

# **Water Monitoring Plan for Lower Southampton Township's Citizen Monitoring Program**

**Developed by Lower Southampton Parks Department with assistance from  
the Consortium for Scientific Assistance to Watersheds**

April 24, 2009 Version



## **Monitoring Plan For Turkey Run Retention Basin**

### **Goals of the Project**

The Basin Beautification Project's main programs will deal with monitoring and improving water quality, increasing infiltration, enhancing aquatic environment, providing wildlife habitat and increasing education.

### **Monitoring Goals**

Our watershed has an in-line detention basin planting at Turkey Run and a buffer built to discourage geese, yet the water quality has never been tested. Monitoring will allow us to evaluate the quality of our stream water and help us to achieve restoration. It will also assist us in determining whether the local Best Management Practices are improving the quality of water and if point sources are impacting the water quality.

### **Data Use**

The Basin Beautification Project's chief mission will be to improve overall water quality while using the monitoring data collected for educating those working on the project and by and large, the community that surrounds the basin to encourage better landowner practices.

### **Monitoring Training**

Monitoring will be conducted beginning in April 2009. Volunteer monitors interested in being part of this long term monitoring project will be trained in protocols and techniques on April 18, 2009 through the C-SAW Technical Assistance Program and at that time baseline macroinvertebrate monitoring will be conducted at two stream sample locations. Monitors participate in a 3-hour training that provided instruction for the following parameters: dissolved oxygen, nitrogen, pH, temperature, and turbidity.

### **Water Quality Indicators to be Monitored**

Because forested buffers take a long time to mature, note that improvements in water quality indicators like stream temperature and dissolved oxygen will take time to develop (as the trees have to grow and shade the stream over time) so be patient when it comes to linking water quality indicators such as these to a riparian buffer project of this type. Also remember, the bigger the natural buffer and the less mowed turf grass located upland of the basin that attracts geese, the more water quality improvements you will see.

Since the goal of the project is to involve citizens in routine monitoring to better educate the community and since field test kits are available to inexpensively test water quality and there is an interest by the Park to link water quality to the project, the following parameters were selected for field testing:

- *Nitrate-nitrogen*
- *Dissolved oxygen*
- *Water Temperature*
- *Turbidity*

**Lower Southampton Kit Specifications and Equipment**

<i>Parameter</i>	<i>Measurement Range<sup>1</sup></i>	<i>Accuracy</i>	<i>Manufacturer/Model/Cost</i>
Temperature	0-45 °C	+/- 0.5 °C	Lamotte 1066/\$20.50
pH	6.8-8.2	+/- 0.1 pH unit	Lamotte 2110/\$30.70
Nitrate-nitrogen (zinc reduction- non hazardous)	<1 – 15 mg/L	+/- 2 mg/L	Lamotte 3354/\$48.30
Dissolved oxygen	0-10 mg/L	+/- 0.2 mg/L	Lamotte 5850/\$47.50
Secchi-Tube			<a href="http://www.watermonitoringequip.com">www.watermonitoringequip.com</a> \$52.00 (Lawrence enterprises)
DI rinse bottles and buckets (misc)			~\$10.00
Dipper (for detention basin sample)			\$36.10 (Wildco)

<sup>1</sup>Kit ranges can be increased using standardized dilution measures recommended by kit manufacturer

At the time of monitoring, volunteer monitors will also collect the following information: Air temperature, Number of Geese present, stream bottom survey in riffle habitat, water appearance, flow conditions, wildlife observations, present weather conditions, precipitation in last 48 hours

**Monitoring Frequency and Timeline for Water Chemistry Monitoring**

Volunteers will begin monitoring on a monthly basis during dry weather (not within 24 hours of rain). Once established, the Monitoring Coordinator will organize several wet weather monitoring events to capture differences in water quality during rainstorms and to educate but will contact the volunteers for that specific testing.

**Additional Monitoring Techniques listed below for future planning and expansion  
Habitat Assessments of the Planted Basin**

The Park currently has a maintenance plan and contractor that monitors and maintains the riparian buffer plantings and invasive species colonizations around the Basin. If at some point this contractor is not part of the routine maintenance, C-SAW recommends training volunteers in Adopt-A-Buffer type visual assessment protocols to be sure invasive species that colonize are monitored early and eradicated before becoming a major problem. These protocols were developed in an effort to efficiently train and use volunteers to assist with the long-term health and success of restoration projects. Reality for many groups is there is no funding available for routine monitoring and maintenance so Adopt-A-Buffer provides

restoration project managers methodologies to benefit from the expertise of trained volunteers. Lower Southampton Parks is able to have funding for these components but a resource to keep in mind as time elapses. The Adopt-A-Buffer Toolkit is available for download at [www.delawareriverkeeper.org](http://www.delawareriverkeeper.org)

**Annual Spring Macroinvertebrate Monitoring** – “Spring Bug Madness on Turkey Run”  
For this initial monitoring plan, Delaware Riverkeeper Network performed benthic monitoring at two locations surrounding the detention basin at sample stations TR001 and TR003 on April 18, 2009 to obtain a baseline of the macroinvertebrate community that resides on Turkey Run. The Park may decide to expand their volunteer monitoring program for next spring to continue macroinvertebrate monitoring post project implementation, but for this first round, volunteer monitors are focusing on water chemistry parameters. The information below on macroinvertebrate monitoring is included for informational and planning purposes for the Park in the future.

### **Summary of Macroinvertebrate Monitoring**

Aquatic insects, or macroinvertebrates, many with life spans of a year or longer, can be found in streams year round. Many aquatic insects spend much of their lives, their entire immature development, in water. Only a small fraction of their lives is spent as terrestrial adults. These insects, which form the base of the aquatic food chain, serve as excellent indicators of stream health because their populations are directly impacted by the health of the water and our management of streamside lands.

In general, aquatic insects can be divided into three group based on their tolerance to pollution. In healthy streams, representatives from all three groups are present. The occurrence of moderately tolerant or pollution tolerant organisms does not necessarily mean that the stream is being degraded by pollution. It is only when one or both of these groups becomes dominant, and few or no pollution-sensitive macroinvertebrates are found, that stream pollution is indicated. *As a rule - THE GREATER THE DIVERSITY OF INSECTS IN THE STREAM, THE BETTER THE WATER QUALITY.*

Aquatic insects can be divided into three general groups based on their ability to tolerate pollution:

- **Group I organisms** are sensitive to pollution and will quickly disappear if water quality is degraded. This group includes most mayflies, stoneflies, both case-making and freelifving caddisflies, dobson flies (hellgrammites), and gilled snails.



case-making caddisfly

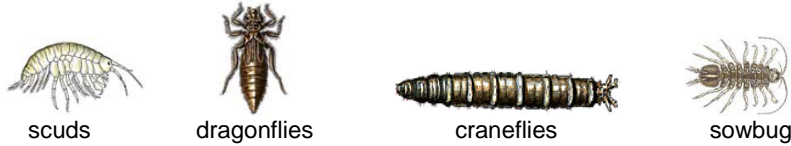


freelifving caddisfly

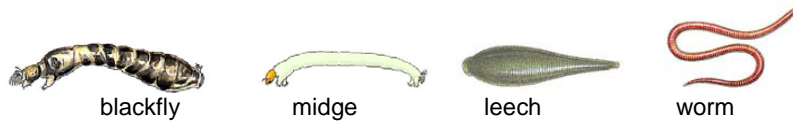


hellgrammite

- **Group II organisms** are able to tolerate moderate amounts of pollution. This group generally includes aquatic sowbugs, scuds, dragonflies, crane flies, and freshwater clams.



• **Group III organisms** are the most pollution tolerant and include aquatic earthworms, the true flies (e.g., midgeflies and blackflies), leaches, and lunged snails.



Because of their varied tolerances, aquatic insects are great indicators of stream health as they live there year-round. For example, a continuous discharge of untreated sewage will initiate a change in the macroinvertebrate population downstream from the discharge. The most sensitive invertebrates will be eliminated. As these macroinvertebrates are eliminated and greater amounts of nutrients are introduced into the stream, the pollution-tolerant macroinvertebrates thrive and achieve greater population numbers. Their dominance, along with low numbers of different species present and high numbers of individuals, is an indicator of high nutrient content (organic pollution). However, continued untreated discharges will eventually eliminate virtually all of the macroinvertebrates. In cases of toxic pollution, there will be very few species of macroinvertebrates present and the number of individuals will be low (as is the case where abandoned mine drainage impacts streams for example). Heavy amounts of sediment eroded from upstream farmland and construction sites will also eliminate most macroinvertebrates by smothering the insects as well as their riffle habitat where they live.

- **Timeline for Macroinvertebrate Monitoring** – best time to monitor with the most diverse communities is in the spring, once a year
- **Equipment Needed (Cost estimate for all equipment – approx. \$300 – equipment all reusable)** – D-Frame net (or surber net) and Kick Net (500 micron mesh), Pans/buckets, ice cube trays or plastic petri dishes for sorting, buckets, gloves, paint brushes, and hand held lenses
- **Sampling Locations** – Riffle habitats in Turkey Run located upstream and downstream of the basin in an effort to determine potential changes in benthic life diversity due to the basin (TR001 and TR003)
- **Sampling Methodology** – Modified Rapid Bio-assessment Protocol (Adopt-A-Buffer Protocol used April 18, 2009)
- **Identification of Benthics** – Conducted stream-side to Order level with a few exceptions using pan and trays for sorting. All insects returned to the stream unharmed.

### Sample Stations

On March 5, 2009 Lower Southampton EAC members and Delaware Riverkeeper Network visited stream locations for sampling. Three stations were established to bracket and test effects of the basin beautification project.

**TR001** – Just upstream of Fox Hollow Rd. (US of the Basin) – (park along road and access stream from road) (access from right bank as likely right of way?)



TR001 – left bank (facing downstream)  
TR001 – right bank (facing downstream)  
(right photo)

**TR002** - access on small dirt path at downstream end of third detention basin on left bank (facing downstream) – just before dam – sample can be grabbed safely by using the dipper extension from the bank – Township property



photo not specific to exact sample station but impoundment/Turkey Run basin sampling representative of sample station TR002

**TR003** – Playwicki Farms (downstream of Turkey Run basin) – off of walking path – about two minute walk from parking lot – EAV members offered to clear a small path to access water



TR003 – facing upstream



TR003 – algae on rocks in riffle

***Sampling Methodology*** – Step-By Step Protocols approved by PA DEP and the manufacturers will be used for each test kit and a datasheet will be used to document results. For nutrient test kits, blanks will be conducted before testing to ensure accurate results. Volunteers were instructed to keep kits clean and out of extreme temperatures to keep reagents fresh. Alconox was also provided for routine glassware cleaning. (Refer to Protocols and datasheet attachments)

***Quarterly Lab Analysis*** – Quarterly lab analysis for bacteria and nutrients could be an important addition to volunteer monthly testing. This would involve proper grab sampling techniques in sample bottles provided by the lab and transportation on ice to a lab in your area like QC Laboratories and may be pursued in the future if funding allows.

#### **Quality Assurance and Quality Control Measures**

QAQC measures help ensure that data collected is accurate and precise. The following QAQC measures have been incorporated into this monitoring plan.

- 1) All volunteer monitors have been trained in sampling techniques (3-hour training conducted by Delaware Riverkeeper Network thru the C-SAW Program)
- 2) Standardized sampling protocols provided to each volunteer – protocols reviewed and approved by PA DEP, Delaware Riverkeeper Network, kit manufacturers, and C-SAW
- 3) Standardized datasheets provided to monitors
- 4) All data centralized and reviewed by the Monitoring Coordinator (Dean/Marian) before data entry
- 5) Data entered into an excel database by the Monitoring Coordinator

**Data Use**

Data will be used by the Lower Southampton Parks Department to track the impact of management practices to the Turkey Run Basin. Data collected will also be provided to Marian Gilbert. This data will be summarized and used to implement other naturalization projects in the township which will benefit the health of the water and ultimately the health of the local residents of the township.

**Monitoring Plan Review**

The Township, with assistance from the Environmental Advisory Council, will review the plan on an annual basis and make changes when appropriate based on data results.