Philadelphia Water Department

The Monoshone Watershed

Quarterly Water Quality Update

Issue No. 3 February 2010

Introduction

Welcome to the Philadelphia Water Department's (PWD) Third Quarterly Water Quality Update for the Monoshone Creek. This issue provides updates on our Saylor Grove Treatment Wetland, and more detailed sampling information.

Saylor Grove Site Facts

- Saylor Grove Park is approximately 3.2 acres. The Saylor Grove Wetland makes up about one-third of the park.
- Saylor Grove Wetland drains approximately 156 acres of stormwater runoff from Germantown. The wetland is designed to drain the stormwater within 24 hours.
- Saylor Grove Wetland will filter a significant portion of the estimated 70 million gallons of stormwater per year.
- The wetland will remove approximately 13 tons of total suspended solids from the Monoshone Creek per year.
- The first 0.7 inches of every rainfall event will be sent to and treated at the wetland. According to the long-term historical record of the airport's rainfall data, 70% of all storms make up 0.7 inches or less of rainfall.
- The wetland will improve flow variability of the Monoshone Creek.
- The wetland will increase biodiversity (vegetation and animals).
- Approximately 3,000 trees, shrubs, and herbaceous plugs have been planted.

Saylor Grove Treatment Wetland: What has been happening there?

The Saylor Grove Treatment Wetland had been treating stormwater runoff from a drainage area of approximately 156 acres for over three years now. During this time, the wetland bottom has seen an accumulation of a large amount of sediment and some organic matter that settled as the water was retained in the basin. This sediment buildup has reduced the volume of water that the wetland can hold and treat, which created the need for the dredging operation of the pond. We expected this to happen, as both detention basins and man-made treatment wetlands require periodic dredging in order to allow them to continue to operate in an optimal manner. (The sediment collected in the treatment wetland is sediment that does not make its way to the Monoshone Creek).

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Separate and Combined Sewer Systems

In many of Philadelphia's homes, sanitary sewage and stormwater travel together through a combined sanitary/storm sewer system for treatment at one of the City's three sewage treatment plants, where it is cleaned before it is discharged to the Delaware River.

In some areas of Philadelphia, such as the Wissahickon Creek Watershed, stormwater from downspouts, yards and streets is piped to separate storm sewers and released into local streams. This stormwater runoff is not treated before it is released.

Homes that are serviced by separate storm sewers also have a separate drainage system for their sanitary sewage, which is collected in the sanitary sewer and sent to a treatment plant.

In some homes, the pipes (called laterals) leading to these two systems may be leaking or improperly connected. In this situation, sanitary sewage may enter stormwater sewers and may be released untreated into local waterways.

Laterals that are improperly connected (also known as crossed laterals or cross connections) and laterals that are leaking due to deterioration are known as defective laterals.

PWD funds the correction of the crossed laterals in its effort to improve stream water quality with minimal public impact.

(Saylor Grove *from page 1)*

PWD has done a topographic survey of the wetland, using the as-built elevations versus the survey gathered prior to the dredging to determine the amount of sediment that had built-up throughout the wetland and that would have to be removed to get the wetland back to the as-built elevations and volume. This information will give us the sense as to how often the wetland should be dredged as a component of its long-term operation and maintenance.

In order to effectively dredge the site, the wetland was drained so that the material removed would have a larger solid content. During the work, a survey was done to confirm that the appropriate elevations were achieved in a particular area prior to moving on. The forebay pond area was dug to about three feet in the deepest part and graded, while the channel areas around the left and right sides of the island were excavated up to two feet. The northeast area of the wetland was left undisturbed due to the existence of vegetation that we wanted to preserve and the 48-inch stormwater pipe that runs beneath the wetland. Currently, PWD is testing the removed material to determine its characteristics and content, including moisture content, organic vs. inorganic composition, nutrients such as nitrogen and phosphorus, and chemical constituents. With this knowledge, we will gain a better understanding of just how effective the wetland has been in treating stormwater runoff, as this wetland is serving as a model for similar projects in the Wissahickon Creek Watershed.

Why we use Fecal Coliform as an Indicator

Fecal coliform bacteria indicate fecal contamination and the potential presence of human pathogens (microorganisms that can make people sick). The fecal coliform test is used because it is reliable, relatively simple to perform, and provides results quickly and inexpensively compared to tests for specific pathogens. One of the disadvantages of the fecal coliform test is that these bacteria are found in feces of many different kinds of warm-blooded animals, not just in sanitary flow. Although not ideal, fecal coliform is presently regulated by PADEP water quality standards and used by PWD for screening sources of potential pollution in streams and dry weather flow from stormwater outfalls.

When performing a fecal coliform test, lab scientists do not actually count individual bacteria themselves, but count the colonies that grow from a single bacterium. A sample of water is passed through a very fine filter which is then placed in a petri dish containing a food source and a selective indicator chemical. If bacteria are able to consume the food source and multiply, the chemical indicator changes color. Each color spot on the petri dish is considered one "colony forming unit" (CFU).

PWD lab scientists need to be able to test for bacteria in samples that range from very pure (drinking water) to polluted (stormwater), so they may use a much smaller subsample of water when testing stormwater and multiply the number of colonies counted by the amount that the sample was diluted. This is why the precision of the results decreases as bacteria concentration increases. With the large dilution factors applied for testing a stormwater sample, each spot on the plate can represent 1000 bacteria (or more) in the final sample result.

Summary of Fecal Coliform Results

Stormwater Outfall Monitoring Program

Data from project initiation (May '09) to present.

MONOSHONE CREEK Outfall #5 (ST068050)

Sample Date	Fecal Coliform (# per 100 milliliters)
05/12/09	720
05/19/09	4,000
05/26/09	1,700
05/26/09	4,900
06/02/09	3,000
06/22/09	3,000
06/24/09	4,800
07/06/09	11,000
07/15/09	1,100
07/27/09	78,000
08/17/09	26,000
08/26/09	560,000*
09/02/09	9,400
09/08/09	5,100
09/21/09	7,600
09/21/09	1,100
10/06/09	4,900
10/14/09	7,270
10/27/09	12,300
11/09/09	5,000
11/18/09	7,545
11/30/09	45,000
12/29/09	200
12/29/09	210
12/30/09	280
01/05/10	964
01/12/10	4,600

MONOSHONE CREEK -- Downstream Site (MON0250) RITTENHOUSETOWN SITE

Sample Date	Fecal Coliform (# per 100 milliliters)
05/12/09	400
05/19/09	300
05/26/09	1,000
06/02/09	180
07/06/09	900
07/15/09	200
08/17/09	700
08/26/09	540
09/02/09	500
09/08/09	800
09/21/09	1,100
10/06/09	800
10/14/09	200
11/09/09	100
11/18/09	100
11/30/09	300
12/30/09	150
01/05/10	10
01/12/10	45

*As the sampling above illustrates, fecal coliform numbers are often in the low thousands, which means we all still have work to do. But, at the same time, we have witnessed a marked improvement from sampling results taken a decade ago. Often, a high result – such as the one obtained on 8/26/09 – is an indicator that there is a problem within the City's sewer or a property lateral(s), resulting in sewage entering the creek. PWD inspects the sewers in this area to track down and repair potential problems. We did not find a problem in our system and therefore believe it was related to a private property problem.

Water is considered safe for recreation (immersing oneself in the water) when it tests below 200 colonies per 100 milliliters of sample. The Monoshone, as is true with other urban streams, rarely consistently meets that target as bacteria sources include sewage leaks, wildlife and stormwater runoff. That is why it is important to wash your hands or other parts of your body that come into contact with waterways when fishing or hiking just as you would do when gardening in your backyard.

Why does fecal coliform bacteria concentration decrease in the Monoshone from Outfall 5 to RittenhouseTown?

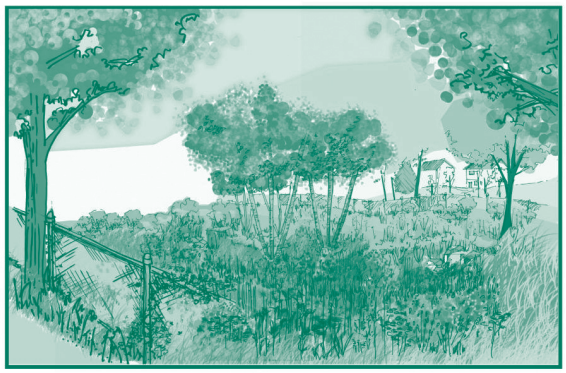
Indicator bacteria generally grow best under conditions similar to the gut of warm-blooded animals. Once exposed to the environment, these bacteria may die or become otherwise injured such that they do not produce colonies in laboratory tests. Bacteria may die from natural causes, such as being eaten by other organisms, or changes in water chemistry, temperature, and sunlight exposure. Urban stormwater may also contain pollutants that are toxic or injurious to bacteria.

Dilution by other sources of water with smaller concentrations of indicator bacteria causes the overall bacteria concentration to decrease. There are several sources of flow to the Monoshone Creek between outfall 5 and the MON0250 RittenhouseTown monitoring site.

Bacteria, and particles to which bacteria are attached, settle out of the water column. Indicator bacteria in sediments generally die and are consumed by decomposers. However, some bacteria may be re-suspended during subsequent storm events, or rarely, even multiply within sediments under favorable conditions.

Additional Stormwater Treatment Wetlands to be Constructed in the Wissahickon Creek Watershed

The Saylor Grove Stormwater Treatment Wetland served as a working model for two new treatment wetlands planned to begin construction this spring - the Cathedral Road and Wises Mill Stormwater Treatment Wetlands. PWD and its partners are very excited about the opportunity to treat polluted stormwater runoff before it flows into these important tributaries of the Wissahickon Creek.



PWD and the Fairmount Park Commission are working together to design a stormwater treatment wetland at the headwaters of Cathedral Run. Cathedral Run is a small first order tributary to the Wissahickon Creek. The stream originates from springs downstream of Courtesy Stables and then travels approximately 2,500 ft through a wooded section of Fairmount Park before entering Wissahickon Creek. The stream is relatively steep with an average gradient of 8.5%; however, the downstream half of the tributary is visibly steeper than the upstream reach.

The watershed is highly developed with 31% impervious cover and 361 homes. The natural drainage area is 116 acres; however two outfalls collect stormwater from an additional 40 acres. Base flow is low and was measured to be 0.06 cfs during August 2005. One outfall (W-076-01) located at the headwaters of the tributary drains approximately 91 acres of residential and commercial property.

The stormwater wetland will be designed to achieve the following goals:

- Reduce downstream sediment loading
- Improve the flow variability of storm related flows on Cathedral Run
- Increase base flow
- Improve diversity of in-stream biological community
- Maintain and enhance recreational use/aesthetics
- Reduce shear stress in channel
- Ensure wetland drains within 72 hours

Schuylkill Soundings Presents:

Freshwater Mussel Restoration Program
A Project of the Partnership for the Delaware Estuary

Wednesday, February 17, 2010 • 6:00 pm to 8:00 pm
Fairmount Water Works Interpretive Center

Please RSVP by February 15. For reservations or information, please call 215-685-0723. Visit us at 640 Water Works Drive, Phila PA 19130 or online at www.fairmountwaterworks.org.

Next Issue:

PWD will be reaching out to its environmental and citizen partners to initiate a Stormwater Troopers program –– an event in which PWD and community partners saturate the neighborhood that drains into Outfall 5 to raise awareness of defective laterals and other problems that can contribute to the pollution of the Monoshone Creek.

For More Information:

PWD's Annual Stormwater and Combined Sewer Overflow (CSO) Annual Report and other watershed management and comprehensive characterization reports can be found at: www.phillywatersheds.org.

For up to date information on the recreational water quality of the Schuylkill River, go to http://www.phillyrivercast.org/.

Here's What You Can Do:

Join a watershed partnership. For information, go to: www.phillyriverinfo.org.

Visit the Fairmount Water Works Interpretive Center, both online at www.fairmountwaterworks.org, or in person at 640 Water Works Drive in Philadelphia.

What is a WATERSHED?

A watershed is the land surrounding a system of rivers (or streams or creeks), or a particular river, that, when it rains, sheds the runoff into that waterway. Everything you do impacts your watershed. Runoff from garden fertilizers, hazardous substances like used motor oil, and trash dumped into one area of a river bank can pollute water many miles downstream. Protecting and preserving our watersheds helps protect our water resources.