



Help protect the water resources in Berks County.

# Water

Without a doubt, clean water is considered by most people to be a fundamental measure of environmental health. We rely on surface water and groundwater for our drinking water supplies, for irrigation of crops, for industrial processes, and for outdoor recreation. Moreover, clean waters, whether they be free-flowing streams and rivers or serene ponds and lakes, have always been visited and admired for their natural beauty. Monitoring and protecting the health of surface water and groundwater resources has generally been at the forefront of environmental laws and regulations at the federal, state, and local level.

Many of our regulations that apply to water resources are directly or indirectly linked to the Federal Water Pollution Control Amendments of 1972, which substantially strengthened prior Federal legislation addressing water quality. Major amendments were added in the Clean Water Act of 1977 and the Water Quality Act of 1987.

There are many aspects of our water resources that can be, and are, monitored quantitatively. The amount of rainfall is one of these, and our television weather reports commonly talk about whether our region is in a water deficit or surplus, based on comparisons with long-term averages. The amount of rainfall that percolates into underground aquifers, the “groundwater” resource, is another critical measure. We rely on wells for much of our drinking water, and if the aquifers are not recharged, our wells may run dry.

Rainwater that does not percolate into underground aquifers contributes to flows in our streams and rivers, and is often stored in surface reservoirs as drinking water supplies. Water flowing across the land surface will carry with it soil particles and chemicals, and these materials may adversely affect the quality of the water eventually flowing into streams and rivers. Anything you place on the ground, be it antifreeze, oil, pesticides or herbicides, fertilizers, industrial chemicals, or trash, is likely to make its way into your local streams and rivers.

Humans are, of course, not the only organisms that depend on high quality water for survival. Clean streams and rivers support a diversity of fishes and invertebrates (animals without backbones), while polluted or stressed surface waters generally support a lower diversity and different group of aquatic organisms or none at all. Stream health, therefore, can be gauged not only by measuring water quality and chemistry directly, but also by sampling the communities of organisms that live in that water.

Our Water Indicators look at groundwater resources, stream condition and health, and plans in place to protect water resources in Berks County.

- Groundwater Elevations
- Miles of Impaired Streams
- Water Systems with Protection Plans
- Status of Sewage Facility Plans (Municipal PA Act 537)
- Aquatic Life in Streams



Water Indicator One

# GROUNDWATER ELEVATIONS

Although waters at the surface of the land, i.e., rivers and streams, are the most conspicuous of our water resources, the water stored below the ground surface is a very important resource. This groundwater is tapped for drinking water by individual and community wells, and also feeds the surface streams and rivers by seeps and springs. Groundwater is replenished from the surface by percolation of rainwater through the soil and into the underlying bedrock, and only a fraction of the annual precipitation that falls on the land percolates deep enough to recharge the groundwater reservoir. Therefore, the depth to groundwater is an important gauge of the quantity of groundwater available for use. The United States Geological Survey (USGS) monitors a groundwater well at Fleetwood in Berks County. The principal measurement is the depth of groundwater below the ground surface. A smaller depth-to-water measurement (shorter bar on the graph) means that the level of groundwater is higher.



Groundwater at Fleetwood well is relatively constant, but Berks County could use more monitoring wells.

## What the data tells us

Groundwater elevations at the Berks County monitoring well in Fleetwood have varied over a relatively narrow range around the 1994-2008 average of 131 feet below ground surface. The area of Berks County that this well monitors, groundwater elevations have been relatively stable over this period.

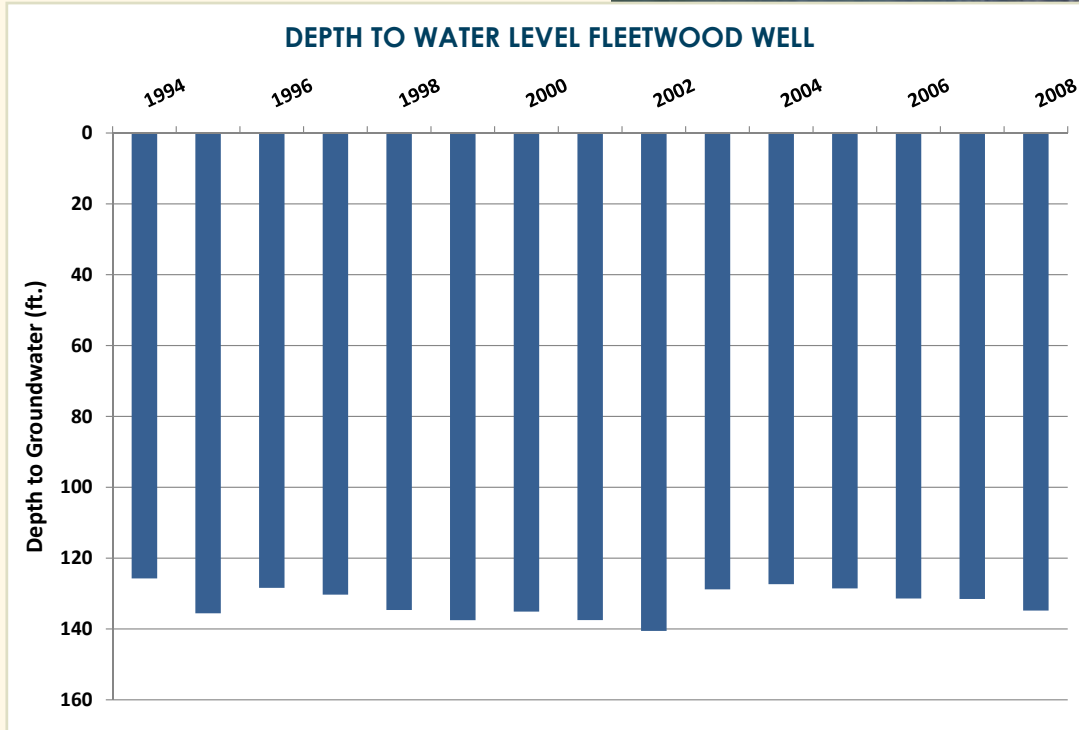


## How do we make things better

Recharge of groundwater occurs through pervious surfaces (soil, gravel), while impervious surfaces (buildings, roads, driveways) tend to divert runoff to surface waters. Reducing impervious cover or using infiltration techniques to infiltrate surface runoff before it enters streams can promote groundwater recharge. Simple, common-sense measures to reduce unnecessary water use (e.g., turning off water taps when you're not actually using the water, using low-flow shower heads) also reduce the overall demand on groundwater resources. Through the Berks County Planning Commission and the Pennsylvania Department of Environmental Protection (PADEP), Berks County residents could work to have one or more additional monitoring wells in Berks County to better document the status of groundwater.



Maiden Creek



## Ways to SAVE WATER

- Turn off the water while brushing your teeth and washing your face at the sink.
- Install water-saving showerhead and faucets.
- Turn water off while you are washing the dishes. Don't rinse your dishes before loading the dishwasher. Most dishwashers are designed to handle unrinsed dishes, and in fact, they may perform better if dishes are not pre-rinsed.
- Routinely check toilets for leaks. Most toilets will need their inner parts replaced at least once every year or two to prevent unnecessary leaks. If you need to replace your toilet, install a low-flush toilet to save money and water.
- Use a rain barrel at the bottom of your gutter downspouts to collect rainwater for watering your garden and plants.

# MILES OF IMPAIRED STREAMS

The Pennsylvania Department of Environmental Protection (PADEP) evaluates the status of surface waters within the State on a regular basis, and determines whether the properties of each specific reach of surface water meets its designated use. These uses vary with the character of the surface water and surrounding watershed, and include such general uses as aquatic life, fish consumption, recreation, and potable water supply.

Surface waters that do not meet the properties of their classification are identified as “impaired.” There are several categories of impairment, from failing to meet one surface water use to multiple shortcomings and the need for the establishment of Total Daily Maximum Load (TDML) restrictions on discharges to a specific surface water. The graphic below presents PADEP data from 2009 on miles of impaired streams in Berks County, and the specific types of impairments that have been documented.

## What the data tells us

Many factors impair our local waterways, while not reflected in the chart below, impervious services and stormwater are among the most significant. Agricultural effects on surface waters are the principal reason for classification of Berks County waters as impaired. For context, it is important to note that a large fraction of Berks County is used for agriculture, and that many miles of streams traverse agricultural areas. Agricultural impacts on surface waters can be reduced by using well-recognized land management techniques. Farmers can readily obtain information on Best Management Practices (BMP’s) for agriculture from the Berks County Conservation District.



About 361 miles or 26.4% of Berks County streams and rivers are impaired. There is a total of 1366 miles of streams in Berks County.

### MILES OF IMPAIRED STREAMS AND REASONS

Source	Description	Reason	Miles	Total Miles
Agriculture	Agriculture	siltation, nutrients	246.8	
Erosion/ Development	Land Development	siltation, urban runoff	1.72	11.66
	Erosion	erosion from derelict land	8.14	
	Removal of Vegetation	siltation	1.81	
Hydromodification	Channelization	habitat alterations	2.26	6.13
	Draining or Filling	draining or filling	0.66	
	Impoundment	upstream impoundment	3.22	
Runoff	Golf Course-Related	siltation and pesticides	4.28	30.92
	Residential Runoff	water flow variability, siltation	5.70	
	Urban Runoff/Storm Sewer	siltation, water flow variability	20.95	
Point Source	Industrial Point Source	metals, salinity, total dissolved solids, chlorides	6.56	12.13
	Land Disposal	cause unknown	1.98	
	Mining	surface mining, siltation, flow alterations	3.00	
Other	Municipal Point Source	pathogens	0.58	53.24
	Natural Source	siltation, water flow variability	1.79	
	Unknown	PCB (source unknown)	45.99	
	Other	organic enrichment, low dissolved oxygen	5.46	
<b>TOTAL</b>			<b>360.91</b>	<b>360.91</b>

Source: PADEP. 2009. Integrated List Non Attaining [online]; Office of Water Management, Bureau of Water Supply and Wastewater Management, Water Quality Assessment and Standards Division

**Stream bank fencing BMP** - This Best Management Practice (BMP) limits cattle access to the stream to protected crossings and drinking stations, preventing the cattle from eroding stream banks and degrading water quality.

## How do we make things better

For non-agricultural properties and owners, many of the same BMP’s as recommended for farms apply to residential, commercial, and industrial sites. Try to minimize land disturbances and soil erosion, apply the minimum amounts of pesticides or fertilizers to achieve your objective, and don’t discharge hazardous materials where they can enter the soil or surface waters. Although a direct connection may not always be self-evident, many contaminants can eventually make their way into drinking water supplies, whether such supplies are surface reservoirs or groundwater wells.

## Keep our WATER CLEAN

- Never dump anything into storm drain inlets. Everything that enters the storm drain inlets ends up in the water. Don’t dump oil, trash, leaves, pet waste or any other material into the inlets.
- Pick up pet waste. Stormwater will carry pet waste left on the ground into the storm drains, contributing to harmful bacteria, parasites and viruses in our water.
- Practice environmentally friendly lawn and garden care. Use only organic fertilizers and use them sparingly. Avoid pesticides. These chemicals will be swept into local waterways by stormwater runoff and harm aquatic life.
- To reduce runoff, direct downspouts over porous, not paved, surfaces. Or use a rain barrel to collect rainwater for later use on your lawn or garden.
- Practice environmentally friendly automotive care. Check your vehicles for leaks and fix immediately.
- Don’t dump anything into streams. Even garden debris like leaves, branches and grass clippings are hazardous to our waterways because excess amounts hurt aquatic life.
- Protect riparian buffers (streambank plantings). Don’t mow to the edge of streambanks. Allow native vegetation to grow freely in at least a 10-foot strip along the bank to reduce erosion and to help filter out pollutants.
- Take your unused pharmaceuticals to a collection program. Don’t flush them down the toilet or pour them down the drain.
- Participate in community cleanups.

Water Indicator Three

# WATER SYSTEMS WITH PROTECTION PLANS

The Safe Drinking Water Act (SDWA) Amendments of 1996 require that each state develop a Source Water Assessment and Protection (SWAP) Program for all drinking water sources - groundwater and surface water - that serve community water systems. The requirements for the SWAP program were adopted by the Department of Environmental Protection (DEP) as regulations (Title 25, Chapter 109). The SWAP program for a Community Water System (CWS) consists of two parts: assessment and protection. The assessment part is mandatory. Many of the assessments were completed in the early 2000s, and provided a very general evaluation of the immediate protection area for existing water sources.

The second part of SWAP - protection - is voluntary. This is the source water protection plan indicator selected for this report. A CWS may voluntarily choose to develop a more detailed, comprehensive, and community-oriented source water protection (SWP) plan following DEP's regulations in Chapter 109. For several years there was a grant program available for interested water systems. In 2007, DEP initiated the Source Water Protection Technical Assistance Program (SWPTAP) to help community water suppliers develop a protection plan for their water sources. All Community Water Systems are eligible to participate in this program through their regional DEP office.



*Lake Ontelaunee is the water supply for the City of Reading.*



Only 6 out of 63 Berks County community water systems have source water protection plans. This includes municipal authorities and water departments, private suppliers, community associations, mobile home parks, and apartments. All of these water suppliers are eligible for source water protection assistance through the DEP.

## What the data tells us

The SWAP program is relatively new and the voluntary “protection” phase of the program follows the assessment phase, so the low number of Berks water suppliers with a source water protection plan in place is not a distressing statistic. However, the hope would be that the number of Berks water suppliers with source water protection plans shows a substantial increase over the next few years.



## How do we make things better

Upon completion of SWAPs, public meetings are held to discuss results, recommendations, and enhancements. Find out about the status of source water protection plans for your area, and try to attend public meetings discussing these issues. Encourage your water supplier and municipality to participate in the SWAP program. Landowners, commercial, and industrial facilities in proximity to designated source water protection areas should evaluate the potential for their sites to affect source waters, and take reasonable steps to reduce potential adverse impacts (e.g., spill protection plans).

## BERKS COUNTY PUBLIC WATER SYSTEMS WITH SOURCE WATER PROTECTION PLANS



- Bernville Borough Authority
- Kutztown Borough
- Lyons Borough Municipal Authority
- Maxatawny Township
- Reading Area Water Authority
- Womelsdorf/Robesonia Joint Authority

Source: Spotts, Stevens and McCoy, 2009

## What if you have well water?

If you get drinking water from your own well, you should take some precautions to assure that the water you are pumping out of the ground is safe (USEPA, 2009).

- Get your well water tested periodically.
- Use lawn fertilizers and pesticides per the label instructions. Excess chemicals could enter your well.
- Be aware of changes in land use around you. New developments or land use practices could affect local groundwater quality and/or quantity.
- The area around your well cap should be graded so that surface water does not collect resulting in possible contamination of the well.
- Visit <http://mwon.cas.psu.edu> - a good resource for well owners in Pennsylvania.

## STATUS OF SEWAGE FACILITY PLANS (MUNICIPAL 537 PLANS)

Whenever people live in close proximity, they must address two basic environmental concerns: clean drinking water, and treatment/disposal of sewage. While farmsteads might have been able to rely on a well and a privy to meet these needs, increased density of development requires more comprehensive planning to protect human health and water resources.


A 537 Plan is a Wastewater Management Plan that complies with the requirements of Act 537, the Pennsylvania Sewage Facilities Act. Act 537 was enacted in 1966 to correct existing sewage disposal problems and prevent future problems by requiring proper planning and permitting of all types of sewage facilities ranging from municipal wastewater treatment plants to individual on-lot disposal systems (septic systems).

Under Act 537, all municipalities must develop and implement an official sewage plan that addresses current and future sewage disposal needs. These 537 Plans may require revision due to new land development projects or other changes in demands on a municipality's sewage disposal capabilities. Changes in municipal 537 plans are reviewed by the Pennsylvania Department of Environmental Protection (PA DEP). The chart at right lists the "ages" of Berks County 537 plans, i.e., how long the plan has gone without revision.

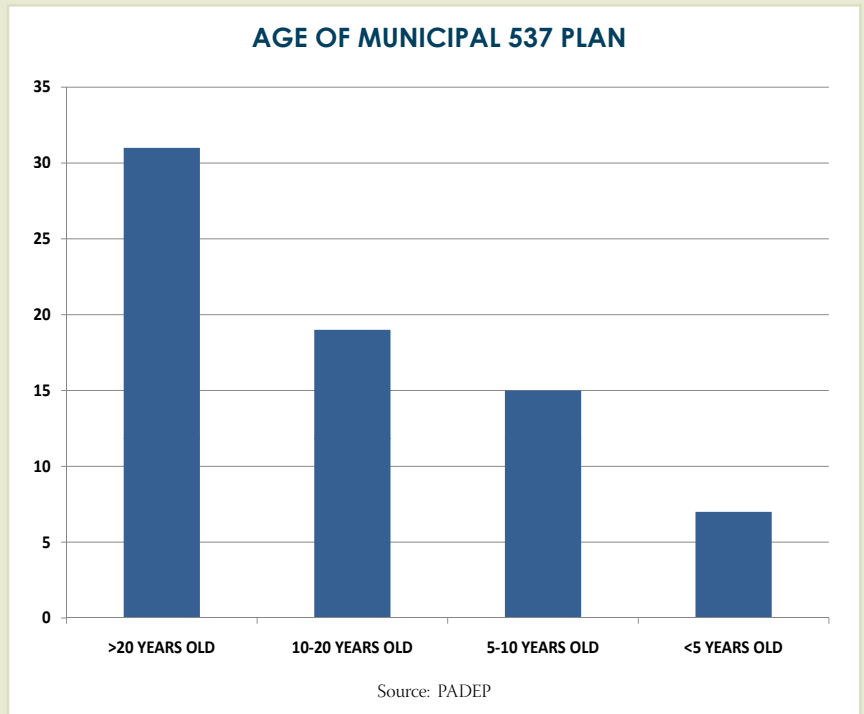
### What the data tells us

Because a 537 Plan needs be revised only when a municipality's sewage disposal needs change, an "older" 537 plan is not necessarily outdated. However, revisions to 537 plans generally incorporate technical improvements that have become working practices for the engineering and water treatment professions.

 Most Berks County 537 plans are more than 10 years old.

 How do we make things better

Everyone should be aware that water conserved is water that does not have to be treated, either in an individual on-lot system or in a public wastewater treatment plant. So, prudent consumption of water is a good first step we all can take. Property owners with on-lot septic systems can practice good management by having their systems pumped out on a regular schedule. On-lot septic systems serving individual residences should be pumped out every 3-5 years, depending on the number of users. However, because some municipalities may have ordinances specifying pump-out intervals for on-lot septic systems, it is good practice to consult your municipal officials before setting your schedule.



## Tips to Care for your SEPTIC TANK

- Divert rainwater from the septic drainfield. A soggy drainfield won't absorb and neutralize liquid waste. Plan landscaping and roof gutter drains so that excess water is diverted.
- Perform regular maintenance. Check with a septic professional to see how often you need to do removal.
- The toilet isn't a garbage disposal. Never flush medicine, cat litter, disposable diapers, sanitary napkins, tampons, paper towels, facial tissues, coffee grounds, or cigarette butts.
- Keep trees at least 100 feet away from the septic system. Tree roots that invade your septic system can do major damage.
- Avoid hazardous chemicals. Varnish, paint thinners, motor oils, gasoline and other chemicals can ruin your system and are a hazard to groundwater. Dispose of them properly.
- The septic drainfield should be graded so that stormwater does not accumulate and stand on the drainfield.



## INDIVIDUAL ON-LOT SYSTEMS

Municipalities or local agencies are required to employ Sewage Enforcement Officers (SEO's) who are certified by the state and are responsible, among other duties, for reviewing permits for construction of on-lot septic systems.

## How can local partnerships lead to trails, education, **AND WATER PROTECTION?**

### Sacony Creek and Watershed

Protecting the surface water and groundwater that flows through the entire Sacony Creek Watershed and Kutztown Borough Wellheads is important to the quantity and quality of the drinking water that is ultimately available in people's homes. The headwaters of the Sacony Creek originate in the pristine Oley Hills and travel through rural agricultural areas until they make their way to the Borough of Kutztown, and eventually to the Maiden Creek (which feeds Lake Ontelaunee – the City of Reading's drinking water supply). New trails, native plants, educational stations, a protected marsh and healthy vegetation now serve as a companion next to this important creek as it makes its journey. How did this creek and its surrounding watershed get so lucky?

### Community Action

Several years ago members of the greater Kutztown community worked together to raise funds to help protect the Sacony Marsh (an important freshwater natural feature in Kutztown). This group of citizens and businesses, Friends of Sacony Marsh, is still active today. Together, with the Berks Conservancy, Maiden Creek Watershed Association, County of Berks grant funds, and the Borough of Kutztown, the "Friends" have done much more than protect the marsh. They've helped the dedicated staff of the Borough create trails, install benches, build an observation deck, develop signage, and plant vegetation along the creek.



This group of partners has utilized grant funds to install best management practices along the Sacony Creek to improve eroded areas – this helps to ensure healthy water in the stream. In addition, walking and biking trails were created that meander next to the creek, and Kutztown Borough completed the construction of an observation deck that overlooks the creek and marsh. This deck includes educational stations so that visitors can appreciate the importance of the natural resources that are surrounding them.

What makes this project extremely special is that a portion of the trail and the observation deck are located along the Kutztown Area School District's property line. As a result, hundreds of Elementary and Jr/Sr High School students utilize the trail to learn about the importance of the creek and marsh. The teachers and students have taken an active role in utilizing this special natural resource and the Kutztown Area School District should be commended for their participation.

Now, one can enjoy a walk or bike ride along the completed trail that takes you from the Sacony Marsh and observation deck over to Main Street in Kutztown. But that's not all...In 2009, the focus of the partnership turned to the protection of the borough's wellhead property (drinking water supply). Numerous land management techniques were implemented on the property, including the addition of 850 native trees and shrubs in buffers to help filter and protect the water. This project involved nearly 1580 volunteers to assist in this major tree planting effort – including the Environmental Club at Kutztown University, Kutztown Middle School Students, Maiden Creek Watershed Association members, and volunteers of the Berks Conservancy's Environmental Committee. The cooperation of many partners and volunteers made this project successful. This partnership, simply aimed to improve natural resources in the Sacony Creek Watershed, can serve as a model for similar projects involving municipalities, school districts, and non-profit organizations elsewhere in Berks County. For more information about community partnerships addressing the Schuylkill River, visit [www.schuylkillwaters.org](http://www.schuylkillwaters.org).

## AQUATIC LIFE IN STREAMS

One important measure of stream health is whether a waterbody supports a diverse community of plants and animals. One group of animals monitored for indications of stream health are the larger invertebrate animals that typically spend some or all of their life cycles in fresh water.

These animals are referred to as “benthic macroinvertebrates,” and can be quantitatively sampled using net samplers. After the invertebrates are counted and identified, the data can be evaluated using a variety of ecological measures or “metrics.”

The Stroud Water Research Center in Avondale, PA, has implemented a long-term assessment of streams in the Schuylkill River Basin, sampling benthic macroinvertebrates at 19 locations in that basin.

The data are assessed using a metric termed the Macroinvertebrate Aggregated Index for Streams (MAIS), which combines or aggregates several conventional ways of assessing the health of a stream’s invertebrate community. The MAIS score ranges from 0 to 20, with scores from 13.1 to 20 yielding a classification of “Good,” 6.1 to 13 as “Fair,” and 0-6 as “Poor.” Basically, the higher the quantity and diversity of aquatic life, the better the water quality.

The graphic at right is a Stroud Research Center representation of the MAIS scores for the six Stroud stream monitoring locations within Berks County. These locations are on Manatawny Creek, Hay Creek, Angelica Creek, Maiden Creek, Northkill Creek, and Tulpehocken Creek.



### How do we make things better

Conditions in surface waters reflect what is happening in the surrounding watershed, i.e., the land area that provides water to a particular stream or river. Lawn and farm fertilizers increase algae growth and may promote episodes of low oxygen in streams; motor oils, antifreeze, and other chemicals can enter streams from roadside culverts and drains; cutting back lawns and fields to the edges of streams can elevate water temperatures and increase sediment loads in the stream waters. Reducing fertilizer, sediment, and contaminant inputs, and maintaining vegetated buffers and canopies along streams, are easy ways to promote healthy streams and rivers in Berks County.

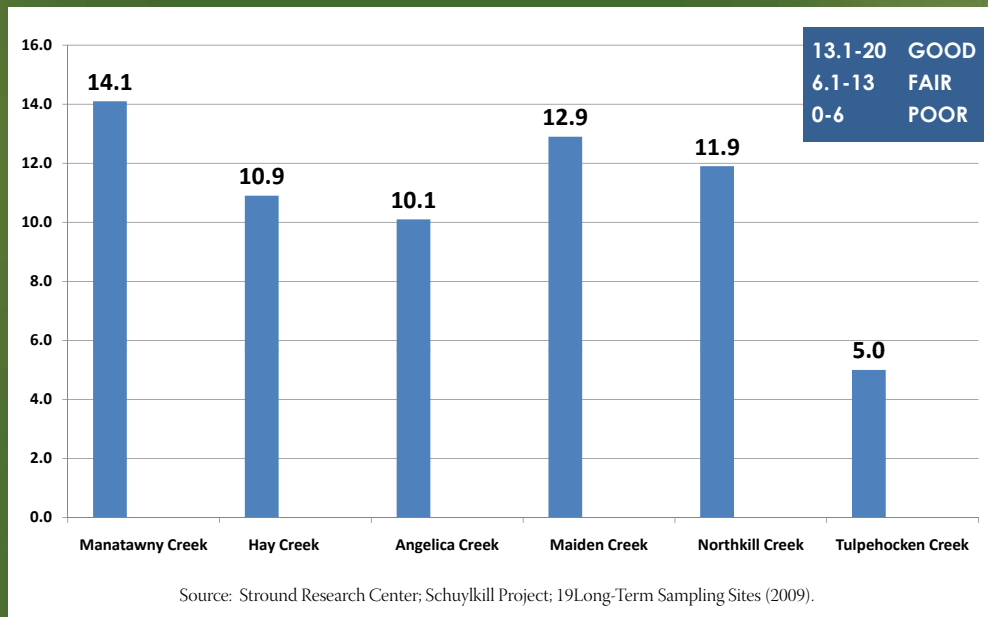


Measures of stream health based on organisms in streams are mixed.

### What the data tells us

Manatawny Creek scores “good” on the MAIS benthic invertebrate score, while Hay Creek, Angelica Creek, Maiden Creek, and Northkill Creek score in the upper half of the “fair” range of MAIS scores. Only Tulpehocken Creek among this group scores in the “poor” range of scores. Stroud has published a detailed discussion of the sampling results from Tulpehocken Creek; that discussion can be found in *Understanding Stream Conditions ...*, available on Stroud’s website at [www.stroudcenter.org/schuylkill/report.htm](http://www.stroudcenter.org/schuylkill/report.htm).

### MACROINVERTEBRATE AGGREGATED INDEX FOR STREAMS (MAIS) BERKS COUNTY SAMPLING LOCATIONS



Benthic macroinvertebrates are animals without backbones living on the bottom of streams and ponds. This group includes crayfish, snails, clams, and many immature forms of insects (e.g., mayflies, caddisflies, gnats, midges, dragonflies).

Source: Stroud Research Center; Schuylkill Project; 19 Long-Term Sampling Sites (2009).



### Why is this IMPORTANT TO YOU & YOUR FAMILY?

Conditions in surface waters reflect what is happening in the surrounding watershed, i.e., the land area that provides water to a particular stream or river. The quality of the stream, and the types of organisms that live in the stream, are affected by how the watershed is developed, what is carried off these lands into the streams during rainstorms, how much vegetation remains along stream banks, etc.