2018 Poster Abstract Submission Synthesis

Volunteer

1. Vicki Soutar: When the $#*! hits the creek…increase your reach!

2. Moira Salazar: Evaluating Effectiveness of Strategic Stream Sampling for Contamination Source Identification

Graduate School

1. Denzell Cross: The Watershed Learning Network: A Path Towards Sustainability And Public Engagement In Urban Watersheds

2. Morgan Teachey: Pelagic bacterial community dynamics in a temperate, urban stream

Undergraduate

1. Diana Gambone: Implementing a Green Infrastructure and Water Quality Project at Savannah Country Day School

2. Michael Cuprowski and Cody Beavers: Quantifying the effects of the Dalton State College campus on leaf litter breakdown rates and the macroinvertebrate community of College Creek

3. Seth George, Mackenzie Devine: Can Citizen Science be used to Develop a Predictive Model for Water Quality?

High School

1. Renee George: The Effect of Organic Bio Char on Turbidity and Reusability

2. Hannah O'Driscoll & Jessie Turner: Bacteria Spike in Wildcat Creek

1. Vicki Soutar, UOWN/oconeewaters Group ID: AAS-G-2206

Title: **When the $#*! hits the creek…increase your reach!**

After sewage spills from pump stations and Calls Creek Wastewater Treatment Plant into Calls Creek in Oconee County, Georgia, the Oconeewaters AAS group formed in 2015. Some members were already volunteering with Georgia Adopt-A-Stream Program and with the Upper Oconee Watershed Network (UOWN). As a result, we felt by joining forces we could better exert a greater influence on water quality in Oconee County. The Oconeewaters AAS group; with a core membership of 6 AAS certified chemical and biological regular monitors and 1 certified trainer, became a standing committee of UOWN in 2015.

Oconeewaters poster will convey the benefits of partnering with or becoming a part of larger watershed group. Oconeewaters shares the same mission and goals as the Upper Oconee Watershed (UOWN) so it has been a mutually beneficial relationship. By becoming a standing committee with a line item budget under the UOWN umbrella, Oconeewaters has had increased resources for monitoring, money and publicity for outreach/education events, help with grant writing, access to lab bacterial testing, guidance with addressing advocacy issues and in general a greater sphere of influence/exposure. Through our UOWN involvement, more opportunities have presented themselves for networking with other organizations already working or wanting to work with UOWN. In return, we provide UOWN with AAS certified people helping at quarterly samplings, provide additional opportunities for AAS certification for members, additional help with UOWN events, help with fundraising and serving on other UOWN committees. We will share successes and challenges we have experienced.

2. Moira Salazar, Chattahoochee River Keeper

Title: **Evaluating Effectiveness of Strategic Stream Sampling for Contamination Source Identification**

In this study, we research the effectiveness of using strategic stream sampling to identify areas of sewage contamination in streams. Chattahoochee Riverkeeper (CRK) Neighborhood Water Watch (NWW) is partnering with EPA's Environmental Justice Small Grants Program to monitor key waterway locations for E. coli bacteria. We examined data generated from a one-day water testing event, the Westside River Rendezvous held on November 11, 2017.

During the Westside River Rendezvous event, volunteers were trained on sampling techniques and methods in accordance with CRK's EPA approved Quality Assurance Project Plan (QAPP) and deployed to strategic locations to collect water samples along Sandy, Utoy and Proctor Creeks. Tests for E.coli were conducted by CRK staff following QAPP procedures utilizing the IDEXX Quanti-tray system. We assessed results and chose locations for follow up testing.

Follow up testing at Campbellton Rd on 11/30/17, 12/21/17, and 1/4/18 yielded E.coli levels of 9250 MPN, 6480 MPN/100mL, 3795 MPN/100mL, respectively, indicating raw sewage present in abundance in the waterway. Bracket testing indicated E.coli levels of 11,120 MPN/100mL at Ivydale on 1/19/18, and >120,980 MPN/mL at Hyden on 1/23/18 (upstream of Campbellton Rd.). Downstream tributaries tested negative for sewage contamination determining our target area for ground level inspections. The result was successful identification and remediation of a contamination source; an overflowing manhole was discovered. Successful bracketing, source identification and remediation efforts resulted in improved waterway conditions and the elimination of a public health threat.

Graduate

1. Denzell Cross, University of Georgia (PhD)
Teacher: Dr. Krista Capps
Co-authors: Dr. Krista Capps, Dr. Yomi Noibi, Jenny Hoffner

Title: **The Watershed Learning Network: A Path Towards Sustainability And Public Engagement In Urban Watersheds**

Communities living in urban watersheds are often plagued with flooding and exposure to pollution and pathogens from combined sewer overflow. In Atlanta, neighborhoods in the Proctor and Intrenchment Creek Watersheds have been subject to intense periods of flooding and severe levels of environmental degradation. To promote public engagement and enhance community understanding of watershed science and policy, a large group of organizations including, ECO-Action and American Rivers, developed a community education program--The Atlanta Watershed Learning Network (AWLN). The AWLN sought to protect the ecological health of urban streams while improving the quality of life of residents. The intent of the network was to transform stakeholders into engaged stewards who will serve as leaders and activists within their communities. Now, in collaboration with a service-learning course at the University of Georgia, the AWLN stakeholders hope to transform their place-based education program into an online curriculum that is relevant for stakeholders living in urban watersheds throughout the nation. The Watershed Learning Network will be an online resource run through the River Basin Center at the University of Georgia. Faculty and students from both natural and social science backgrounds in the Center for Integrative Conservation Research will contribute to the Watershed Learning Network curriculum.

2. Morgan Teachey, University of Georgia (PhD - Microbiology); Upper Oconee Watershed Network
Teacher: Dr. Elizabeth Ottesen
Co-authors: Norman Hassell

Title: **Pelagic bacterial community dynamics in a temperate, urban stream**

Stream networks play key roles in global carbon and nutrient cycles, connecting terrestrial and marine environments and determining the quality and quantity of nutrients transferred between biomes. Because microbes are vital to riverine nutrient cycling, the makeup of stream microbial communities and their contribution to riverine stream metabolism is key to watershed health. In an initial study of the Upper Oconee watershed, stream microbial community comparisons across the watershed for five consecutive seasons revealed a recurring trend in which microbial diversity (richness and site-to-site variation) was negatively correlated with upstream dendritic distance. The relative abundance of soil and sediment-associated microbial taxa also declined with increasing total stream length, while the relative abundance of freshwater-associated taxa increased. These patterns, however, were disrupted at a landscape scale for two seasons, potentially due to temperature and rainfall fluctuations. To investigate short-term variability in these assembly patterns, a single stream exhibiting similar trends in population succession was selected for two multi-day studies. In each study, water was collected at three locations daily for 11 days and used for microbial community DNA extraction and high-throughput 16S rRNA gene amplicon sequencing. In the first study, which focused on the full stream length, we found similar, highly consistent longitudinal trends in microbial community diversity and taxonomic representation, with the upstream sampling site exhibiting the highest temporal variability in community composition. A second study focused on understanding variability in headwater sites, and captured a temporary disruption in the community composition and diversity patterns observed previously, potentially as a result of a rainfall event.

Undergraduate

1. Diana Gambone, Georgia Southern University
Teacher: Simona Perry

Title: **Implementing a Green Infrastructure and Water Quality Project at Savannah Country Day School**

Savannah Country Day School was built in the 1950's on 65-acres of low-lying and wetland areas in coastal Savannah, Georgia. The campus experiences stormwater runoff and flooding issues in many parts of the campus. Much of the stormwater runs off into a drainage ditch on the north side of the campus. The goal of this project is to implement a green infrastructure project that would convert this drainage ditch into a living bog environment that serves to both improve stormwater management and provides students and teachers with an outdoor classroom for collecting water samples as part of their new Adopt-A-Stream monitoring program. The new green infrastructure/bog area will be used to teach students about Adopt-a-Stream methodologies for monitoring both water chemistry and biology. Along with creating a platform that would make collecting water samples effortless, specific plants will be planted alongside the current ditch to help reduce flooding outside the ditch and onto other parts of campus. Creating this infrastructure and monitoring platform will provide teachers with a new way engage students beyond the classroom to increase their knowledge about how to properly collect and process water quality samples, the importance of short- and long-term monitoring of water quality, and the relationship between land use practices and water quality.

2. Michael Cuprowski and Cody Beavers, Dalton State College
Teacher: Dr. John Lugthart

Title: **Quantifying the effects of the Dalton State College campus on leaf litter breakdown rates and the macroinvertebrate community of College Creek**

Vegetation surrounding forested headwater streams block sunlight required for instream photosynthesis. Consequently, headwater streams rely on external sources of energy, such as leaf litter from riparian vegetation. Macroinvertebrate feeding activities play an important role in breaking down leaf litter, making nutrients available to other stream organisms. If stressors accompanying urbanization negatively affect stream macroinvertebrates, the capacity of a headwater stream to retain and process organic matter may in turn be affected. The purpose of our research was to determine if the Dalton State campus has had an effect on a headwater stream which flows through it by comparing leaf litter breakdown rate and macroinvertebrate community surveys at a site downstream from the campus and an undisturbed upstream reference site. Potential campus stressors include non-point source pollutants, channelization, and reduction of riparian vegetation. In August 2017, we placed 18 bags, containing 4g of dry red maple leaves, at each site. Approximately every 4 weeks, three bags from each site were randomly retrieved. Additionally, three bags were removed from each site on the day of placement to account for handling loss. On each sampling date, habitat characteristics, including width, depth, temperature, conductivity, dissolved oxygen, and turbidity were measured. In the lab, leaf material was removed and rinsed over a 250 µm sieve, placed in paper bags, dried, and weighed to calculate breakdown rates. Macroinvertebrates were removed from the material remaining in the sieve and identified to family or lowest practical taxonomic level. Family richness and biotic indices were compared between the sites.

3. Seth George and Mackenzie Devine, Piedmont College
Teacher: Debra Dooley
Project Partners: Upper Oconee Watershed Network

Title: **Can Citizen Science be used to Develop a Predictive Model for Water Quality?**

Water quality is often assessed using various parameters such as conductivity, E. Coli counts, pH, dissolved oxygen, and nutrient loads. These analyses are performed by citizen science groups like Adopt-a-Stream and the Upper Oconee Watershed Network (UOWN). Can and should this data be used in making predictive models for water quality and decision making concerning environmental pollution? UOWN data from 2001-2008 was used for this study. Conductivity was selected as an indicator of water quality based on the consistency and amount of available data. Watersheds were delineated within the Upper Oconee Watershed in Clarke County using ArcGIS. Conductivity measurements at pour points were used as potential indicators of water quality in response to land use changes, specifically impervious surface change and commercial building permits issued. Although long term data was used to relate conductivity with both percent change in impervious surfaces and number of commercial building permits issued annually per area, there was no demonstrated relationship between conductivity and changes in land use. This may be in part due to the lack of consistently gathered data where up to 50% of data required for analysis was not recorded. Based on this study, data gathered by citizen organizations may more appropriately be used for acute occurrences of contamination events.

High School

1. Renee George, Rockdale Magnet School for Science and Technology
Teacher: Shelley Seagraves

Title: **The Effect of Organic Bio Char on Turbidity and Reusability**

This project is testing the Effect of Organic Bio Char on Turbidity and Reusability. The purpose of this project is to improve water quality in areas where modern filtration devices are not present. The specific aim of this project is to determine which organic material is best in the absorption of particulate matter in water. It is hypothesized that the rice hull bio char will absorb the most particulates. Key procedures used includes the soil pit method for making bio char, water filtration, and SpectroVis analysis. The outcome was the cornhusk bio char had the best absorption properties. The water filtered out clear of contaminants from the naked eye. The cornhusk also had the highest light absorbance rate, meaning more of the particulates were filtered out and light could pass through the sample. This meant that neither the hypothesis nor null hypothesis was supported. The implications from this study could result in lower rates of water borne illnesses in developing nations as well as introducing affordable methods of water filtration in these areas.

2. Hannah O'Driscoll & Jessie Turner, Villa Rica High School
Teacher: Stephanie Miles

Title: Bacteria Spike in Wildcat Creek

The Bacteria Spike in Wildcat Creek was a water study on the intermittent creek on the Villa Rica High School campus. The spike occurred in October of 2017 prompting the belief that the creek was being polluted. Chattahoochee River Keeper was contacted and the investigation commenced. A creek walk revealed that the entrance ramp of I-20 was at the head of the creek. Subsequent testing revealed that bacteria levels had returned to normal leading us to believe that a pollutant had been washed into the creek from I-20.

Bacteria Spike in Wildcat Creek

Hannah O'Driscoll and Jessie Turner | Stephanie Miles | Villa Rica High School

Question

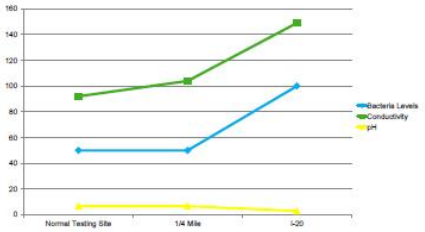
How does the surrounding environment affect Wildcat creek?

Location of Wildcat creek

Walking the Creek with CRK

Jess Sterling from CRK joined Hannah and Jessie to walk the half mile stretch of Wildcat Creek on November 21. We discovered that the beginning of the creek is very close to I-20. We tested for bacteria, conductivity, and pH. Our conductivity rose from 92 us/cm³ at the beginning of our walk to 149 us/cm³. The pH stayed stable around 6.6.

Data from Creek Walk – Nov. 21



Creek Walk Pictures

Site 1 – Notice abundant leaf litter in creek.

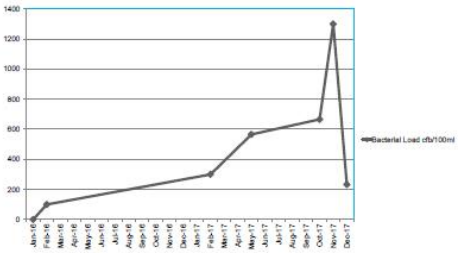
Site 2 – Foam is produced from dissolved organic matter.

Site 3 – The headwaters of Wildcat Creek are beneath the caved in cement.

Data / Observations

- Heavy rain event.
- Construction on I-20 near creek may have caused pollutants to be washed into river causing spike in bacteria and conductivity.
- Conductivity spiked by 50% during the half mile trek from the normal testing site to the creek head near I-20.

Bacterial Load Over Time



- The average of the five years we have been collecting data was in the low one hundreds. Because it is an intermittent stream, there are months with no data; however, in November 2017, there was a massive spike.

Conclusion

- The bacteria spike was likely caused by an increase in organic matter including decaying leaves and animals feces.
- Heavy runoff from the interstate due to a storm days prior likely contributed to the increase in conductivity, as Iron was carried into the water.

What next?

- Test the different ions in the water to determine what is causing the variations in the conductivity.
- Collect heavy rain data to see how the runoff affects conductivity and bacteria levels.