments. Refreshments provided.

For ages 6 to adult. Fees per person: \$5 for GVA Members; \$7 for Nonmembers. Advanced registration required.

Young Naturalist Days

Wednesday, March 27 and Thursday March 28

8:30 a.m.-3:00 p.m.

On their days off from school, drop off your children at Welkinweir to enjoy a day(s) of nature discovery! Through a variety of educational games and activities, and nature walks to explore fields, forest, wetlands, ponds and streams, students will learn about plants, animals and habitats in their own community.

Both days offer different topics and activities. – So sign up for one or both!

For students in 1st through 5th grades.

Fees per day: \$65 GVA members, \$75 nonmembers. Sign up for both days and receive a \$10 discount. Advanced registration required.

Basins, from p.3

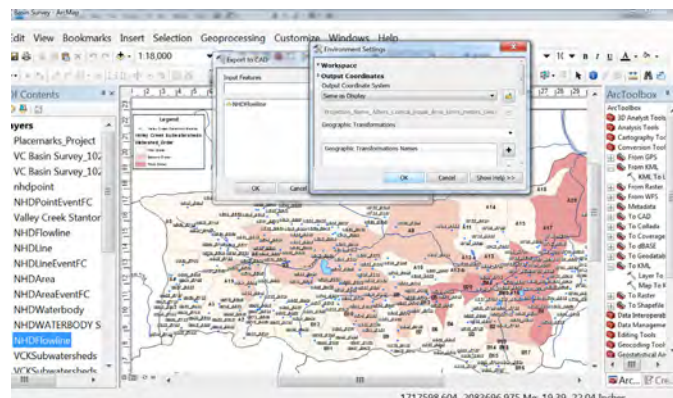
geese, which are attracted to expanses of lawn that typically make up conventional detention basins.



Naturalized stormwater basins increase rainwater infiltration, remove point-source pollutants and reduce the need for fertilizer, mowing and other maintenance.

There are several examples of naturalized detention basins in our area. In Royersford, the Spring-Ford High School converted its one-acre conventional basin in 2009 by excavating smaller depressions within to help hold water, planting several hundred trees and shrubs, and sowing a native meadow from seed. Students now use the basin as an outdoor classroom to study its effect on water quality³.

In 2002 Tredyffrin Township retrofitted two detention basins next to the township building on DuPortail Road in Berwyn. Now wildflowers such as New York Ironweed (*Vernonia noveboracensis*) attract butterflies during the summer from the twin mini-meadows⁴.



This screenshot of one of our ArcGIS software windows shows a map of the Valley Creek, divided into subwatersheds, with each blue triangle representing a stormwater detention basin.

Green Valley's mapping initiative

Green Valleys is using geographic information system (GIS) technology to identify basin naturalization opportunities in the Valley Creek watershed. This watershed's 23.4 square miles stretch from its headwaters near the intersection of Routes 202 and 30 in Frazer, to Valley Forge National Historic Park where it empties

into the Schuylkill River – an area subject to decades of expanding business and development.

Remarkably for such a developed watershed, the Valley Creek is both an Exceptional Value stream and a Class A Wild Trout Fishery, able to support breeding populations of imported brown and native brook trout. However, this important cultural and recreational resource is under threat from the stormwater runoff generated by so many decades of development. Sediments and pollution damage the stream's ecology, while flooding threatens the important historical structures in Valley Forge⁵.

To address these issues, Green Valleys Association has sought to identify potential basin naturalization projects within the watershed. We built upon two existing surveys—one by Dr. Clay Emerson and the other by environmental engineers Cahill Associates⁶. Then, using aerial imagery from Google Earth combined with GIS datasets of topographic contours, we located around 260 detention basins in the

Valley Creek watershed—and that number is growing!

Using topographic contours, we have divided the watershed into 43 sub-watersheds in Google Earth. In order to analyze this data, we used ArcGIS computer software to map the information in a geo- or spatial database. From there, we can create maps that combine this information into a format that's easy to dissect and distribute.

With this data we can identify detention basins in critical areas of the watershed that could benefit from naturalization. Subwatersheds near the source of Valley Creek, for example, would be an important target; intercepting pollutants at the headwaters will lead to cleaner water downstream.

Naturalized stormwater detention basins are an excellent tool to improve water quality and help reduce flooding and streambank erosion associated with stormwater runoff. They offer maintenance cost savings and great benefits to communities and wildlife. And they are one of the solutions to a complicated and long-standing problem of improving the quality of our streams and rivers.

With the help of powerful geographic tools like ArcGIS, Green Valleys can map and analyze data for numerous watershed protection projects in the future.

Kelsey Stanton

³ "Regional Project Profile: Spring-Ford High School Naturalized Basin". Temple – Villanova Sustainable Stormwater Initiative. 2006-2009. http://www.csc.temple.edu/t-vssi/bmps/survey/springford_basin.htm

⁴ <http://dsf.chesco.org/conservation/lib/conservation/pdf/TredTwpBldgSite19.pdf>

⁵ Thornberry-Ehrlich, T. 2010. Valley Forge National Historical Park: geologic resources inventory report. Natural Resource Report NPS/NRPC/GRD/NRR—2010/236. National Park Service, Ft. Collins, Colorado. Page 6.

⁶ Emerson, Clay Hunter. "Evaluation of the Additive Effects of Stormwater Detention Basins at the Watershed Scale". MS Thesis Drexel University, Philadelphia, 2003.

A Hearty Thanks To Our Many Volunteers in 2012!

Volunteers extend the resources of our association, providing extra hands that enable us to do tasks and activities that might not otherwise get done. The input that volunteers provide helps to build organizational strength. That strength comes not only from growing and retaining members and enhancing programs, but also from the sense of ownership that volunteers gain when they become advocates for GVA.

The photos here show just a few of our volunteers.



We appreciate the volunteers who help our organization fulfill our mission: XL Insurance employees for maintaining the restoration site along French Creek in East Vincent Township and for cleaning up a section of the Pickering Creek; Siemens employees, in Great Valley, for restoring forested riparian buffers along the Valley Creek; Cabrini College students for planting at Wilson Farm Park in Tredyffrin Township; the various school, Scout and church groups for all their efforts in restoring forested buffer along the Birch Run; Vanguard employees for their assistance with buffer plantings at Camphill's Beaver Farm; our members who maintain the roadside cleanup along Pughtown Road, and many more - we thank you all!

GVA has many opportunities to be involved. If you'd like to help drop us an email at gva@greenvalleys.org or call 610-469-4900.

Watersheds, from p.1

testing in our watersheds since the 1960s. GVA has been collecting, organizing, and processing this data to establish baselines and identify trends.

New Data: GVA is sampling and analyzing for a variety of parameters including *E. coli*, pH, dissolved oxygen, conductivity, nitrate, ammonia and chlorides.

How good does the data need to be? In order to compare and merge data from different organizations and across decades, the accuracy and precision for all data needs to be fairly good. This is accomplished through an established Quality Assurance/Quality Control (QA/QC) plan. At a bare minimum, QA/QC requires the following: an approved method appropriate for surface waters; analytical instruments capable of the required precision and accuracy; trained samplers and analysts; certified reagents, calibration standards and other consumables used; and QC checks during sampling and analysis.

2 - Macroinvertebrate Index of Biological Integrity (IBI)

IBIs are excellent indicators of long-term water quality conditions. Because the aquatic animals are continuously exposed and affected by water quality, they become a living record of the health of the stream. *Taking samples of freshwater invertebrates and identifying the organisms present can reveal whether a body of water is healthy or ill, and the likely cause of the problem if one exists, much like an examination by a physician.*¹



The PA DEP has recently released a new method for calculating macroinvertebrate IBIs, and GVA interns and staff have been

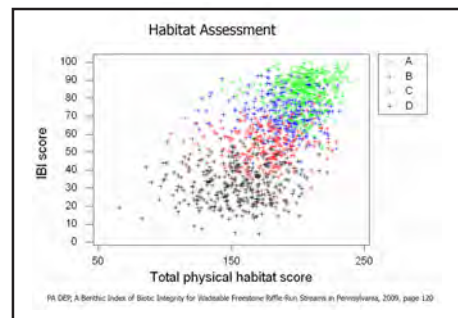
¹ J Reese Voshell Jr, A Guide to Common Freshwater Macroinvertebrates of North America

working through the large quantities of past data available to create trend charts for many sites throughout the watersheds. Accurate macroinvertebrate identification is essential to the overall process of calculating an IBI. The data GVA is working with meets that standard, but we are not currently able to collect new macroinvertebrate data of this accuracy.

IBI scores range from 0 to 100, with 80 or above qualifying as High Quality/Exceptional Value.

3 - Habitat Assessment (HA)

HAs are conducted by visually inspecting and documenting the physical condition of the stream habitat along a 100-meter section of stream. As can be seen in the figure, HAs correlate very well with



macroinvertebrate IBIs, and therefore are a very useful tool to complement macroinvertebrate IBIs. Twelve parameters are assessed, each on a scale of 1 to 20, and then totaled. Streams which are healthy and unstressed will score very well, while streams which are impacted from stormwater, construction run-off, loss of riparian buffer, or other man-made stressors will have visible changes which will be reflected in a lower score.

GVA is proceeding with habitat assessments across three watersheds, with plans to greatly expand this program in 2013 using college interns and through partnerships.

4 - Land Cover

How the land is used in each subwatershed will in most cases determine water quality and the biological integrity of the ecosystems. There are exceptions. For instance, a fully-forested, pristine

subwatershed can be subject to a point source such as acid mine drainage or untreated effluent and have terrible water quality. Acid rain from coal plants can



Valley Creek in Valley Forge National Historic Park, showing steambank damage from stormwater flows.

have the same effect. But these are rare exceptions.

GIS provides many sources of information about both current and historical land cover. Aerial photography can be delineated by hand in GIS (see example) and there are several other products including satellite land cover data sets with which GVA has been working for the last two years.

See "Watersheds," page 11

What is a watershed?

Put simply, a watershed is an area of land forming a basin where the rain and snow which falls in it goes downhill and toward one exit. For example, precipitation that falls into the Pickering Creek watershed makes its way to the Pickering Creek, and eventually exits into the Schuylkill River. (Obviously, precipitation which evaporates or is withdrawn for use, exits by other means.)

Throughout the United States, each watershed is identified by a unique Hydrologic Unit Code (HUC). The HUC is also an indication of where a unit falls within a larger watershed. For instance, Pickering Creek (HUC 020402031006) is one of the watersheds nested within the larger Schuylkill watershed (HUC 02040203), which in turn is nested within the still larger Lower Delaware watershed (HUC 020402).

Why We Tend the Forest Watersheds, from p. 10

Streams are dependent on trees to filter pollutants, manage stormwater, regulate temperatures, and provide habitat for local and migratory species. In doing this, trees secure for us the abundant and clean fresh water supply we depend upon.

Unfortunately, forests throughout Chester County are struggling to regenerate naturally. With an upsurge in aggressive, non-native plant species and bulging deer populations, competition in the plant world is fierce. Truly, the survival game has changed. No longer can we expect an abandoned field to revert naturally to a healthy and diverse forest ecosystem as it once did. This is troubling, because we know that streams need trees; *lots* of trees.

GVA's Watershed Restoration Program works with community partners and volunteers to aid in forest restoration. The program finds volunteers to install trees, plus plastic tree tubes to protect the plantings from hungry wildlife. Now at the completion of three years, the program has engaged over 470 volunteers, formed 16 partnerships, and installed over 4,000 trees, 350 shrubs and 20 bird boxes. Work has taken place in on 11 sites in three watersheds: French Creek, Pickering Creek, and Valley Creek. We are very proud to have achieved so much in such a short time.

This year we installed 1,000 trees and shrubs at multiple sites in partnership with existing and new partners. We joined again with Open Lands Conservancy in the Valley Creek watershed to plant at Miller and Cool Valley Preserves with help from Boy Scouts, Trout Unlimited, and Siemens volunteers. We received special assistance from Bryce Dupe, who coordinated the Miller Preserve planting as part of the service project requirements for his Eagle Scout candidacy.

An exciting new partnership was formed this year with Tredyffrin Township's Environmental Advisory Council, working at Wilson Farm Park. Situated in the heart of Chesterbrook and spanning two watersheds (Valley Creek and Trout Creek), the well-used and loved 90-acre park is a mix of passive and active recreation areas. Features include a pocket woodland in the center of the park, and a good-sized stormwater collection pond. An initial planting of 250 trees was made in late

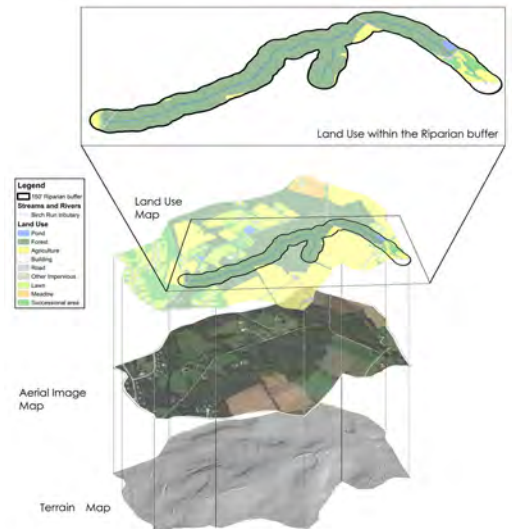
The importance of trees in maintaining watershed health cannot be over emphasized. Higher levels of forest cover in a watershed correlate strongly with water quality. Also of importance is whether those trees are located along the stream, i.e. are there gaps in the forested riparian buffer?

Integrating the Data

Across the country there are many approaches being taken as to the kinds of data being gathered and how they are integrated. The overall trend is to integrate data from many sources to build a detailed assessment of the current health of a watershed. The same process will allow us to use historical data to assess previous watershed conditions and also do scenarios looking forward.

Why assess? Assessments allow GVA to prioritize work in subwatershed locations and support our goal of exceptional watersheds in northern Chester County. *Mike Bullard*

With a degree in Biochemistry from Penn State University, Mike Bullard has over a decade of experience in a commercial water quality lab and a lifelong fascination with aquatic life. Mike has been a long-time volunteer with GVA, beginning with designing the new bridge for the main pond at Welkinweir in 1998. More recently, he has been putting together GVA's water quality monitoring program and supervising interns.



September by Cabrini College and township volunteers as a part of the township's first "Tree-dyffrin" event. The site's highly visible and accessible location led to frequent questions about what we were doing during and why. Pre-made labels were attached to tree tubes to educate park users on the purpose of the planting. An article was also placed on the township's website <http://www.tredyffrin.org/pdf/general/Wilson%20ParkTree-dyffrin%20flyer.pdf>

Plans are already underway for 2013, to continue to build the riparian forest at this location. Other best management practices planned for the park are rain gardens, basin naturalization, and bio-swales.

Planting continued on the West Vincent Township's Griffith Farm with support from the Youth Group from St. Matthew's Lutheran Church. Girl Scout Troop #419 installed shrubs around a high quality wetlands and Troop #4959 built and installed bird boxes throughout the site.

It is unique opportunities such as these that allow us to forge new and varied relationships and service learning opportunities within the community.

What makes our Watershed Restoration program successful is that volunteers gain the sense that they are doing something positive for the environment. This has never been more important! Faced with catastrophic environmental problems across the globe, the sense of paralysis can become all-consuming.

The Watershed Restoration Programs fosters a sense of environmental stewardship, builds informed advocates, involves a variety of community groups and truly nurtures the soul. Come join us in 2013! Send us an email to be added to our 2013 volunteer tree planting roster, gva@greenvalleys.org. Plant on!

Margot Taylor

Please join us...

Join GVA or Renew Your Membership Today! *ONLINE MEMBERSHIP now available!

Name _____

Address _____

City _____ State _____

ZIP _____ Phone _____

Township _____

Watershed _____

Email _____

I would like to volunteer time to GVA.

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**Make checks payable to Green Valleys Association
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MEMBERSHIP includes quarterly newsletter, notice of events and programs, access to Welkinweir grounds, reduced rate to special programs (including summer environmental camp) and fishing with a GVA permit.

- Individual** \$45.00
- Supporter** \$60.00
- Naturalist** \$100.00
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I am a **Renewing Member** **New Member**

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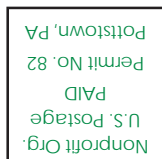
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