CONFLUENCE

Director's Overflow by Michael Flinn

As we gear up for the start of the semester, I want to welcome back our returning students and offer an invite to those who have not visited HBS. Further, I want to remind the students to get involved with research, join us for some monitoring "cruises" and pester the faculty to offer experiences. And don't wait, the experience you gain will help you find your passion and likely be the stepping stone to a future job.

To the staff and faculty, I wish you good luck and hope your preparations for a great semester go smoothly, and that your efforts to balance teaching and research with the rest of life are a success. Like many of you, I have been asking myself where the time has gone and how classes can be in full swing. Lastly, consider how HBS can synergize your teaching and research with hands on experiential learning and resources that include expertise from grant management to field equipment.

Summer 2023

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Featured Faculty: Dr. Bommanna Loaganathan

My teaching/research career journey commenced at MSU in the year 1997. I accepted the role of a Center for Reservoir Research (CRR)-Chemistry postdoctoral fellow. With degrees in biology and environmental chemistry, it became evident early on that this interdisciplinary joint appointment was a perfect fit for my teaching and research interests. In the year 2000, I was fortunate to transition to a tenure-track faculty position in the chemistry department. Presently, I am a full professor and I am proud to continue holding a joint appointment with CRR (presently Watershed Studies Institute-WSI) and the Chemistry Department.

During my time as a postdoctoral fellow, I used the Chemical Services Laboratory (CSL) facilities to conduct my research, mentor undergraduate students, and perform analytical services to the regional industries. My students and I explored persistent organic pollutants including PCBs, pesticides, dioxins, etc. Our focus included an atmospheric evaluation of western Kentucky using pine needles as a bioindicator. I also collaborated with faculty in the Chemistry Department and a graduate student on a project dealing with butyltin compounds, an antifouling ingredient in paint and well-known endocrine- disrupting environmental pollutant, and its effect on human immune system. This project provided a new understanding on how environmental pollutants are linked to human health issues. In addition, I also taught an introductory chemistry course for non-majors. As a CHE-WSI faculty member, I built on my previous postdoctoral experience to realize my passion forteaching, research and service. Over the past two decades, I have taught more than 15 different chemistry courses at the undergraduate and graduate levels. I also collaborated with several faculty in the Chemistry, Biology, Earth and Environmental Sciences departments and developed new courses including, a Service Learning Course (CHE-305-80), International Experience in Chemistry (CHE-388), Mass Spectrometry (CHE-628) and Biogeochemistry courses (BIO/CHE/EES-565-665). Many traditional as well as non-traditional (regional industrial chemists, high school teachers) benefited from these courses. Also, when the previous director of CSL, Dr. David Owen, retired in 2009, I took over the CSL responsibilities and helped to continue and grow analytical services to the region and beyond.

As an environmental/analytical chemist, my research focus is based on the fact that 'The quality of our life depends on the quality of our environment'. My undergraduate and graduate students are actively engaged in innovative research to enhance the understanding of classical and emerging new pollutants in air, water, soil, sediments, foodstuffs, and biological tissues and their effect on wildlife and humans. In this process, my students have gained experience in field sampling (by attending several KLMP cruises), trace level analytical methods as well as hands-on training with a variety of analytical instruments. To date, more than more than 25 undergraduate, 19 graduate students (master's thesis) and a visiting scholar (Ph.D. student) completed their research under my tutelage. Every one of them utilized Hancock Biological Station and Chemistry Department facilities to conduct their research. Many of my students have won regional, state and national level awards for their outstanding research and they have gone on to achieve remarkable success in their careers, attaining influential positions in academia, industry, and research institutions. These studies have resulted in more than 100 peer-reviewed publications with over 5600 citations and Scientific Index rankings (https://www.adscientificindex.com/university/Murray+State+University/). I also have visited more than 20 countries to attend symposia/conferences to present papers and organize/preside workshops and scientific sessions. In addition, my research work on William Kelly's pneumatic iron and steel process (developed over 160 years ago in Land Between the Rivers) resulted in the first National Historic Chemical Landmark in the Commonwealth of Kentucky. Furthermore, I had the honor of working with several esteemed faculty in the Jesse D. Jones College of Science, Engineering, and technology (JCSET), including, biology (CRR/WSI), chemistry, geosciences and mathematics in several successful grants from the: NSF, NSF-CRUI, NSF-EPSCoR, EPA-EPSCoR, US EPA-NY-NJ Harbor Discharge Group Sub-contract, Howard Hughes Medical Institute (HHMI), and several local industries/institutions contracts amounting to over 4 million dollars.

None of these milestones would have been possible without the contributions of my students, collaborators (national & international), and the teamwork of many of my colleagues in the JCSET, coupled with the opportunities offered by the MSU community at all levels. I am looking forward to higher levels of service in the years ahead.

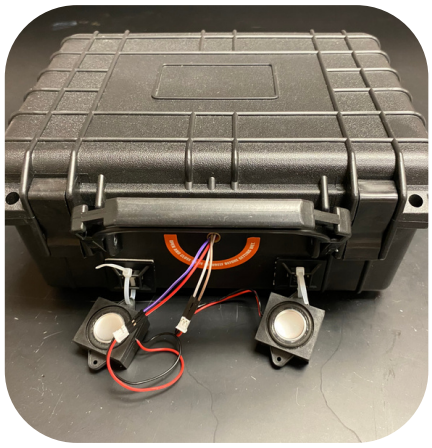
Featured Graduate Student: Cord Lemons

Pictured above: Cord Lemons, just below that is a raccoon at the foraging station. Pictured below (left to right) is Jasper, resident Red Wolf at the Nature Station in LBL, taken by Cord on his first visit to the Nature Station (left). next is the Audio equipment used to play red wolf howls (middle) Audio equipment deployed at a study site with rain protective cover (right).

My name is Cord Lemons. I'm originally from Dyersburg, TN and transferred to Murray State University in the Fall of 2020 to earn my Bachelor of Science degree in Wildlife and Conservation Biology. I did so in the Spring of 2023, and I am now a graduate researcher for the Darracq Lab at Murray State University, working towards my Master of Science degree in Wildlife and Conservation biology. I love to hike, trail run, rock climb, and kayak, and my love of the outdoors, nature, and wildlife came from growing up in rural West Tennessee, where forests, gullies, ponds, and streams were my backyard playgrounds.

My graduate research is focused on extirpated predators and landscape of fear (a predator's presence on the landscape affecting the behaviors of prey species), specifically pertaining to red wolves, and how they can affect the foraging habits of native mesopredators, raccoons. When raccoons do not have an apex predator in their ecosystem to mitigate their foraging behavior, they can cause significant harm to song bird nests, as well as any ground nesting species, such as turkeys, quails, or turtles. Because red wolves have historically, as well as currently, been known to depredate raccoons, my hypothesis is that raccoons will still display increased vigilance and decreased foraging when exposed to red wolf howls, even in areas where red wolves have been absent for decades. To test this, I have currently deployed audio systems at Clarks River National Wildlife Refuge, along with trail cameras and foraging stations, to observe how foraging raccoons react to red wolf howls.

The goal of my research is to demonstrate that red wolves (via their recorded howls) can affect a landscape of fear on raccoons, thereby increasing their vigilance and decreasing their foraging, in an area that hasn't seen red wolves for many years. This research will demonstrate a valuable ecosystem service that red wolves can provide, and help with their conservation efforts, as they are one of the most endangered species on the planet.



Ruby Simpson

May 2023

Pre-K students from Ruby Simpson learned about aquatic and terrestrial "Bugs" from around the world. Displays included several live dragonfly nymphs, snails, beetles and butterfly collections.

Wildlife Techniques

May 2023

Wildlife techniques is 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. Pictures here are of Dr. Andrea Darracq and her students in the field.

Tennessee Natualists Day

May 2023

Students from the Tennessee Naturalist Program visited for a workshop at HBS to learn about aquatic ecosystems and methods to determine health and diversity of our aquatic systems. The workshop included coursework in the classroom and demonstrations of sampling equipment used by our KLMP Long-term Monitoring Program.

Herpetology

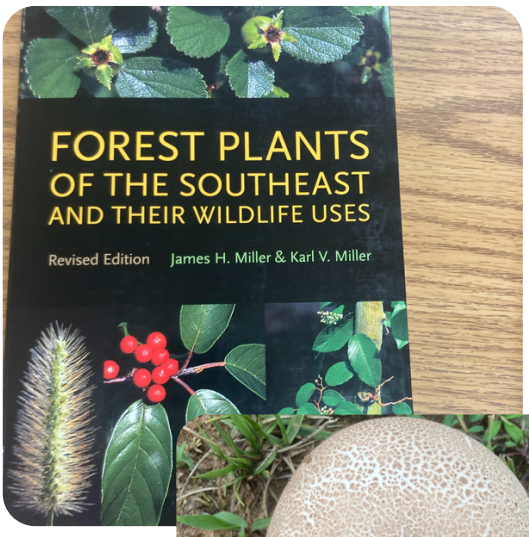
June 2023

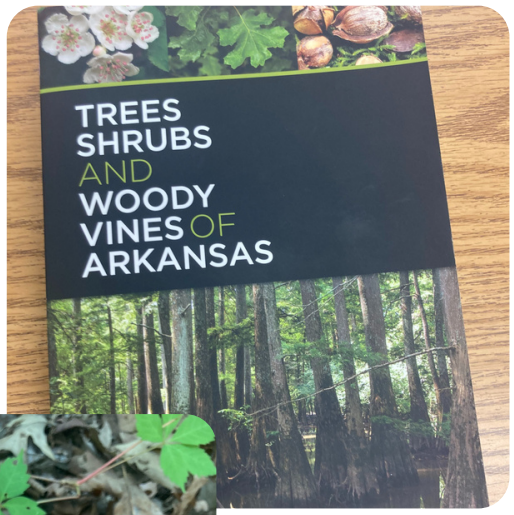
John Hewlett taught Herpetology which is a study of the taxonomy, morphology and natural history of reptiles and amphibians. Emphasis is placed on those species occurring in the central United States. Pictured here is John Hewlett and his students in the field.

Riverland Plant ID day

June 2023

A Native tree and shrubs workshop led by Gage Barnes, Director of Riverlands Alliance. Gage taught the group how to identify some of the most common trees and shrubs in west Kentucky, and how to document plants using the iNaturalist app to help monitor Kentucky flora.





Butler County Educational day

July 2023

Students from Butler Co. Summer Program visited HBS for a full day of learning about wetlands. Students made their own micro-wetland terrariums with test tubes and sampled "bugs" from our wetland on the HBS campus.

GSP Educational day

July 2023

Kentucky Governors Scholar Program students visited HBS for a STEM day program to learn about possible career opportunities in fisheries and wildlife. Students interacted with graduate students from various programs and had the opportunity to examine zooplankton collected from the lake. Unfortunately, weather kept us from our pontoon cruise on the lake, but students made the most of the day by perusing our research posters and learning more about the research we conduct.

Cruise #681

July 2023

Dr. Loganathan joined the crew for cruise #681 and stepped in for our regular Captain Clay Thompson. Cord Lemons (resident featured above) sampled zooplankton while Clay and Dr. Flinn ran primary production and sampled for nutrients.

Stream sampling

July 2023

Eastern Tiger Swallowtails butterflies, *papilio gaucus*, were observed puddling by Dr. Flinn.