Butler County Stream Team
August News - 2013

Volunteer Stream Monitoring in Southwest Ohio
Next Sampling Day - August 10th - tomorrow!

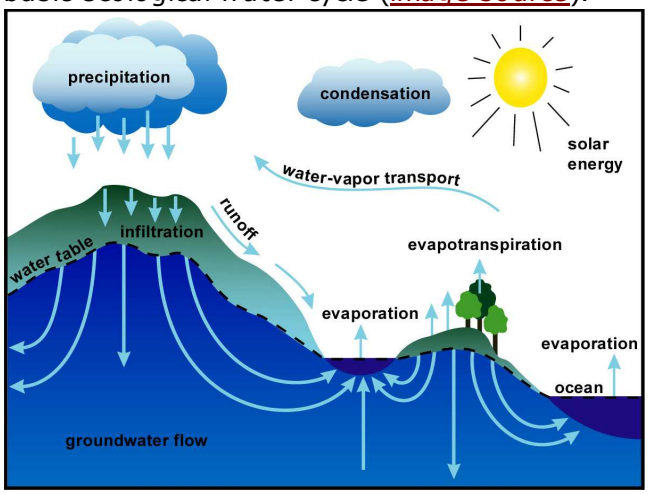
Coolers are picked up at 10:30, except at West Chester Presbyterian, which is picked up at 10:00.

Who's watching your water?

by Dr. Donna McCollum

Have you ever wondered who monitors what water and why? Have you ever traced your water from your tap and back again? We all know that the molecules that made up water when *Tyrannosaurus rex* was here are the same ones here today, right? So, how do they move from your tap, through the world, and back to your tap? Monitoring the water as it goes through this cycle is accomplished by many organizations and agencies, which I thought would be a fun topic to explore this month.

First, a little background .... let's start with the basic ecological water cycle (image source).



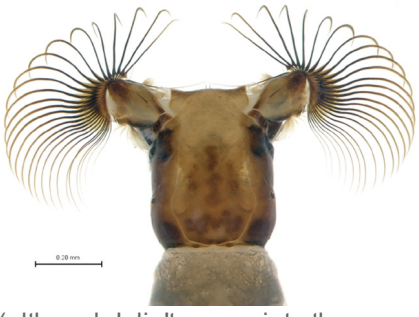
Water falls from the sky as precipitation (clouds on left above). It either runs off into rivers and lakes or sinks into the ground (blue lines moving downward). Some molecules are stored for days, years or millennia in rivers, lakes, underground aquifers, or even soil. Of the water that sinks into

Volunteer Spotlight

Thanks to everybody who joined us to learn about some of the macroinvertebrates that live in our streams. We had great groups on July 20th and 27th. They even

braved the rain on the 27th ... they weren't about to be scared off when the critters they were studying weren't!

People who were able to attend the first day learned a little about why macroinvertebrates make good indicators of stream quality and got a good look, with a dissecting microscope, at some of the critters they would see the next week in the stream. Here's a picture of the head one of my favorites, a black fly larva



(although I din't appreciate them so much last week up in Minnesota!).

the ground, some moves slowly sideways through the soil (blue lines moving towards stream or ocean above), keeping our rivers and streams flowing even when there has been no recent precipitation. Some of it is absorbed by plants and transpired (breathed) out into the atmosphere as a gas (blue lines moving upward above). Surface water may enter the atmosphere as a gas through evaporation. Water vapor may be transported around the globe through atmospheric circulation, but to get back into our surface realm, it is condensed high in the atmosphere and redeposited as precipitation, to start the whole process over again.

What probably interests each of **us**, though, is what happens between precipitation and reprecipitation. You turn on a tap and water flows, but where does that water come from and where does it go? Well, back to basics again. Water from your tap goes either into another pipe or directly back into the environment. If it goes into a pipe (your sink, shower, toilet, or tub drain), it is on its way to a sewer system or septic tank. Sewage systems take the water to a wastewater treatment plant, where it is cleaned and returned to the environment through a pipe into a river, lake or the ocean. As shown below, water coming into a wastewater treatment plant is screened to remove large items, stirred to expose the waste to air to speed natural decomposition, then allowed to be still so the remaining organic matter, called sludge, can settle to the bottom. This sludge is pumped out and lighter wastes like fats are skimmed from the top of the water. Sometimes the water is further filtered through sand or gravel before it is treated (generally with chlorine compounds) to kill bacteria. To keep aquatic organisms from being harmed by the disinfecting compounds, these compounds must be neutralized before the water can be released into the environment.

The students also began to learn how to identify macroinvertebrates and whether particular ones are indicators of high or low quality streams.

On our stream day, conducted at the Indian Creek Metropark, we talked about a variety of methods used to sample stream macroinvertebrates and then collected some critters to do our own analysis of the stream. One of the highlights was three big hellgrammites ... check out the article below to learn a little more about these large inhabitants of our good quality streams.

And again, thanks to all who joined Butler County Metroparks and Stream Team for these fun days!

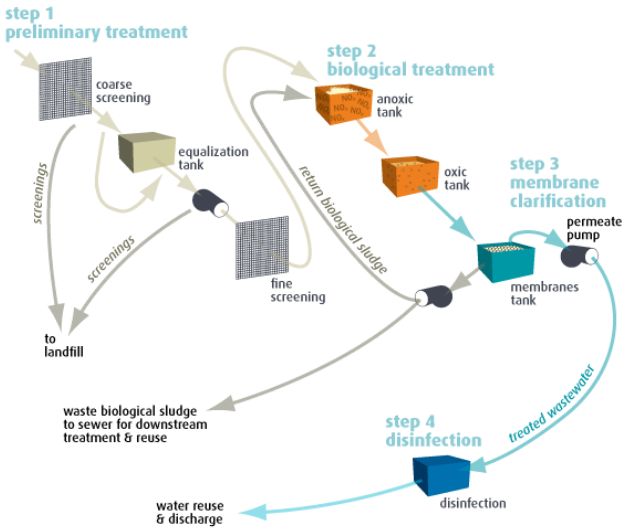
Macro spotlight

Eastern Dobsonfly (*Corydalus cornutas*)

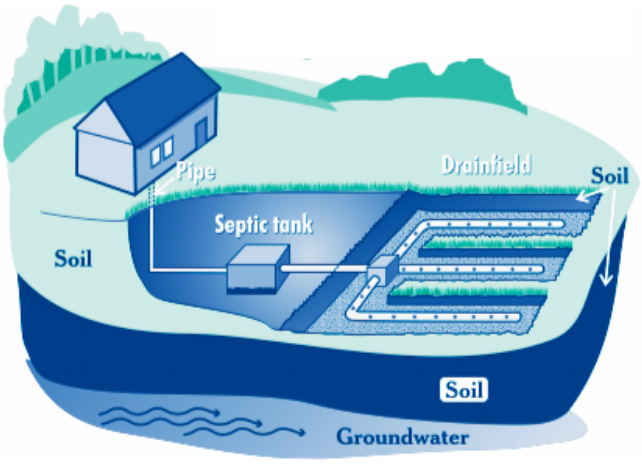
One of the most ferocious predators of our creek critters is the larvae of the eastern dobsonfly, or hellgrammites. Fishermen are one group who may appreciate hellgrammites. These large larvae (up to 5"; pic below) are

considered wonderful bait for our native smallmouth bass. They live in fast-moving sections of Butler County streams and are indicators of good water quality, since they are intolerant of pollution or low-oxygen conditions.

Like their larvae, helgrammites, dobsonfly adults are large and somewhat scary-looking, especially the males (~2-3" long; pic below).



Basic septic systems (pic below) work a bit differently, relying on microbes in the soil to clean the water. Water from your drains is collected in a tank, then slowly allowed to seep into the soils of a leach field. The result is the same, or perhaps better since it does not involve chlorination, as long as the septic tank is adequately maintained and properly located - the clean water is released back into the environment, but into the soil rather than a stream or river.



If the water released from your tap goes directly into the environment, say from a sprinkler or hose, it could wind up in a storm drain, a stream or river, the soil or an underground aquifer. Many people don't realize that storm drains in Butler County do not go to a wastewater treatment plant, but go directly into the nearest ditch, stream or river. That's why it's so important to make sure runoff is as clean as it can be - so no carwash soaps, oils, road runoff or lawn fertilizers (for example) go directly into our aquatic ecosystems.

Before that water comes back to your tap,

However, the male's large mandibles (jaws), as much as 1/3 of their body length, are more deadly-**looking** than deadly - they are used only for grasping the female during mating. The female, though, with its much smaller and

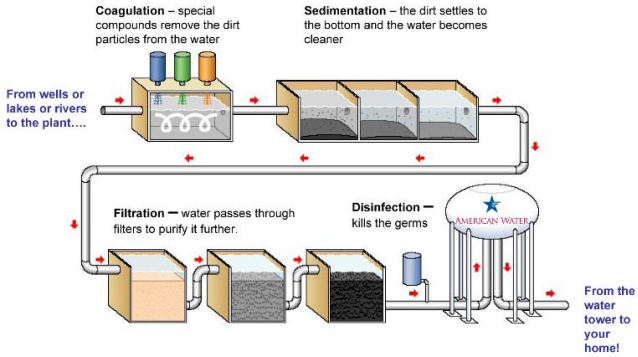
less deadly-looking mandibles, can deliver a painful bite.

Dobsonflies can live 2 to 5 years. As with many aquatic insects, the vast majority of this time is spent as a larva; they are pupae for less than a month and adults for only 1 to 2 weeks. During their lives as larvae, hellgrammites use their strong jaws to ambush other aquatic larvae, such as mayfly, dragonfly, damselfly, and stonefly nymphs. Like the adult females, large hellgrammites can deliver a painful bite, drawing blood on a human who treats them carelessly.

Hellgrammites are well-adapted to their life in fast-moving riffles. The projections from their abdomen are actually gills that help them breathe and "fingers" that help them know what is going on around them. They have 2 small prolegs at the tip of their abdomens with hooks that help anchor them to rocky substrates. And finally, the thorax and head of a hellgrammite is covered with a thick armor to resist damage by its prey.

Unlike many aquatic species, the dobsonfly pupates on land. When it is ready to pupate, a hellgrammite

whether it goes to a wastewater treatment plant, septic tank or the environment, it is cleaned. It may be naturally cleaned by soil microbes and the soil itself if you get your water from a well. If you rely on a public water supply, your water goes to a drinking water treatment plant before it comes



to your tap. The water may come from an underground aquifer, a lake or river, or a municipal well, but the basic steps of cleaning any of these source waters includes addition of chemicals to cause particles to coagulate, removal of particles by sedimentation and filtration, and disinfection to remove germs.

Now, where along this process is your water monitored? Two of the important occasions for monitoring, of course, are when the water comes to our taps and when it leaves our "human" system to go back into the environment.

Monitoring of water coming from a municipal water source to your tap is required by the Clean Water Act, regulated by state EPAs and carried out by the water treatment plant itself. Each year these plants are required to provide their customers with with a detailed report of the results of their testing - you may have seen one in with your water bill recently (for more details click here). Included in the report should be definitions of important terms such as Maximum Contaminant Level (MCL), Maximum Contaminant Level Goal (MCLG), Maximum Residual Disinfectant Level (MRDL), and Maximum Residual Disinfectant Level Goal (MRDLG), along with a table that summarizes contaminant levels and levels of germs such as Giardia and Cryptosporidium, radon, and some other unregulated substances.

If you do not have "city water", testing is considered your responsibility. Timing is not mandated, but testing is suggested annually for bacteria and nitrates, or if (from MT State University):

crawls as much as 50' from the stream and finds cover, usually under a rock or log. It then digs a hole, smoothing it out with its body, and after a week or so sheds its exoskeleton and lies immobile as a pupa (pic source) for 1 to 2 weeks

before it emerges as an adult. Unlike many insects, dobsonflies do not spin a web, so their pupa do nor form cocoons and must be sure to choose a sanctuary that will keep them moist while they develop. The migration of mature hellgrammites ready to pupate usually takes place all at the same time, or within a few days, and may be triggered by thunderstorms.

Adult dobsonflies live very short live - males only about 3 days and females up to 2 weeks. They were thought not to eat, but researchers have recently found they will eat sugar water in captivity. Their one duty as adults is to reproduce.

Females lay about 1,000 eggs on the underside of leaves or other objects that overhang

streams. They cover the eggs with a mucous substance to keep them moist, cool and undiscovered while the eggs develop, which takes up to 2 weeks. When ready to hatch, the larvae do so only at night, dropping into the water and making their way to a suitable habitat.

While dobsonflies may do some minor harm to humans, overall they are important components of the aquatic community. Because of their large size as nymphs, and since they spend the vast majority of their lives in streams, they are food for the larger predaceous fish in rocky streams. Unfortunately for you,

- you notice a change in your water quality.
- people using the water suffer from an illness which may be waterborne.
- there is a flood or large storm that may have carried contaminants to your wellhead.
- maintenance work is done on the well.
- a pregnant woman, a woman anticipating pregnancy, or an infant under the age of six months becomes a water user.

Some Soil and Water Districts provide free testing of some substances; Butler SWCD has a well testing program nearly every winter that Stream Team lab managers and some area high schoolers help with. Test include nutrients, bacteria,and arsenic. For more detailed testing, they offer a list of contractors who will provide lab tests.

At the other end of the process, when water leaves the wastewater treatment plant, it is also tested, as mandated by the Clean Water Act. The municipal district, whatever size, is responsible for monitoring the effluent. This requires daily or even hourly testing of particular aspects of the water. Private systems that serve less than 25 people are regulated by Ohio's Dept. of Public Health and require similar tests.

The main tests are separated into 4 categories:

- Organic matter
- Solids - that can dissolve or suspend in wastewater
- Nutrients – (nitrogen and phosphorus) that can contribute to the acceleration of eutrophication and
- Physical properties - such as temperature, color, pH, turbidity, odor).

These tests are designed to minimize impact of wastewater on the river or lake ecosystem it is released to. Organic matter at high levels consumes lots of oxygen as they decompose, depriving aquatic organisms in the area of air. Solids can shade the plants in a creek raising the temperature of stream water, decreasing the robustness of fish and larger organisms. High nutrient levels may start a cycle of rapid algal growth => algal death => decomposition => depletion of oxygen, called eutrophication, that

as Stream Team samplers, you will probably not see them unless you go out at night. But if you are ever fortunate enough to see a dobsonfly - adult or larva - consider yourself blessed! They are truly magnificent creatures.

Coming up ...

Canoeing - NOTE DATE CHANGE - Sept. 7th

We recently found out that the Great Miami River Days is not going to happen this year - boo! However, that opened up a better weekend for us for the canoe trip. Here are the details:

Where: Meet at Great Miami River at Rt 73 in Trenton, the Recreational Bike Trail. We will end at Rentschler Forest, have a bit of lunch, then carpool back to our cars.

When: 9 a.m. to ~noon or 1 p.m., depending on water level (and how hard you paddle!)

RSVP: to Donna McCollum at mccollds@miamioh.edu

Izaac Walton League Family Fun

When: Aug 17-18th

Where: 450 Beissinger Rd, Hamilton

What: They will have a Children's Fishing Derby (Saturday), archery lessons, wildlife demonstrations, the World Beneath Your Feet educational trailer, music, hayrides, and much more at this free family event.

New Webinar Series at Butler Storm Water District

Just like last year, the Butler Storm Water District will be hosting the Center for Watershed Protection's webcasts having to do with stormwater management. AAS usual, bring your lunch to the Butler County Engineer's Office from noon to 2 p.m. and enjoy the webcasts at no cost to you.

September 18 - Combining Green & Grey in Combined Sewer Watersheds

can lead to fish kills and "dead zones". (You may remember the thick, odorous algae that used to be common downstream of sewage treatment plants.) Physical properties like temperature can affect organisms as well, and tests like pH may help the treatment plant know how well they have neutralized their disinfectant compounds. Until secondary treatment of city sewage was required, US streams were getting continually worse. The advent of the Clean Water Act and a decade of building and testing sewage treatment plants has made a huge difference!

If your drains do not go to a sewer system, the responsibility to keep your septic system working correctly is yours. Some systems, such as the "aerobic" septic system I have, do require annual monitoring by the county health department to be sure the aerator works properly. Mostly though, septic owners need to be sure to get their tanks emptied every several years and repair leach lines that spring leaks. Only by keeping these in good repair and not ovewhelming the system with built-up waste can septic systems prevent problems similar to those associated with wastewater treatment plants.

While state or county agencies can require strict adherence for drinking and waste water, the Ohio EPA monitors streams to get an overall view of their condition. As we have talked about many times, cleaning up stormwater runoff is a current goal mandated by the Clean Water Act. Stormwater districts are required to monitor pipes or ditches where runoff collects and to try to detect illicit discharges - these may be from faulty pipes, mistakes in hooking up water systems, or purposeful disposal of inappropriate substances into a storm drain. If you want to help with this, the Butler Soil and Water Conservation District sponsors volunteers for labeling storm drains so residents know the grates drain directly to a stream or river.

The Ohio EPA currently monitors Ohio watershed on about a 10-year cycle. Their testing is designed to determine whether stream sections are meeting the Clean Water Acts goals of having "chemical, physical and biological

October 16 - Stormwater Trading – Markets or Mayhem?
November 20 - Stormwater Utilities: Reckoning the Cost Side of the Equation

For more information on what's included in each webcast, click here

Mill Creek Clean-up - Oct. 5th

When: 9:00 a.m. to 1:00 p.m.
Where: Convene at Beckett Park in West Chester Township where folks will be organized into teams to tackle various sites.
For more information see web site

Lower Great Miami River Clean-up - Nov. 2nd

Sign up for a particular location on the web site
This is usually in July, but to get away from high water issues sometimes experienced in the past, the date has been moved.

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

integrity". They check a suite of characteristics at each site they choose and test ~100 sites per watershed. To get a complete idea of what is happening ecologically, the EPA collects fish and macroinvertebrates to calculate indexes of community integrity (IBI, ICI and IMwb), along with fish tissue to test for contaminants, and water to test chemical and physical properties, as well as assessing habitat.

This is, perhaps, where groups like Stream Team come in - as the EPA chooses sites to test, they may refer to our data to determine possible problem sites or where access may be available. Although there are many volunteer groups around the state, there are actually 4 groups working in SW Ohio/northern KY:

- **Butler County Stream Team** - began in 2006 and limits sampling to streams in Butler County. We do our analyses at Miami University in Oxford on the 2nd Saturday of each month.
- **Mill Creek Watershed Council of Communities** - began in April 2013 and is restricted to Mill Creek and its tributaries. They sample the 2nd Saturday of every month from April to November.
- **Green Hills Foundation's Saturday Snapshot** - the first volunteer monitoring program, they were the model for all the rest of us! They sample the Little Miami on the 2nd Saturday of the month from April to November. I'm not sure where they do their analyses. Ann Lyons, copied here, is the contact for that group.
- **Friends of the Great Miami** - begun in 2012 and concentrating on the lower Great Miami river in Hamilton County. They sample the 3rd Saturday of every month from April to November.

So, there you go, a little rundown of who's watching the water that we all use and enjoy. I hope that the knowledge that LOTS of people, organizations, and groups are involved inspires you to realize what a precious resource it is and why we should each be doing our part to protect our water. No matter what your interest (for me it's the critters that live in it, for our volunteer Mitch Otto its the fishing opportunities, for you it

*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

River Reflections

Never underestimate the power of water ... as I hear the flash flood warnings for today, I pray we will have no local disasters.

Flash Flood
by Ratan

at 10: 55
in the night...
depressing sight -
torrential rains,
trees insane,
muddy pool,
blood and drool,
houses shatter,
lives scatter.

at 06: 30
in the morn...
nation mourns,
news flash,
egos clash -
titans tongue,

is ....?) we all need to do what we can to keep our water resources in good condition. As always ..... THANK YOU STREAM TEAM VOLUNTEERS for ALL you do!

Crisis Spot

As always, if you notice something amiss as you sample your streams, please let us know and we'll see what we can do. Crisis Spot emails can be sent to Donna McCollum at mccollds@miamioh.edu.

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

mortals harangue.
figures rise,
aides arrive.

at 07: 00
in the even...
access toll,
dead, injured
put on roll.
still no food,
no money,
little Emily
sits by her
dead family.

Crisis Spot

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

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