Butler County Stream Team

July News - 2012

Volunteer Stream Monitoring in Southwest Ohio

Next Sampling Day - July 14th - Tomorrow!

We need your input! - What date would be better for a fall canoe outing, Sept. 22 or 29? email Marion or Donna by clicking on our names

Stream Team Data Analysis

One of the things we did on June 2nd at our annual sampling training was take a look at some of the data we have been collecting over the last 5 years for Stream Team. Everyone seemed glad to see what the data reflect, so we thought we'd include some analyses in the newsletter each month for the next few months. The analyses are based on all the data collected from the beginning of Stream Team in May of 2006 until the end of 2011, a little over 5 years. Because of the work of an IES graduate student last spring, we now have land use information, watershed area, and some other information for each of the sites sampled during that time. That allowed us to look at each of the parameters Stream Team analyzes based on four different characteristics of the sites; watershed size, predominant land use, primary watershed (Great Miami River, Ohio River, and Whitewater River), and month sampled. This month we will discuss analyses based on watershed size.

Background

First of all, you might ask "What is a watershed?". A watershed is the land area that drains into a water body at a certain point; any drop of rain that falls in that area will eventually flow to that water body. Watersheds may be large or small, depending on what site you are interested in. For instance, the US

Volunteer Spotlight

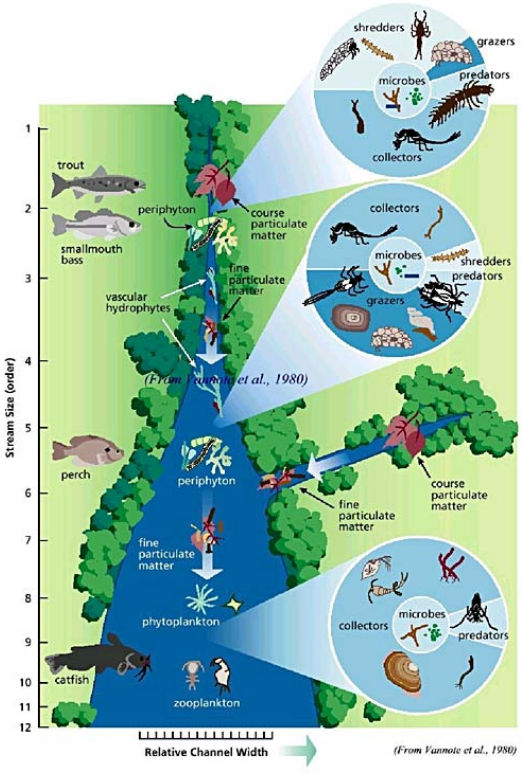
Lynn White

Lynn, one of the original creators of the Butler County Stream Team, works for Butler Soil and Water Conservation District. She has been their Education and Communications Specialist for 8 years, working with children and adults on natural resource issues. Below she shows elementary students what the long, hinged jaw of a dragonfly is like!

Along with teaching students about water pollution and stream biology, she works with homeowners on practices such as composting, rain barrels, and native plant gardens. The booklet you may all have seen, *A*

can be divided into 11 large watersheds (see below), each of which could be divided into innumerable sub watersheds. If you choose any point along a stream or river, it has a unique watershed associated with it. Despite the overall size of the watershed, near the *headwaters* of any stream, where the stream begins, the size of the watershed is smaller than closer to the *mouth* of the stream, where it empties into a larger body of water.

The size of the stream can be important because it determines many characteristics. One generalized version of how streams change upstream to downstream is presented in the River Continuum Concept, visualized by Vannote et al. (1980) and cartooned here by the Ohio EPA. "*The River Continuum Concept describes the physical processes (geology, climate) outside of a river that affect the biological processes (vegetation) along a river, which affect the physical and biological processes within a river (temperature, nutrients).*" As you can see in the diagram, many things in the stream itself change, including the size of suspended particles, where stream creatures get their energy,



Resident's Guide to Protecting Butler County Streams and Rivers, was created by Lynn and her fellow soil and water staff as part of a larger grant project focusing on the Upper Mill Creek in West Chester.

Lynn grew up on the west coast of Scotland, playing in the ocean. This love of the water had to change to an interest in rivers in creeks after moving to Ohio. After receiving her B.A. from the University of Glasgow, she moved here for her M.A. from Miami University. Her research focused in the impacts of recreation on the environment.

Lynn has worked in environmental education for nearly 12 years and is on the board for the Environmental Education Council of Ohio. She recently received a national award from the Council for Environmental Education and the National Project Wild Office for teaching workshops on wildlife.

Lynn collects samples from a water quality basin in Beckett Ridge to determine how this retrofitted wetland basin compares to a traditional concrete-lined detention basin. Amy Cameron, an intern with the Soil and Water Conservation District, is studying this data as a part of her Masters degree at Illinois State.

Invertebrate Spotlight

by Amy Cameron

Mayflies in Butler County Streams

While you're visiting Butler County's streams to collect your water samples, why not explore the underwater world of macroinvertebrates? Animals without backbones that can be seen with the naked eye, such as aquatic insects, are considered macroinvertebrates. By investigating various macroinvertebrates in a stream, such as the mayfly nymph pictured here, you may be able to determine if the water quality is

and what invertebrates and fish live there.

In our analyses, we divided Stream Team sites into five size categories based on a scatterplot of watershed areas. Great Miami River sites were in a category alone, with other sites divided into those on the largest, large, small and headwater streams. A separate category also was used for data from three stormwater retention basins. In each of the graphs below, letters above the columns show whether the averages were different from each other; *columns with different letters are statistically significantly different from each other* in Analysis of Variance (ANOVA) at a p-value of $\leq$0.05.

One more thing before we get into graphs - how does the Ohio EPA evaluate streams? Basically, EPA evaluates streams according to their primary uses in *Aquatic Life Use* (AQL) and *Human Health* (HH) categories. In Butler County, AQL standards are classified as Warmwater (most streams), Modified Warmwater (impaired streams) or Exceptional Warmwater (best) Habitat. HH standards are divided into water supply use (drinking, agricultureal, or industrial) and recreational use (bathing, primary and secondary contact). Obviously, not all standards apply to our Stream Team samples; no one is drinking our stream water and we don't measure habitat or biota. OEPA standards are noted below where they are applicable.

Analyses based on watershed size

So here we go! One thing Stream Team measures is coliform bacteria, which are bacteria that grow in intestines of humans and other organisms. Most of these bacteria not only are **not** harmful, but are helpful to us, living in our guts and helping us digest our food. Stream Team counts both total coliform bacteria and *E. coli*, one of the coliform bacteria particular to mammals and some strains of which may cause human disease. High total coliform and *E. coli* counts generally go hand-in-hand, but *E. coli* are important because they may indicate human fecal contamination.

Bacteria are measured in colony-forming units (CFU) per 100 milliliters of water. The average total coliform counts of Stream Team samples show no difference among the different watershed sizes (below; *n=2667*). All averages are below the former OEPA secondary

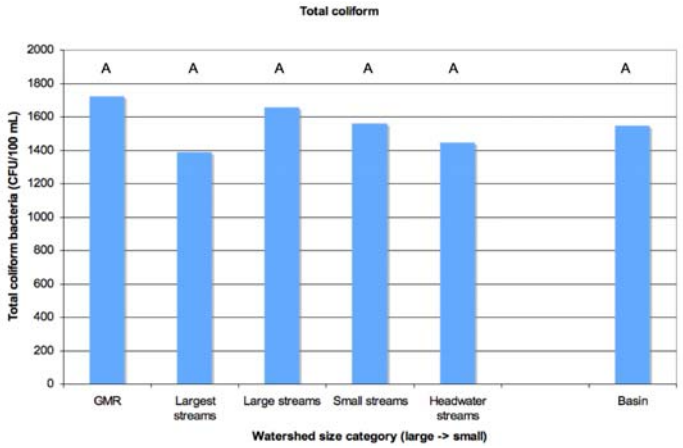
good, fair, or poor.

Mayflies belong to the order Ephemeroptera. The name for the order is derived from the Greek words *ephemeros* meaning "lasting a day" and *pteron*, which means, "wing". The average duration of an adult mayfly is only 24 hours. In fact, mayfly adults live such a short time they don't even develop a mouth to eat with! Mayfly larvae are completely aquatic, while the adults are terrestrial. A nymph can usually be found attached to the underside of a stone in the currents of the stream, using the leaf-like or filamentous gills on the sides of its abdomen to absorb oxygen in the water. Adults may be seen, if you're lucky, flitting about the stream dipping their abdomens down to "oviposit", i.e. lay their eggs, right in the water.

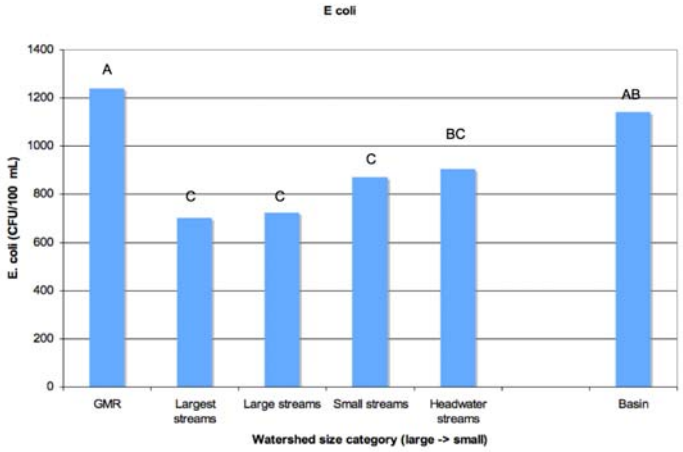
Too much sediment in a stream can inhibit the dissolved oxygen intake through the gills of the mayfly nymph. The sensitivity of most mayfly species, particularly to low levels of dissolved oxygen, makes it a want-to-find insect when assessing the health of a stream. Mayfly nymphs (larvae) found in the streams of Butler County, depending on the species, may tell you a little about the water quality. Though discovering mayfly larvae is not the only factor needed to determine the health of the water, taking into account their abundance and ratio to other macroinvertebrates found in the stream will give you a good idea of how well your stream is doing.

Remember that the best place to discover these critters is under a stone that is submerged under flowing (lotic) water. But how do you determine if what you find is a mayfly nymph? The most distinguishing features of the mayfly are the three long "tails" extending

(5000 CFU/mL) and primary (2000 CFU/mL) contact standards but all averages are above the OEPA bathing standard of 400 CFU/100 mL. So although total coliforms are high enough you may not want to swim, they are not above the level considered safe for walking or fishing in a stream.



E. coli counts do show differences among watersheds of different sizes (below; *n=2991*). The highest levels are in the Great Miami River, which is different from all other sized streams. Although the average counts gradually rise from large to headwater streams, there is no statistical difference among these tributaries. All averages are below OEPA Secondary Contact standards (2318 CFU/mL) but above the maximum count of 284 for Bathing or Primary contact. So again, wading or fishing are OK, but frequent bathing may not be recommended.



Total dissolved solids (TDS) is a measure of ions or agglomerate molecules dissolved in the water. They most commonly are ions found in nutrient runoff, stormwater runoff from roads and parking areas, and molecules included in pesticides or herbicides. They occur naturally in streams from the weathering of rocks and soils, especially with our limestone bedrock. Another way to determine ions (generally from the end of the flat body, as seen in the picture. So, when you visit your sample location this month, make sure to flip over some rocks and try to find some mayfly nymphs.

Mark Your Calendars!

Fall Canoe Outing

If you didn't notice above, we need your input on what date is better for a fall canoe outing, Saturday, September 22nd or 29th. So let us know by contacting Marion Wells or Donna McCollum (just click on our names to email). We have been trying to do two canoe outings every year to get people out on the rivers. For those of you who joined us on the Great Miami last year, you know how good it feels to be out on the water and seeing the river from a canoe! Many people got a real highlight seeing a wild bald eagle up close and personal. More details to come!

BC Storm Water - Webinar Series

If you are interested in learning more about how storm water affects streams, there are three of the webcasts produced by the Center for Watershed Protection, hosted by the Butler County Storm Water District, still to come. Each webcast will air from 12 - 2 pm at the Engineers Office, 1921 Fairgrove Ave., Hamilton. Cost to you is $0! That's FREE! For more info on these titles, click here.

Get the Dirt on Stormwater
Wed. Aug. 15th

Leaving You Out In The Rain - Design and implementation of monitoring projects
Wed. Oct. 24th

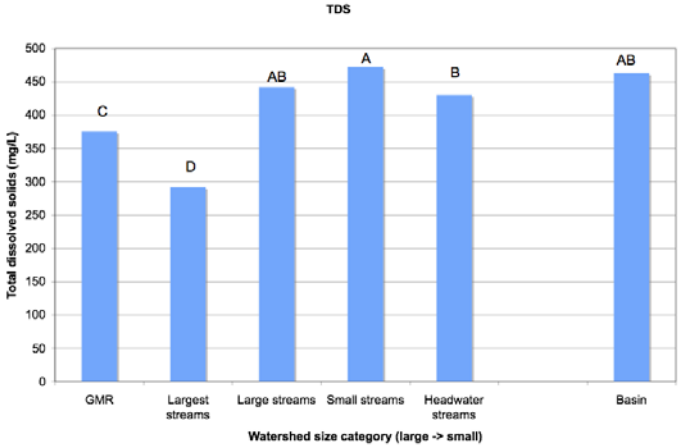
Customizing Your Stormwater BMP Design for Specific Pollutants
Wed. Dec. 12th

Open Lab and Grand Opening - postponed

salts) in stream samples is by measuring how well the sample conducts electricity, or **conductivity**; the higher the ion concentration, the greater the sample's conductivity. TDS is measured in mg/L and conductivity in microSiemens per centimeter (*u*S/cm). In our lab, both are measured on the same instrument.

High TDS can increase water temperature and make habitat poor for organisms, while high conductivity may indicate a level of salts that is unhealthy for organisms. However, the only TDS and conductivity standards are for human health, to make water palatable for drinking, at 500 mg/L and 1200 uS/sec respectively. Both measurements vary widely with rainfall, with an average of 500 mg/L and 800 *u*S/cm, respectively.

In Stream Team samples, TDS and conductivity averages show the same pattern among different sizes of watersheds, with averages in the Great Miami River and largest tributaries lower than in smaller tributaries. (*n=4751, 4732*) The averages fall close to those stated above, ranging from ~300 to 475 mg/L for TDS and ~600 to 900 *u*S/cm. There was a very definite ($p<0.0001$) but also slight effect associated with precipitation; the amount of precipitation in the 24, 48, or 72 hours before out sampling days predicted less than 4% of the variability in TDS and even less in conductivity.



It seems we are not going to make it into our new home in August. But stay tuned and we'll keep you posted on where and when we're moving as soon as we have it figured out ourselves. For right now, the good news is we should be in our lab in Boyd through October.

Collect Data for World Water Monitoring Day

September 18th is the actual day on which people around the world will be monitoring water. But since our September Stream Team day is always at the River Days festival, we decided we should report our October data instead. So come on out and plan to add your sample to a global effort.

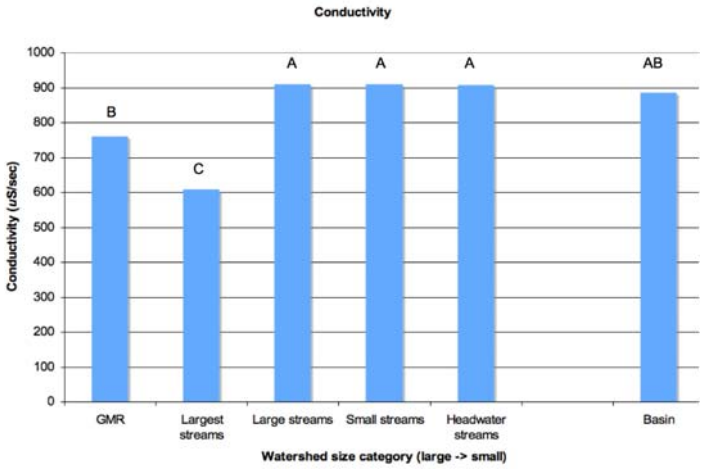
If you have ideas of things you'd like to see the Stream Team do, please let Donna know at mccollds@muohio.edu. For instance, if enough people are interested, we can open the lab up for macroinvertebrate identification again, or run another morning session to get people started knowing what bugs are in our streams.

Lending Library Titles

We all have lots of books that we would love to share with someone who has similar interests. So we thought this might be a way to share them with people we know like streams! If you have books, DVDs or other things - especially about water - that you would like to contribute, feel free to bring them along anytime. Or, if there are particular books you would like us to buy, let us know and once a year or so we can add a few to our collection.

Here's our list to date:

*A Guide to Common Freshwater Invertebrates of North America
*A Guide to Ohio Streams
*After the Storm - DVD
*An Introduction to the World's Oceans



That's all for now, since we're out of room. However, if you want to see a bit more, an unfinished draft of the 5-year review is on our web site under publications. It will be refined in the next few weeks. Also, within a month or so we hope to have your data online again. This has been a project long coming, with lots of hurdles crossed along the way, but we're really close to having a searchable database where you can look up the last 12 months of data by site, watershed, volunteer, township, etc. Meanwhile, as always, if you are interested in getting the data pertaining to your sampling sites, feel free to contact Donna McCollum; it may take a while to get it to you, but we will try to do so in as timely a manner as possible.

Crisis Spot

As you are out sampling or just out for a walk along the waterways and see something wrong, email us. We always want to hear from our volunteers, especially if there is a problem that can be corrected.

You are our eyes in the field, the first line of defense for streams in Butler County when there is a problem. Once a problem has been reported to us, we can pass it along to the appropriate agencies. For instance, Carol Jones's interest in streams led her sister to make her aware of cleared brush in her local creek. When Carol contacted us, Doug Dirksing contacted Duke Energy, who was unaware of the mess and promptly cleaned it up. Success is sweet!

Thanks again for all you do for Butler County Stream Team!

Crisis Spot emails can be sent to Donna McCollum at mccollds@muohio.edu.

*Bugs of the Underworld: a fly fisher's guide to the natural history of aquatic insects (DVD - available on request)
*Exploring the World Ocean
*Fostering Sustainable Behavior: An introduction to community-based social marketing
*Guide to Aquatic Insects & Crustaceans
*Gulf Hypoxia: Action plan 2008
*Handbook for Developing Watershed Plans to Restore and Protect Our Waters
*Introductory Oceanography
*Life in the Soil: A guide for naturalists and gardeners
*Marine Ecology
*Migratory Shore and Upland Game Bird Management in North America
*Monitoring Guidance for Determining the Effectiveness of Nonpoint Source Controls
*Oceanography
*Ohio Vernal Pools: Diamonds in the Rough (DVD - available on request)
*Our Waters, Our Health
*Pond and Brook: A guide to nature in freshwater environments
*River of Words
*Stemming the Tide of Coastal Fish Habitat Loss
*Swamp and Bog: Trees, shrubs, and wildflowers of eastern freshwater wetlands
*The Colorado: A river at risk
*The Evolution of North America
*The Face of the Deep
*The Mill Creek: An Unnatural History of an Urban Stream
*Watersheds: A Practical Handbook for Healthy Water

If you have any comments, concerns, or suggestions, please contact us at mccollds@muohio.edu.

Butler County Stream Team Monthly Newsletter

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