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Butler County Stream Team

February News - 2013



Volunteer Stream Monitoring in Southwest Ohio
Next Sampling Day - February 9th

Remember: Your safety is our primary concern. If any of your sites seems unsafe due to winter weather, please don't put yourself in danger!

New bottle procedure: Plastic sleeves are rubberbanded to each bottle. If you do not have preprinted labels, be sure to grab a bottle with a label in the sleeve. If you have preprinted labels, you will have to fold or cut those labels to fit the sleeves - sorry, next time we print we will use labels that fit!

Ohio's Greatest Disaster: The 1913 flood

In March, many communities in the Miami River valleys and through out the midwest will commemorate the centennial anniversary of the great 1913 flood. It was the "perfect storm", in terms of its ability to flood Ohio lowlands. The 8" to 11" of rain that fell over 3 days over most of the Miami Valley was coupled with still-frozen ground from a hard winter and and soils that were thawed already saturated from snow melt. Because of this confluence of conditions, about 90% of the rain that fell ran off into local streams and rivers, flooding every city along the Great Miami River and its tributaries. The aftermath in Ohio - 462 Ohioans died, most from Hamilton, and another 250,000 were homeless.

A series of upcoming events in Hamilton will provide an opportunity to remember "both the catastrophic event and how Hamiltonians responded to it". Hamiltonians and people across the nation set out to make sure such a natural disaster would be handled better in the future. The catastrophe spurred a revolution in flood-control strategies and the Miami Conservancy was formed to develop a regional flood control system. Failure of communications systems inspired the establishment of nationwide emergency radio. The Red Cross's improvised actions to help families in Ohio became the standard for providing

Volunteer Spotlight Ben Coffey

Our spotlighted volunteer this month seems to me to be a Renaissance man, with many interesting skills and experiences behind him. He is a teacher, who grew up in Boulder, CO, but spent years in Washington, DC and Maryland while in the military, in the US Submarine Force on the USS Michigan and the USS Alabama. Those life experiences primed him to take part in the Stream Team when he moved to Oxford in 2010. In his own words:

"Out West, we have many creeks and river beds that are still devastated by the effects of mining in the 1800's. The water from the tailings is orange, red, and yellow, but not clear or blue. When I lived in Washington and in Maryland, the public worked hard to keep Puget Sound and Chesapeake Bay clean, and I soon became passionate about their cause(s) and joined local conservation efforts. Thus, when I moved here, I was excited to join the Stream Team."

So now Ben joins us every month, sampling 4 sites near Oxford that are perhaps the longest-running sites in our database.

battlefield disaster relief in World War I. And the Community Chest was formed to provide relief in cities around the nation, merging with other philanthropies in the 1940 to form the United Way. This flood had lasting effects in so many ways!

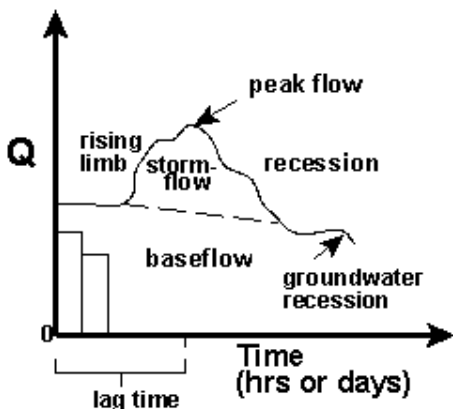
We'll have a bit more information about the flood next month, but for now, you can check out information and a list of some of the events that will take place in Hamilton at:

- ~ 2 documents on our [website](#) under 1913 flood centennial commemoration
- ~ the MJColligan Project [website](#)
- ~ Historian Trudy Bell's [blog](#)
- ~ the Miami Conservancy District's [website](#)
- ~ a short [summary article](#) from the Ohio Magazine
- ~ the relationship of the flood to formation of the [MCD](#)

Measuring Stream Flow - Hydrographs

It seems appropriate, as we focus on the 1913 flood, to take a look at a basic scientific measurement of stream flow, stream hydrographs. A hydrograph shows the volume of water discharged over time, so we can see how the flow of water at a particular location on a stream changes with precipitation events or during periods of drought. A typical hydrograph following a rain event would show the rain event, followed by a lag while the water gets to the

Flood (storm) Hydrograph



stream, then a buildup to peak flow, followed by a gradual decrease. (picture from this [website](#); Q = discharge)

Stream flow is a combination of direct precipitation, overland flow, interflow, and baseflow. Direct precipitation is water that falls directly on a stream during a precipitation event. The other 3 can be thought of as contributions to



Thanks Ben, for stepping up to grab these samples when we had to fill that spot!

You may notice Ben has 2 bottles in the bridge sampler in the photo above. That's part of Stream Team's effort to determine how accurate our testing is - we have some samplers take 2 samples at the same time and site, some sites are sampled by 2 different samplers on the same day, and some samples brought to lab are split into two cups and vials so 2 samples from the same bottle are run through our analyses. Thanks to all of you who help with those quality control duplicates!

Some final interesting things about Ben ...

~He just got married - Congratulations Ben and Kim!

~He hiked the entire Appalachian Trail from Georgia to Maine - that's one of my goals when I retire!

~His environmental goal is "Get the people and the City of Oxford to use less salt during the winter. I have never lived in a place that uses as much salt, and I believe that its use is quite harmful to the environment in many ways." - I second that, Ben!

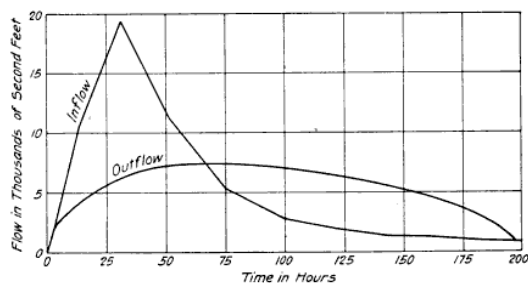
~And maybe most amazing, he has a pet box turtle, Minn, who is more than 28 years old! Now that's a boyhood pet made to last! And it says something to Ben's character, too, since most turtles kept as pets don't fare nearly as well.

But Ben, you may have a few more years of tending to Minn - the average life span of box turtles is 50 years, and many live to be 100! She may outlive you still!

the stream from shallow, intermediate, and deep water, respectively. Overland flow is contributed by rain or melting snow that flows over the surface of the land, reaching a stream quickly. Interflow is water that has entered the upper unsaturated zone of soil and flows laterally through the soil to a stream. Baseflow is water that has infiltrated deeper into the ground and flows to a stream from deep in the earth. As a general rule of thumb: the deeper the water penetrates, the longer it takes to reach the stream. In the diagram above, the peak flow is largely controlled by surface flow and interflow, since baseflow enters the stream much later. The bulge in baseflow occurs significantly later than the storm event.

The amount of water entering a stream via these routes is greatly affected by conditions within the watershed, such as the types of soils, the frozen ground that contributed to the rapid runoff in the 1913 flood, or the amount of hard (impervious) surfaces associated with development that have the same effect. Interflow can be highly variable due to local geology. For example, in areas with sandy soils water travels easily through the soil to penetrate deep into the soil, so there might be little interflow. In areas with clayey soils, though, water is captured in shallow soils and flows fairly rapidly into the streams as interflow, contributing to high peak flows.

In the flood of 1913, surface flow was extremely high; nearly 90% of a 10" rainfall quickly poured into the Great Miami River and its tributaries because the soils were frozen or saturated. The picture below shows a [hydrograph](#) from a retention basin in Englewood in 1913. The peak



inflow was very high, and occurred within about one day of the rains. However, only larger cities had retention basins, so in much of the Miami Valley the rainfall was not retained, but ran directly to the stream. Which one of the

As always, thanks for your efforts with Stream Team!

Down on the Farm: BMPs to Keep Our Streams Clean - Cover Crops

By Amy Cameron

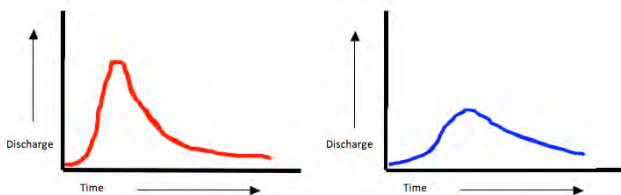
As you may be aware, land use in Butler County is predominately agricultural. That may cause an automatic red flag for those who consider themselves water conservationists, since farming is not always great for streams. However, many measures are being taken by agricultural landowners to help protect water quality in our Butler County streams. My articles over the next few months will be dedicated to letting you know what conservation practices are being implemented on farms in Butler County. This month's article will "cover" the BMP (Best Management Practice) of planting cover crops.

What are cover crops and how does their use help keep our streams clean? Cover crops are those planted in seasons when regular harvest crops are not. Grasses, legumes, grains, and broad-leaf plants can all be used as cover crops. Each benefits both soil and water quality by protecting the soil from hard precipitation and winds, maintaining soil structure, and controlling the amount of nutrient runoff from soils.

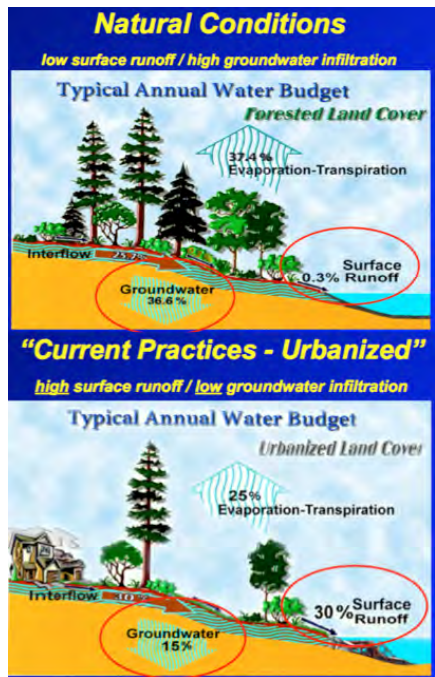
Although soil is one of our most important natural resources, it is also the [leading pollutant in US streams](#). Soils left bare after crops are harvested are very susceptible to weather conditions that, over time, break down their structural integrity. Roots die and invertebrates that help aggregate the soil move deeper, causing the soil to be easily eroded by wind or water. When soil is lost from an agricultural field due to erosion, it usually winds up in the nearest drainage ditch or stream. Planting cover crops offers some protection from erosive forces, keeping soil on the fields and out of the streams.

Water holding capacity in soils is also increased when cover crops are used. A soil's [water holding capacity](#) is the

hydrographs below would best portray the 1913 flood? (from Jeff Babb)



Land use within a watershed also can contribute

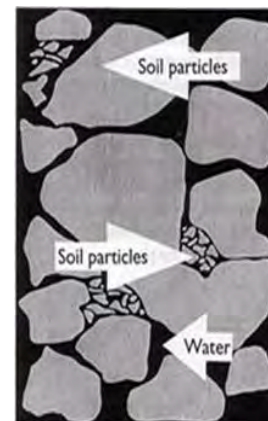


to high peak flows, as shown in the following diagrams of hydrological cycles in a natural versus urban area. A naturally forested ecosystem experiences a much lower peak discharge than an urban area with the same rain event because both surface and

interflow can be greatly increased when hard (impervious) surfaces like roads, rooftops, and driveways are increased. According to May (U of WI), surface runoff can increase from 0.3 to 30%! Interflow from 26 to 30%! Both of these contribute to higher peak flows and lower base flows.

That brings us to another topic - baseflow. Why does a stream continue to flow when we have had no rain? That's because of contributions from baseflow. Baseflow takes the longest time to reach a stream because it is coming from deep pathways. The time it takes baseflow to reach a stream is based on the topography, drainage pattern, soil, geology and land use in a watershed. As shown in the hydrological cycles above, it can also be affected by land use; when surface flow and interflow increase, baseflow decreases. In a heavily human-impacted area, a hydrograph after a storm would look like the urban line shown to the right (from this [website](#)), because water doesn't penetrate the ground as

amount of water it can hold in the spaces between soil particles (see [picture](#)). This capacity is affected both by the [size of soil particles](#) and the [amount of](#)



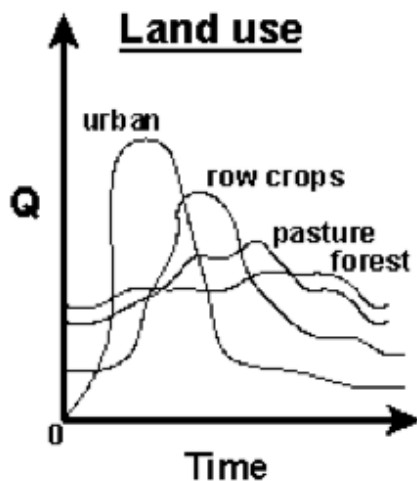
[organic matter it contains](#). Sandy soils that are mostly mineral particles can't hold much water, while fine-textured soils rich in organic matter can hold lots. If a soil has low water holding capacity, water that falls on the field will not stay there long enough to infiltrate into deeper soils, but will run off over land or in shallow groundwater. The faster water runs off, the more soil particles it can pick up and carry to the nearest waterway. Planting cover crops provides both actively growing roots and organic matter that increase holding capacity and surface material that slows down runoff velocity, which decreases movement of soil particles.

Another benefit of cover crops is that they absorb nutrients remaining in the soil after harvest. Phosphorus very effectively binds to soil particles, so more erosion leads to more phosphorus in streams, while cover crops reduce both erosion and the amount of phosphorus in the soil. Residual nitrogen is water-soluble and would eventually leach into the water system if it were not used by a cover crop. Non-leguminous (not in the pea/bean family) are especially helpful in absorbing nitrates.

The number of farmers in Butler County including a cover crop in their planting routine is growing rapidly, primarily because the benefits are evident. Cover crops are one of BMPs accepted by the Great Miami River Watershed Credit Trading Program. This program provides funds for agricultural producers who voluntarily implement nutrient reduction BMPs in the Great Miami River Watershed. Butler Soil and Water Conservation District works very closely

readily as in other land uses.

This hopefully has demonstrated some reasons why hydrographs are studied and the clues they can provide us about stream flows.



River Reflections

Lest you think our volunteers are wimps ... check out these newcomers learning how to collect samples, even in the middle of a snowstorm! Thanks guys! See you Saturday!



Also, somehow, due to computer issues last month, I didn't attach the picture I had found for the River reflections, so here you go You might remember that it is of my son at Hocking Hills after a 2' snowfall. The water was gurgling down the INSIDE of the 50' waterfall! It reminds me of this thought from A Glass of Water by John Ballentine Gough: *Everywhere water is a thing of beauty,*

with Butler County landowners who are taking advantage of the benefits of cover crops and protecting local water bodies. There are many ways to decrease the amount of soil erosion nutrient runoff reaching streams, but planting cover crops is possibly one of the most important.

Mark Your Calendars!

[Butler Soil and Water Annual Tree and Garden Sale](#)

Butler Soil and Water's annual sale includes many native species of trees, shrubs, and perennials. Items also include DIY rain barrel kits, compost bins, cover crop seed mix and more. The sale benefits the district's educational program, including college and conservation camp scholarships along with grants for school outdoor classrooms.

Click [here](#) for more info and an order form.

The order deadline is March 22.

Orders will be ready for pickup on April 18 and 19.

[DIY Rain Barrel Workshop](#)

During the workshop attendees will build their own rain barrel. All materials are provided, including a down spout adapter and hole saws.

When: Sat., April 27 from 9 - 11:30 am.
 Registration fee: \$25 for Butler County residents (\$45 for non county residents).
 A family that plans to build 1 barrel only needs to pay 1 registration fee.

Registration Deadline: Please register by April 19 so materials can be prepared.

Registration form and more Info: available at www.ButlerSWCD.org or contact [Lynn White](#) at 513-887-3720.

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.

gleaming in the dewdrops; singing in the summer rain; shining in the ice-gems till the leaves all seem to turn to living jewels; spreading a golden veil over the setting sun; or a white gauze around the midnight moon.



We'd really love to see your photos here next time! If you have a favorite picture of anything having to do with streams, PLEASE share it with us.

We'd love to show whatever you think is interesting, whether it's your sampling sites or some other favorite.

Crisis Spot

If you see something happening that shouldn't be at your sites while sampling, please let us know!

We will try to get the right info to the right people if we can.

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

Thanks for all you do!

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

[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](#)

*[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](#)

Butler County Stream Team Monthly Newsletter

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