



CONFLUENCE

Directors Overflow by Michael Flinn

This past week, I had the opportunity to present research at the West Tennessee Water Resources Symposium held in Jackson, TN. Undergraduate students (Marla Ashby, Logan Firkins), graduate student (Gage Barnes) and colleague (Dr. Howard Whiteman) and I presented five years of research quantifying the responses of restored wetlands in western Kentucky. With collaborators at Tennessee Tech, Middle Tennessee State, and the University of Missouri, we have been able to examine everything from microbes to bats at over 50 wetland restoration sites. It was exciting to discuss the potential of what we have learned in shaping future management and policy of our natural resources.

The landscape of western Kentucky and western Tennessee share much of the same history, similar topography, and are marked by streams and rivers feeding the Mississippi River. The discussions at the meeting highlighted challenges and wins regarding the conditions of streams and wetlands of the region. Wetlands, in particular, have had a storied past and suffered from dredging and ditching. If there was one clear take-home message, restored wetlands respond quickly to restoration. When water returns to the floodplain, it spurs microbial activity and ushers the arrival of unique plants and critters of all types. Wetland Restoration Programs are a critical first step to increase water quality and biological diversity in our region.



Winter 2022/2023

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Featured Post Doctorate: Scott Thomas



Since 2018, I have been studying tiger salamander ecology with Dr. Howard Whiteman's Colorado research team. This collaboration began during my PhD at The University of Akron, where I was studying spotted salamanders in Ohio and wanted to broaden my research experience by studying a closely related species in a very different environment. Additionally, I have enjoyed sharing the many ideas and experiences that come with being a part of a large and supportive team with members that each have their own research threads.

I went to Colorado primarily interested in the fact that 30 years of research at our primary research site, the subalpine Mexican Cut Nature Preserve, revealed that the population goes through strong, cyclical population fluctuations driven by aquatic adults cannibalizing hatchlings. We also spent time at another long-term research site, the high desert High Lonesome Ranch (HLR), and I noticed that the salamanders here weren't cannibalizing as much in my experiments.

This led me to question whether cannibalism's prevalence in a population is environment-dependent. While Mexican Cut's elevation of over 11,000 feet results in cold ponds and relatively slow growth, HLR sits closer to 6,000 feet and salamanders here grow much faster. If these energetic differences between sites lead to differences in cannibalism, then they could also lead to differences in the factors that control population sizes. In addition, thermal-driven energetic differences are expected under climate change and could also mediate cannibalism rates.

For my post-doc, I am using our 30+ year dataset, experiments, and modeling to explore the relationships between environmental gradients, cannibalism, and population dynamics. With the long-term data, I can look at how the survival of hatchlings varies with the growth of older salamanders across ponds and through time. With our site access provided by the Rocky Mountain Biological laboratory, I am collecting salamanders from ponds with growth conditions both within Mexican Cut and across the region to compare their cannibalism rates in common garden experiments. When these analyses are complete, they will then inform population models that can be used to project population trends under situations like ongoing climate change.

Photo 1. mesocosm.jpg: A paedomorphic tiger salamander in an experimental mesocosm

Photo 2. The salamander team seining for salamanders. From left to right: Emily Hoard, Dr. Howard Whiteman, and graduate student Karissa Coffield.



Featured Graduate Student: Megan Brandt



I am from Savannah Georgia and in May 2022 I completed my undergraduate degree in environmental biology from Hanover College. While applying for graduate research positions I was able to visit the Hancock Biological Station and tour the grounds. Seeing the station before I had decided on what position to take helped the decision process of where to attend because of the unique opportunity the station presented to both live and study at the station. Being so close to the lake also puts me in an ideal location for many of the projects that I am leading or assisting in.

Little is known about the Spring cavefish (*Forbesichthys agassizii*), and even less is known about the Shawnee Hills cavefish (*Forbesichthys papilliferus*), what is mainly understood is that both species are highly sensitive to environmental changes and are now at risk within their Western Kentucky range. The Spring cavefish and the Shawnee Hills cavefish are genetically different but are morphologically very similar and share a majority of the same characteristics. They only live in high quality streams, which are usually spring fed, and shelter in caves or subterranean covers during the day then emerge to surface waters during the night to feed. Being that these species only live in high quality streams and that they are greatly affected by changes within the stream it is important to gather information on them to help preserve the species and in turn, monitor the health of various streams.

During my study I will be using eDNA (environmental DNA) to determine the presence of Spring Cavefish and Shawnee Hills cavefish within four LBL streams. Once gathered I will then use eDNA quantification techniques to determine the number of cavefish within each of my stream sampling sites. While periodically collecting eDNA samples I will also be backpack electrofishing each site in order to collect cavefish to be weighed, measured, and tagged. Due to the cavefish being such a small size, I will be using visible implant elastomer tags (VIE) because they are less likely to hinder the fishes' movements. The injectable tags will also aid in calculating relative population estimates which will assist in verifying the eDNA quantification results.

Field work for the project will be starting in March and it is the aim of this project to determine if eDNA quantification techniques are dependable in estimating population size. It is vital to the project to also determine relative population size within LBL as well as to collect, size, weight, and location data for these sensitive and at-risk species so that they can be better protected.

Photo 1. Spring Cavefish (*Forbesichthys agassizii*)

Photo 2. Practicing VIE tagging on Gizzard Shad (*Dorosoma cepedianum*)

Photo 3. End result of tagging practice



Christmas Luncheon

December 2022



Christmas Luncheon is a tradition and this past holiday we had around 50 people present. Luncheon included turkeys and hams and all the sides prepared by HBS Faculty and Staff.

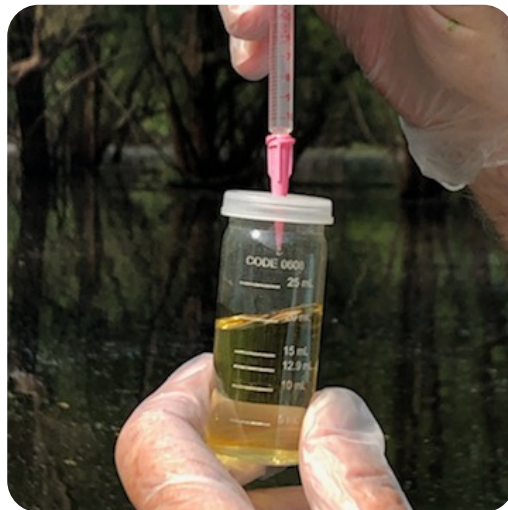


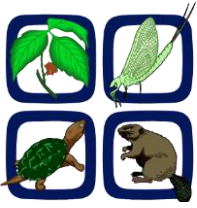
Four Rivers Annual Meeting

January 2023



Four Rivers Annual Meeting held at Hancock Biological Station in January. Four Rivers Watershed is always needing volunteer water samplers. If you would like more information please visit there website at www.frww.org





HANCOCK BIOLOGICAL STATION

SUMMER 2023



Each summer Murray State University's Hancock Biological Station provides an outstanding offering of field oriented environmental and ecological courses. All courses carry 4 credit hours. Scholarships and housing are available. Contact the Station for additional details. Scholarship applications should be completed by May 1, 2023. Find out more by visiting the Station's web site (www.murraystate.edu/hbs) or calling 270-809-2272 (ask for Barbara Like, or e-mail her at blike@murraystate.edu).

BIO 380 – WILDLIFE TECHNIQUES

Dr. Andrea Darracq

A survey and application of methods and techniques used in wildlife management and research including research design and analysis, passive sampling techniques, capture techniques, animal handling and marking, population estimation, telemetry, measuring habitat use and selection, and chemical immobilization. (May 15 – May 26)



BIO 588/688 RESERVOIR ECOLOGY

Dr. Michael Flinn

An examination of the variation in chemical and biological phenomena that characterize river impoundments. Literature reading and discussion is followed by 1) learning techniques of observation to identify pattern and process in nature, and 2) designing and conducting field experiments to assess cause and effect relationships. (May 15 – May 26)



BIO 572/672 – HERPETOLOGY

John Hewlett

A study of the taxonomy, morphology and natural history of reptiles and amphibians. Emphasis is placed on those species occurring in the central United States. (May 30 – June 30)



JOIN US FOR THE ANNUAL FOUR RIVERS WATERSHED SUSTAINABILITY FESTIVAL!

April 2023



FAMILY DAY

6th Annual Four Rivers Watershed Sustainability Festival Family Day on April 4th at the Arboretum (will move to the EXPO Center if rain) will feature interactive activities and program with Jason Lindsey.



WSI RESEARCH SYMPOSIUM

Students with WSI support will be presenting their research on a variety of topics April 12th in the Barkley Room of the Curris Center from 8am-4pm



TWS/BHA BEAST FEAST

Ever try Mountain Lion tacos? Fried Beaver Tail? Or Pheasant Stew? Come by and taste what they are cooking this year on Saturday, April 15th at the Bailey Pavilion in Murray City Park. We will begin serving at 5pm. Followed by a movie presented at the amphitheater across the walkway.



SCIENCE CAFE

Community Conservation Conversation evening on Wednesday, April 19th at TAP216. The speaker will be discussing Chronic Wasting Disease (CDW) in our region. Arrive at 6pm to place your order and speaker will begin at 6:30pm followed by question session.