GEORGIA

*A*dopt-A-Stream

Volume 22, Number 4 October—December 2015
Adopt-A-Stream Staff, Editors

Department of Natural Resources
Environmental Protection Division

Back to the Music

By Rick Hitchcock, UGA Cooperative Extension's Agricultural & Environmental Services Laboratories

I was supposed to be a musician. My parents and grandparents were musicians. I had natural abilities, and I have perfect pitch. I can read sheet music like most people read books. I was the pianist for my junior high, high school, college, and University concert choirs. I played for nightclubs and church, musicals and ballet classes, hundreds of recitals and concerts. This was my life. And I hated it.

I got my first computer in 1980. It had 4,096 bytes of usable memory (RAM). (Today's typical computer has twenty-thousand times that amount.) It could show up to four colors – assuming you could afford a color television to connect to it. You stored programs on a cassette tape – it could easily take 15 minutes to load a program. It cost $400. I bought it with money I made playing at church and teaching piano lessons. It was beautiful. And I loved it.

I had a knack for programming, but I had no idea what I could do with it. I took some technical courses, got hired as an IT lab tech, and then got hired by a wonderful organization – UGA's Cooperative Extension. I've been the programmer for Extension's Agricultural & Environmental Services Laboratories for 25 years.

I knew nothing about agriculture, but I loved working with people who were so strongly service-oriented. If I couldn't help farmers and homeowners directly, I could do so indirectly by creating tools that would help Extension agents and secretaries do their jobs more effectively. I created databases, reporting programs, and expert systems.

One day in 2007, Harold Harbert showed up at the lab. He introduced me to this program called Georgia Adopt-A-Stream. He heard that I had some skills in programming, and he asked if I would be interested in doing some development for him. Here was another group of people who were passionate about their work and cared deeply about the environment. How could I say no?

My time was especially limited since I was working full time. So we did it as a trial, with the option that either could back out if things didn't work out. That trial lasted eight years.

The work I've done with Harold has been some of the most rewarding of my life. We didn't have the chance to accomplish everything we had hoped to. But I'm proud of the work we've done, and I look forward to seeing where the website goes from here.

I have a grand piano at home, which I rarely touch. Maybe it's time to start playing again in my retirement.

From the Adopt-A-Stream Office:

Thank you Rick for eight great years serving as our website and database developer. When we initiated this partnership, we only had a few guidelines: a simple to use, easy to navigate site that stored and displayed water quality data. Over the years, we've presented this database at numerous national and regional conferences and the response is always the same, "How can we get your database?" Your prompt response to requests for updates, your role in ensuring quality assurance, your creative ideas to continuously improve the site and your keen understanding that at the end of the day, this site had to be as user friendly as possible to be effective, have been key to the database's success. Thank you for eight great years; let us know the date of your next piano performance.

Georgia EPD Information Technology department now manages the Adopt-A-Stream website.

Fall Float on the Flint

by Steve Golladay, Jones Ecological Research Center and AAS Board Member

Getting to know the lower Flint River: Over Columbus Day weekend, Georgia Adopt-A-Stream had the honor of partnering with Georgia River Network and Flint Riverkeeper to monitor the Flint River for a third time during an extended paddle trip (see July-Aug 2013 and Oct-Dec 2014 AAS newsletters for recounts of previous Flint trips). The 2015 Fall Float on the Flint brought together a group of about 200 who floated from Albany to just north of Bainbridge GA, soaking in the beautiful lower Flint, noted for majestic cypress trees lining the banks, limestone shoals and bluffs, and abundant wildlife. While participating in the Float, Georgia AAS also provided training for volunteers and collected water quality information along way. Our intent was to get a 'snapshot' of conditions in the Flint during a typical fall period. We also tested some new water quality methods and compared existing methods with measurements made by researchers at the J.W. Jones Ecological Research Center. We sampled the Flint main channel, major tributaries, and springs. Some measurements were taken in the field using Adopt-A-Stream methods (temperature, pH, oxygen, specific conductance, and nutrients). At a subset of sites, water samples were collected and transferred to the Jones Center for processing (organic carbon, inorganic carbon, nitrate, ammonium, and ortho-, or soluble reactive phosphorus (SRP)).

What we learned: Summaries of data collected from the event are shown in Table 1. To get a big picture of our data, we used a statistical technique known as Principal Components Analysis. This allows someone to put all of their data into a program and it summarizes important trends in a graphic form. Researchers use this technique to explore complex data sets and look for patterns or trends that can be pursued in greater detail. The 'big picture' for water quality in the lower Flint can be found in Figure 1. Points with numbers are individual sample sites with smaller numbers being more upstream (closer to Albany) than larger numbers (closer to Bainbridge). The color of points indicates whether a sample was taken from the river, a tributary, or a spring. Arrows originating from the center of the graph represent how important a water quality measurement is in a particular direction, with length proportional to importance (stay with me, all will be revealed!).

Table 1. Water quality measurements taken from the Fall Float on the Flint, October 9 – 12, 2015.

		Air Temp (°C)	Water Temp (°C)	pH (units)	Dissolved O2 (ppm)	Conductivity (µS/cm)	TOC (ppm)	IC (ppm)	NH4-N (ppb)	SRP (ppb)	NO3-N (ppb)
All Sites	max	30	29	8.3	8.1	750	5.52	32.5	18.2	17.8	5540
	avg	22	22	7.2	6.2	233	3.59	19.5	5.1	10.1	2012
	min	15	19	6.8	2.4	80	1.71	5.5	0.0	2.2	354
Flint River	max	25	25	7.5	7.2	410	5.52	12.9	18.2	17.0	1180
	avg	21	23	7.1	6.7	147	4.61	9.9	9.1	13.4	726
	min	17	22	6.8	6.0	90	3.99	6.0	1.9	11.5	376
Springs	max	30	22	7.8	7.0	360	3.67	32.5	14.2	17.8	5460
	avg	23	21	7.3	5.5	273	2.69	28.3	2.4	10.4	2737
	min	15	19	6.8	2.4	160	1.71	20.9	0.0	2.2	1320
Tributaries	max	25	23	7.5	8.0	310	4.73	26.6	15.0	6.2	5540
	avg	22	21	7.1	6.1	208	4.02	14.8	5.0	5.2	2277
	min	19	19	6.8	3.3	100	2.84	5.5	0.0	3.8	354

Now, with that in mind, let's look at the graph on the next page (Figure 1). Hopefully, you will agree that most of the red and blue points are on the left; and most of the grey points on the right. Looking at the arrows, those on the left are DO (dissolved oxygen), Temp (temperature), NH4-N (ammonium, a form of nitrogen found in fertilizer and released during decomposition), and TOC (total organic carbon, also known as dissolved carbon, produced by plants and animals). Therefore, the red and blue points (Flint and tributaries) had greater levels of DO, NH4-N, and TOC. The Flint and tributaries were also warmer (temperature arrow).

The right side of the graph has mostly grey points. Arrows on that side include SpC (conductance, a measure of the electrical conductance of water), IC (inorganic carbon, a measure of carbonate minerals or dissolved limestone), and NO3-N (nitrate, another form of nitrogen found in fertilizer and water treatment discharges). The grey sample points, all from springs, generally had greater amounts of inorganic carbon, higher conductance, and more nitrates than other sites. The summary data from this analysis is shown in Table 1 and in general supports this bigger picture.

What this means: The data we collected only reflect the conditions in the Flint at the time of sampling. In order to make general statements, more data would be desirable and necessary. However, there have been other studies of the lower Flint and our data are comparable. In general, the samples we collected in the Flint, its tributaries, and springs are within or below water quality guidelines and limits (http://epd.georgia.gov/georgia-water-quality-standards). It is difficult to make direct comparisons with nutrients as guidelines are generally set for the total of all forms of a nutrient and we only measured dissolved forms.

Fall Float on the Flint , continued…

Differences we observed between sites reflect differences in geology, climate, and land use. River and tributary samples were generally warmer and had greater oxygen concentrations. This reflects longer exposure to warm surroundings and opportunities for reaeration from turbulence. Greater TOC concentrations reflect leaching of material from soil organic matter and release by aquatic plants and animals. NH3-N is produced by excretion and decomposition and is more abundant in the river and tributaries, which have more plant and animal life.

Springs in the lower Flint originate from groundwater originating from the upper Floridan aquifer. As water moves through the soil into the aquifer, oxygen is depleted and levels in springs tend to be low until reaeration occurs. The aquifer is contained within limestone bedrock, which is soluble in water. As rock dissolves it releases calcium and carbonate ions (Ca and CO3). This accounts for the elevated levels of IC in spring samples. Dissolved minerals also account for higher conductance (a measure of how well water conducts electricity). Salt water, or water with mineral ions, is a slightly better conductor than water without ions. NO3-N (nitrate) concentration also appears to be greater in springs. NO3-N is a very soluble form of nitrogen that moves with water. It originates in fertilizers, municipal discharges, animal waste, and septic leachates. It is dissolved as water moves through the soil and into the aquifer, eventually discharging into springs. Detailed studies of nitrogen in groundwater springs have revealed that it strongly reflects local land uses. Springs in urban areas tend to have greater nitrogen originating from municipal and septic system sources. Springs in rural areas tend to have greater nitrogen from agricultural sources.

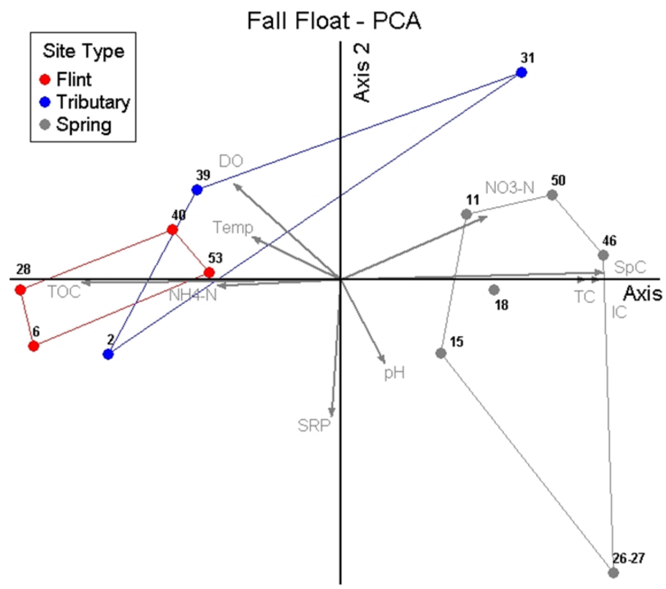


Figure 1. Principal Components Analysis of Fall Float on the Flint data.

Our data reflects the geology and hydrology of the lower Flint region. It also demonstrates that humans and their activities are reflected in water quality. For example, you've been wondering about point 31 on the figure. That sample was from Cooleewahee Creek in Newton, GA. If you look on google maps, you will see an area that is labeled water that looks like polygons. This is an aquiculture operation. The ponds likely use well water (groundwater) as a source to keep water levels constant and have overflow outlets to the stream. Thus, the water quality signature at that tributary is more similar to a spring than the Flint or other tributaries.

Our results suggest that the Flint is a healthy river, but shows signs of human activity. These are reinforced by the abundant and diverse aquatic life those participating in the trip observed. Rivers have the ability to receive and assimilate some of our waste. This process is referred to as assimilative capacity and we rely on it in our water treatment strategies. Monitoring, like the data we collected, is important in verifying that our streams and rivers continue to be within water quality guidelines. This helps to ensure that our activities don't exceed the capacity of rivers to provide water purification and other services we value, like biological diversity, fisheries, and recreation.

Board Member Spotlight: Steve Golladay, Jones Ecological Research Center

Steve Golladay is a biologist who studies water. His interests include the ecology of streams and wetlands, the effects of people and their activities on water quality and aquatic invertebrates, and how rainfall and climate trends affect ecological processes and aquatic communities. Recently, he has developed an interest in the ecology and conservation of rare and endangered freshwater mussel species and is an unapologetic mussel hugger.

Steve has been involved with Georgia Adopt-A-Stream since the Pleistocene. When he arrived in Georgia, he was delighted to find a network of people who shared his enthusiasm for streams and rivers. Among his favorite activities in AAS is teaching about aquatic invertebrates, showing people the secrets of streams, and leading float trips. Steve has served as a board member, trainer, and technical advisor to the program. He has also worked to introduce AAS programs for educators and helped with local Rivers Alive efforts.

Steve hails from Virginia but has lived as far north as New York, as far south as Georgia, and as far west as Oklahoma. His current home is in the lower Flint River basin, in Bainbridge. He is an aquatic biologist at the J.W. Jones Center at Ichauway.

Beavers in Georgia

by Bob Kobres, UGA Libraries (retired) and Volunteer of Blue Heron Nature Preserve


Photo: Bob Kobres

When you see a beaver family's dam in a Georgia stream, you may want to take a moment to think how fortunate we are that this ancient riparian maintenance crew is returning to resume the work that we ignorantly interrupted. We almost did in this incredibly important keystone species because of the utility of their fine pelts, and in many ways we are still suffering from that unfortunate episode!

Beavers have been an integral part of the riparian system in the northern hemisphere for millions of years. We know this from fossils as well as from the characteristics of trees that co-evolved along with beavers. For instance, trees like willow and cottonwood that grow along waterways will regrow after being cut down. In other words, the tree is not killed by the beaver taking the above-ground part but instead grows deeper roots and puts out shoots from its trunk. This more bush-like form of the tree serves to stabilize the banks of waterways and also provides accessible browse and nesting areas to other wildlife. The only trees killed by beaver activity are those that are flooded, and these low lying dead trees become ideal homes for several types of birds that have evolved with access to beaver created wetlands.

But what about the fish? Don't those dams mess up their migration? Well, actually there will be more and bigger fish in a beaver-controlled stream than in a free flowing one, as the former is the ancient norm while the latter is a recent human creation. The unobstructed stream is an erosive assault on the health of the land due to several factors, but the most important loss is the groundwater recharge. It is an ample supply of cool water seeping back into a beaver-deepened pond from adjacent earth that keeps conditions ideal for fish throughout the summer. Creeks without beavers behave as drains rather than holders of rains! Actually, some of the sea level rise over the past few centuries is due to our decimating the beaver population during that time period. In general, our efforts to tame the waterways and drain the wetlands have dried the land, so water that used to soak deeply into the ground now flows quickly to the sea.

It has long been understood that beaver dams filter and trap sediments, clearing the water downstream; however, other lost beaver benefits that we are just realizing include carbon capture and denitrification of the water. We need beavers back in our watersheds in greater numbers to better retain rain and allow that intermittent input of fresh water to soak into the ground. This will return many now dry-most-of-the-time creek beds to year-round full streams.

The biggest barrier to fully returning the naturally evolved ecological services beavers once provided is us. We've occupied their former habitat and modified it with no consideration for these vital citizens of the wild. In fact, because beavers were mostly trapped out by the time most European settlers had arrived, we have no recent cultural experience of healthy beaver-controlled watersheds; rather, we are accustomed to fast flowing streams that rise and fall due to rainfall amount and frequency. So although beavers have spread throughout Georgia since the wise reintroduction of them in the 1940s, beaver families are often killed when they try to reoccupy waterways we have modified to suit ourselves.


Photo: Meta Larsson

Might we alter our status quo response to beavers that cause us problems? Currently, Georgia law classifies beavers as nuisance animals like rats and simply warns to 'be careful' when shooting near water. Certainly these family-oriented social critters deserve better treatment than that from us! Tools to mitigate human/beaver conflict have been developed, and in general the cost of employing them is less than the recurring expense of hiring someone to trap the beavers and destroy their dams. The current process of removal only temporarily alleviates the problem because the next beaver family will find the site just as attractive as the family that was exterminated. The best plan for beavers *and* us is to use these inexpensive solutions--heavy gage fence material to protect trees we don't want them to use and drain pipe to control the level of their pond. This way the beaver family's pond has time to mature and so provide a full suite of ecological services.

The most effective and least expensive way to ensure the health of our riparian systems in Georgia is to welcome the natural maintenance and repair crew whenever and wherever we can!

Want to learn more about beavers? The Blue Heron Nature Preserve in Atlanta is hosting a quarterly Urban Ecology series which, in addition to other notable topics, includes the "Beaver Summit—What are the Benefits and Challenges of Living with Beavers?" This two-part session has guest lecturers, discussion and lunch on January 30th at Oglethorpe Univ. The second part is held on February 6th with a visit to the Blue Heron wetlands showcasing their urban beaver project. Registration required. More information on Blue Heron's website www.bhnp.org/urban-ecology.html or at 404-345-1008.

The Beavers at Candler Park–An Ongoing Urban Saga

by Jack White, Board Member of the Candler Park Conservancy

In urban areas, recognizing that beavers are a valuable keystone species is only the beginning. Working with municipal authorities to protect beavers — even those that are flourishing (sometimes especially those that are flourishing) — is often a major challenge.

A decade ago a coalition of neighborhood and environmental groups partnered with the City of Atlanta on a 319(h) grant that daylighted a headwaters stream of Peavine Creek alongside a golf course in Candler Park in northeast Atlanta. In many ways it was a routine restoration; underground sections of the stream were put back on the surface, a hexagonal concrete channel was removed, the stream's contours, width, and meanders were restored, grade controls were installed, and an abundance of native trees and flora were planted. That decade's drought happened to be in full force as we finished, and the plant material took hold slower than it might have, but success on most of the project's goals was never in doubt.

With one exception. Our project narrative had whimsically included inviting beavers to move in. There were numerous signs of them downstream and we hoped they would take over at Candler, but for two years they were a no-show, perhaps daunted by 2007's scant rain, which was only 60% of the last few decades' average.

The next summer the rains came, and to our enduring delight, so did the beavers. *Read the full article and additional information on beavers on the Science & News page at www.GeorgiaAdoptAStream.org.*

Beavers Thriving at Intrenchment Creek

by Bob Bourne, Cobb County Water Quality Lab and AAS Board Member

The beaver dam at Intrenchment Creek in southeast Atlanta has added quite a bit of biodiversity such as an increase in migratory birds and wildlife in general. There was some fear of flooding from adjacent properties but these fears have not materialized into any actual events. The neighborhood has taken an interest in the beaver and they enjoy going out at dusk to see if they can spot it. The beaver was probably partly attracted to the property because of all the hard work done to create a more natural environment by removing non-native vegetation and planting natives. Also, population pressures could have forced it further upstream. The dam has been there for over a year and beavers and humans have thus far got along nicely.

CONFLUENCE 2016: MARCH 11-12

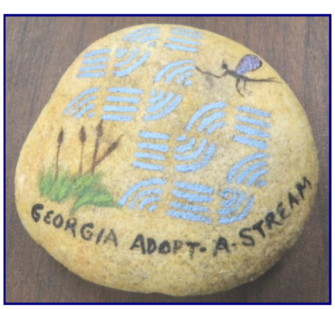
ADOPT-A-STREAM ANNUAL CONFERENCE

Friday evening: Student Water Science Poster Competition and Social
Saturday: Water Quality Workshops, Exhibits and Awards Ceremony

Announcing Keynote Speaker: Barb Horn, Water Quality Specialist, Colorado Parks and Wildlife

~ Environmental & Heritage Center in Buford, GA ~
For more information, visit the Confluence page at www.GeorgiaAdoptAStream.org

Nominate an Outstanding Volunteer, Trainer or Watershed Group!



Adopt-A-Stream Award Categories

Volunteer Awards: Volunteer of the Year ~ Extraordinary Watershed Monitoring
Red Flag Award ~ Outstanding Outreach and Partnership ~ AAS Multimedia Award
Excellence in Data Collection ~ Nymph Award ~ Beyond Borders

Trainer Awards: Trainer of the Year ~ New Trainer of the Year

Watershed Awards: Local public utilities, government agencies, regional commissions, nonprofits and watershed organizations

Award Nomination Deadline is January 15th, 2016

Volunteer nominations can be submitted via the AAS Award Nominations page of the website.
Trainer and watershed group award criteria and applications can be found on that page and submitted to AAS@gaepd.org.

Volume 22, Number 4 October—December 2015

The preparation of the Georgia Adopt-A-Stream quarterly newsletter is financed in part through a grant from the US Environmental Protection Agency under provisions of Section 319(h) of the Federal Clean Water Act of 1987, as amended. For more information about the Georgia Adopt-A-Stream program or to contribute to the newsletter, contact:

Georgia Adopt-A-Stream
Environmental Protection Division
2 MLK Jr. Dr. SE, Suite 1462 East
Atlanta, GA 30334
404.651.8512 / 404.651.8513
GeorgiaAdoptAStream.org

AAS Staff: *Harold Harbert, Seira Baker and Chelsea Hopkins*

GO BLUE!
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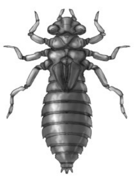
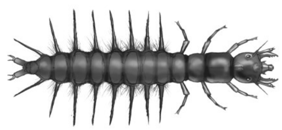


Dragonfly

Riffle Beetle



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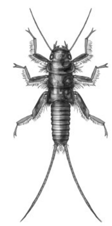
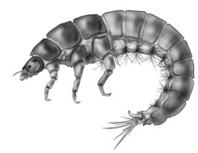


Stonefly



Net Spinning Caddisfly

Remember to Enter Your 2015 Data!

The end of the year is upon us and we hope you had a wonderful one — personally, professionally and scientifically! Please input any monitoring results that have not yet been entered into the AAS database. Also, check out the graphs to see seasonal and long-term changes and trends at your site!

Thank you for all of your hard work and dedication to monitoring throughout the year. We hope 2016 brings even more opportunities for you to monitor, protect and enjoy Georgia's waterways.

Student Water Science Poster Competition: Call for Abstracts

Georgia Adopt-A-Stream will host the second annual Student Water Science Poster Competition at Confluence 2016. For selected graduate, undergraduate and high school entries, presentations of posters will be judged by a team of scientists and professionals during the Friday Night Social on March 11.

Abstract Submission Deadline: January 15th, 2016

Cash prizes for winners!

More information on the Confluence page on the AAS website.

Upcoming Dates

January 15: AAS Awards nomination deadline

January 15: AAS Student Poster Competition abstract submission deadline

January 30 & February 6: Beaver Summit, Blue Heron Nature Preserve, Atlanta www.bhnp.org/urban-ecology.html

March 4-5: Environmental Education Alliance Conference, Environmental and Heritage Center, Buford www.eealliance.org/annual-conference

March 11-12: AAS Confluence Conference, Environmental and Heritage Center, Buford

May 2-6: National Water Quality Monitoring Conference, Tampa FL acwi.gov/monitoring/conference/2016/

Please visit our online calendar at www.GeorgiaAdoptAStream.org for upcoming monitoring workshops and Adopt-A-Stream events!