MURRAY STATE UNIVERSITY





Fall 2026

Confluence

Joint newsletter for Hancock Biological Station and Watershed Studies Institute









HANCOCK BIOLOGICAL STATION ON KENTUCKY LAKE

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WSI Watershed Studies Institute MURRAY STATE UNIVERSITY

Howard Whiteman

Director's Outflow



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As the Seasons Change, Our Gratitude Remains

The cold front could not come quick enough, could it? When it did come, it was quick. One moment we were still in summer, and the next we were looking for our vests and hoodies. It was definitely a relief, as has been the changing of the leaves. Autumn is finally in the air, one of many things for which we can be thankful.

Beyond the cool air, I'm thankful for the wonderful faculty and staff we have at WSI and HBS, including our newest staff member, Michelle Weaver. WSI and HBS are blessed because of the skill, dedication, and work ethic of our staff, faculty, and student workers. From our long-term sampling on Kentucky Lake, GIS analysis at MARC, chemical analyses at CSL and HBS, maintenance of our facilities and equipment, interacting with classes both within and beyond Murray State, helping faculty, undergraduate, and graduate researchers, and going way beyond normal work hours to plan and implement outreach events, we could not ask for a better team.

That is what warms me on a cool fall (and winter) day: knowing that we have such a dedicated group running the show. As in every previous Confluence, you will see examples of their hard work within this newsletter.

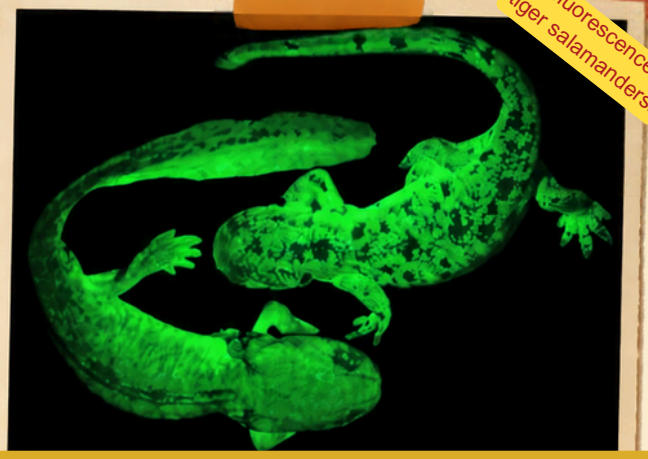
Keeping the ship running, however, is a work in progress, and we can always use help. If you would like to volunteer your time, please contact Michelle (mweaver8@murraystate.edu) and she will be glad to add you as part of our team. If you would like to help financially support WSI or HBS please see page 16 for details.

Best wishes for your fall, and please enjoy every cool minute. Sooner than we may like, Summer Is Coming.

Howard Whiteman



The 2026 field crew processing salamanders within our field tent.



Biofluorescence in tiger salamanders.

WHAT THE HECK IS WHITEMAN DOING IN COLORADO?

WRITTEN BY HOWARD WHITEMAN

I started working in Colorado as a graduate student in 1990 (yeah, last century…) and have been going back ever since. I go back each summer not just because the mountains are beautiful or because it allows me to escape the heat of Murray, although both of those motivations are real. I also don't go back just because of the many friends I have made at the Rocky Mountain Biological Laboratory (RMBL, pronounced "rumble"), which, like HBS, is a world-renowned field station. But, those friends, many of which are close collaborators, are also an important motivation.

I also return each year, as you might expect, because of the salamanders and the science that they allow me to conduct. So, what have I been doing?

Back in 1990 I started individually marking tiger salamanders at the Mexican Cut Nature Preserve, which is a montane (11,200 ft) Nature Conservancy property that is managed by RMBL. When you follow individuals with mark and recapture techniques for four years you can get a dissertation. But after that initial study it started to snowball, and I realized that every year I learned new things. After the first decade, I was sure I knew almost everything about them. After the second decade, I wasn't sure I knew anything; it became apparent that things were more complex than I thought. Clearly, I needed more data. After my third decade, I realized that the entire system was changing, and that my long-term data was becoming even more important because of climate change, similar to the Kentucky Lake Monitoring Program (KLMP).

My research initially focused on the evolutionary ecology of polyphenism, or environmentally-cued polymorphism, that these salamanders exhibit. Some salamanders metamorphose from their aquatic larval stage into a terrestrial adult, called a metamorph, just like a tadpole changes into an adult frog. Other individuals may remain in their larval, fully aquatic form but become sexually mature, which are called paedomorphs (paedo = juvenile, morph = form). Paedomorphs are like axolotls, but in tiger salamanders they have the option to metamorphose. Whether a salamander larva becomes a metamorph or paedomorph depends partly on genetics and partly on the environment it experiences—things that affect its growth rate, like temperature, food, and competition. Because the two morphs have completely different life histories, the polyphenism allows us to understand how the environment can affect their development, evolutionary fitness, population dynamics, and effects on surrounding communities, because paedomorphs are keystone predators in subalpine ponds.

Continued on the next page...



Paedomorphic and metamorphic tiger salamanders.

More recently I have focused my research on climate change, because this species—as an ectothermic amphibian living on the top of a mountain that also happens to have environmentally-induced adult forms—turns out to be pretty amazing system to understand how climate change can affect both an individual species and the ecosystem with which it interacts.

To that end, my collaborators and I have observed salamanders breeding in even higher-elevation ponds in recent years, similar to altitudinal and latitudinal shifts in other species due to climate change. We have begun implanting temperature data loggers within the salamanders to explore how the physiology of the two morphs might be affected, since one lives mostly on land and the other in water. We have also been learning how a climate-migrant caddisfly species—a prey species native to Colorado but not the elevation of our study site—is affecting the growth and life history of our salamanders. We're learning that tiger salamanders have slowly shifted their life history traits as the growth conditions at our study site have become more like lower elevation ponds, both due to climate (warmer temperatures and longer growing seasons) and new prey (those caddisflies) to eat. We have predicted that because of all of these changes, morph frequencies—the proportion of larvae that become one morph or another—are likely to shift over the next decade, subsequently affecting pond communities. Although climate change can be complex, we hope our research will allow us to learn how to better conserve this and other species, including those living at lower elevations.

One other recent discovery that is both fun and insightful: it turns out that salamander's glow. More accurately, they are biofluorescent, which means that they don't produce light themselves (bioluminescence) but rather do so as a response to light that contacts their skin. In this case, blue wavelengths of light, which are easily transmitted through clear water, react to produce green wavelengths. The kicker is that tiger salamander retinas are attuned to these green wavelengths. Thus, even though you and I see a brownish, non-descript salamander, to each other they apparently, at least some of the time, are bright green. Cool, huh?

We've learned that larvae and adults of both morphs glow differently, as do males and females, suggesting that they not only see each other but are likely using their glow in interactions and perhaps mating behavior. Over the past two summers Julie Chairez, one of my undergraduate research students, has conducted a series of experiments to show that their glow is affected by the environment: when you rear them under different light conditions, or at different densities, they glow differently. This suggest that biofluorescence may act as a useful bioindicator.

You would think after almost four decades of study I would know everything about these salamanders, but it turns out the more you learn, the more you realize that we really don't know as much as we think. That is the beauty of science—just when you think you understand it all, you find that there is so much more to explore, and that is true whether you are sampling salamanders on top of a mountain or zooplankton in Kentucky Lake. With the global environment shifting all around us, it adds to that complexity.

I get excited thinking about the discoveries that still lay ahead, the cool mountain air, and the friendships that keep me motivated for my annual western migration. I also think about how the new data we will collect can help us prepare for a changing planet, and perhaps help us understand how to better conserve these and other species. Surely, I can manage one more decade of Rocky Mountain field ecology, right?



Whiteman with collaborators at the Mexican Cut Nature Preserve.



Native Trail

(In Progress)

Our native trail will highlight beautiful, native plants that support local pollinators and wildlife while thriving in our region's natural conditions. You will be able to follow the path, discover something new, and enjoy the colors of every season.





Native Trail

(In Progress)



Our native trail will also allow students to get up close and personal with native plants allowing them to look at key identifying features.





Station Highlights (July)

We hosted two Governor's Scholars Program classes. One focused on media influence of ecological concepts and the other on general ecology.

HBS staff also renewed or became AED/ CPR certified!

Lastly, we visited Murphy's Pond to do some dock repair and tree trimming.



Above: Angie teaching GSP students about SEM's ability to take high-resolution surface images of organisms and micro-structures from local ecosystems —such as tick mouth parts.

Below: Dr. Flinn and Clay repairing the dock at Murphy's Pond.



Adam Martin and Dr. Flinn discuss how media influences anglers perceptions of aquatic systems.



Station Highlights (August)



Vaccinium sp. fruits.

On August 5th - We hosted MSU admin and shuttled them to Burger Barn for their monthly lunch meetup.

After posting an identification on the iNaturalist app of deerberry, we received a surprise visit from the Feder lab of Notre Dame! They were on the hunt for fruit from deerberry, sparkleberry, and dogwoods! Their research is exploring the relationship between the *Rhagoletis sp* of fly and the fruit.

On August 25th we held our first craft night, making bat boxes! Participants were able to create a bat box and take it home!



MSU Admin on their way to Burger Barn!





Above: Dr. Flinn and Michelle discussing bat box design at bat box craft night.

Below: Matthew Brown in the process of assembling his bat box!



Station Highlights (September)



Dr. Pryor shows students how to create science centers within their classrooms!

Sept 8th - Students in ELE413: Elementary Science Methods visited Hancock Biological Station to explore how local wildlife, ecology, and community resources can bring science standards to life for elementary learners.

Sept 18th - Christian County 8th grade gifted and talented math and science students visited for the day!

Sept 23rd - HBS hosted their annual riversweep. It was the largest turnout we've ever had and in total we picked up 880lbs of trash from around Kentucky Lake.



Above: Michelle discussing the life cycle of a frog to ELE 413 students.

Below: Riversweep participants gathering trash.





The truck loaded down with trash picked up during the riversweep.

Station Highlights (October)



El Masri and Mina Poku-Agyemang discussing soil sampling.

October has kept us busy! The first weekend we hosted the KY NSF EPSCoR CLIMBS Learning Hub Field Day, where students were given a tour of HBS before learning about plants, radio telemetry, soil sampling, and thermal sensor activities.



Above: Angie discussing long-term lake sampling with the class.

Below: A professor holding an Eastern box turtle after using radiotelemetry to track it.



Jason discussing the mint family (Lamiaceae) characteristics and a student smelling a specimen.



WSI Highlights (October)



Watershed Studies Institute
MURRAY STATE UNIVERSITY



On October 16th, Andrew Brown defended his M.S. thesis successfully!

On October 17th, students participated in Annual Regional Sigma Xi Research Symposium at UT Martin!

On October 22nd, WSI hosted their annual ecologies tournament, where Sadie Smith took home the trophy!

Above: Students competing in the annual ecologies tournament!

Below: Madison Klinker discussing her research at the Sigma Xi conference.



Sigma XI conference participants



Station Highlights (October)

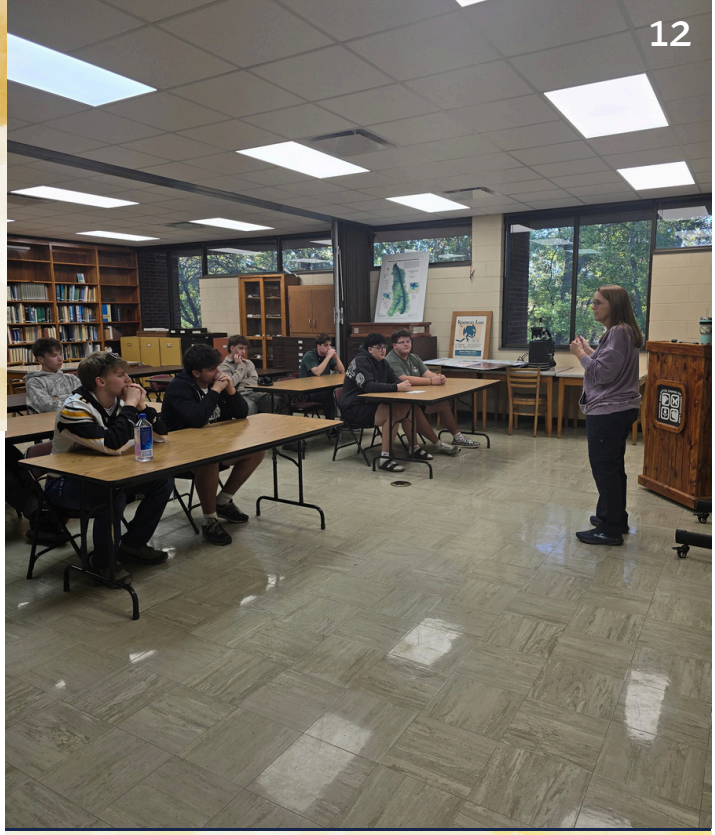


Clay providing students with a pontoon ride while discussing the various ways we sample the lake.

On Oct 22nd we hosted the Murray Independent Schools forestry and wildlife class. They split into several groups where they learned about several topics including chemistry, radio telemetry, prescribed fire, and Kentucky Lake sampling.



Jason discussing prescribed fire techniques before doing an example burn on our native prairie.



Above: Angie discussing long-term lake sampling with the class.

Below: Michelle discussing radiotelemetry and preparing students to track an Eastern box turtle.



It’s all in the technique

CLASS HIGHLIGHT



Swabbing for bSal

Searching for newts





Class photo

BIO 380 : Wildlife techniques

Twenty-five students took part in this semester’s Wildlife Techniques course taught by Dr. Andrea Darracq, a required course for wildlife majors that is offered in the fall and summer. In this course they learn about techniques they will use in the field of wildlife biology. They utilized HBS several times throughout the semester to learn about radiotelemetry, necropsy techniques, camera trapping, tractor operation, mast surveys, and disease sampling (swabbing newts for the deadly bSal fungus). They also did an overnight trip at a local wildlife refuge in TN, with alum Rob Lewis (Wildlife Manager II TWRA) to small mammal trap.

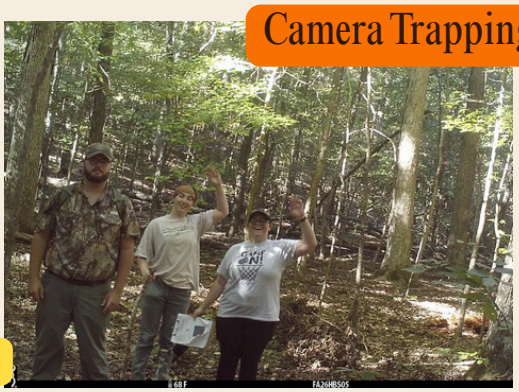
Radiotelemetry





Student with a mouse

Camera Trapping



Upcoming Events



Nov

25th - 27th - Thanksgiving break

Hancock and Murray State University campus is closed for Thanksgiving break

Dec

1st - Holiday Craft night

Several crafting activities centered around the holidays

11th - Holiday Luncheon

End of the year celebration

18th thru Jan 3rd - Winter break

Hancock and Murray State University campus is closed for winter break

Jan

11th - Classes begin

Feb

Feb 2nd - First Friend's Group Meeting

TBD- Craft night

In the Works

Hancock Biological Station Friend's Group
Interest is building to create a friend's group for HBS, see page 15 for more info.

Craft nights
We are starting a crafting night at HBS, where nature and art will collide. We are hoping to make it a quarterly event open to all. If you are interested in hosting a nature themed craft night at HBS please reach out to Mweaver8@murraystate.edu.

Science by the Lake Seminars/Webinars
This seminar series will focus on a variety of topics, with different guest speakers hosted at HBS. Coming in the spring.

K-12 Collaboration
HBS is looking to work with more K-12 schools in our region. We would like to start crafting materials that match the curriculum already in place. If you are interested in collaborating please email us at Gharris@murraystate.edu.

Friends of Hancock Biological Station

What is a friends group?

A group of citizens with a shared common interest in the stewardship of an organization, park, or in this case HBS. Their activities can range from volunteering, fundraising, hosting events, and operational support. A member can be as active as they choose within the group.

What will the mission be?

Supporting Hancock Biological Station's mission of providing scientists with a wide variety of field research and presenting students with opportunities for field-oriented classes, individualized instruction, and independent research. These efforts will support students, teachers, the public, and local agencies through acts of volunteering, fundraising, and events.

What is the first step?

Fill out the form below if you are interested or want to learn more. This is a work in progress but the first meeting will be in early 2027.

Membership includes:

- First pick at the plant sales and seed exchanges
- Recognition in our newsletter/socials
- Exclusive events (craft nights, speakers, hikes, boat rides)
- Movie nights on the lawn
- Volunteer opportunities
- and more..

Sign Up



Organism spotlight: Moth Urchin Fungus

Akanthomyces aculeatus

Native to Europe and America, this fungus parasitizes and consumes adult moths. The mycelium takes over the host's body and manipulates the host to seek higher ground. It produces rod like protrusions from the moth.

CONSIDER GIVING



Your contributions support:

*Monitoring Kentucky Lake
*Community outreach and education
*Student cabin upgrades
*Equipment upgrades
*Native prairie restoration
*Invasive plant management
*Student research
*General upkeep

Ways to Give

1. Write a CHECK payable to MSU HBS foundation or WSI foundation and mail it to us at Hancock Biological Station 561 Emma Drive Murray KY 42071.

2. Scan the Click here or scan QR Code

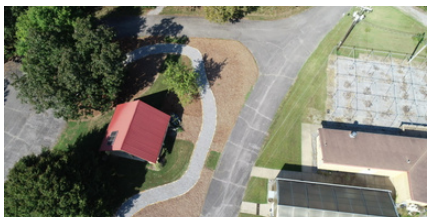
DONATIONS HELP US IN MANY WAYS! YOUR SUPPORT PROVIDES OPPORTUNITIES FOR STUDENTS IN THE FORM OF SCHOLARSHIPS AND RESEARCH SUPPLIES. YOUR DONATIONS HELP FUND PROJECTS THAT IMPROVE OUR INFRASTRUCTURE: UPDATING LABS, RENOVATING STUDENT AND GUEST HOUSING, AND PROVIDING FUNDS FOR ITEMS NOT COVERED BY GRANTS.

Follow Us

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Photos Courtesy of

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