

Tennessee Tech University School of Environmental Studies



FALL 2023 NEWSLETTER

Message from the Director

Welcome to the latest edition of the SOES Newsletter. Inside these pages, you'll find a plethora of activities and updates from our students, alumni, faculty and staff. The school celebrated its 10th anniversary earlier this year, which culminated with a gathering in Stonecipher Lecture Hall in March. More than 20 students graduated from our programs in 2022-2023 and have moved on to the next phase of their environmental and sustainability careers. Special thanks to Holly Stripling, Irene Mauk, Samantha Allen and all those who contributed materials for this issue of the newsletter. Keep up the good work and please stay in touch!



Hayden Mattingly

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Bachelor of Science

Environmental & Sustainability Studies

2022 - 2023 Capstone

The 2022-2023 Capstone students worked with Tennessee Tech's Office of Sustainability on the initial phase of developing a sustainability strategic plan for the university. They completed literature reviews to determine best practices for college and university sustainability plans and assembled in groups related to sustainability categories to write the plan and develop recommendations. The categories were Energy, Food and Dining, Water Conservation, Recycling and Waste, Green Space, Transportation, Education, and Community Engagement. Capstone student wrote the preliminary plan and developed goals, and they presented their work to Delayne Miller, sustainability manager, and several of the Sustainability Department's students.

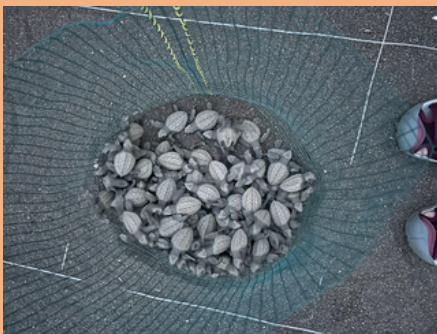
Current Student

Lydia Burton, a senior majoring in environmental and sustainability studies with a biology focus at Tennessee Tech University, has embarked on a journey of conservation and research driven by her love for marine ecology and commitment to environmental sustainability. This summer, she ventured to Guanacaste, Costa Rica, volunteering for a sea turtle conservation program through the university's study abroad program.

She said, "It was super fun; I saw the listing on the website and thought it would be a great experience." The heart of the adventure took place in RNVS (Refugio Nacional de Vida Silvestre) in Camaronal. This was a national park where her cabin was nestled in the jungle, just a short walk from the beach. Her primary responsibility during her stay was to ensure the safety and survival of sea turtle nests, which have a roughly 64-day incubation period. She and her fellow volunteers collected newly laid eggs, moved them to a protected hatchery and closely monitored the nests, safeguarding them from the primary threat: raccoons.



"Raccoons would pick up the eggs, drink everything inside, and leave the broken shells everywhere. So, we would find a raided nest in the morning," Lydia explained. Despite these challenges, she and her team successfully saved numerous nests and released baby sea turtles into the ocean.



Lydia's time in Costa Rica rekindled her passion for marine ecology. She began to explore career paths in conservation biology, particularly focusing on marine environments. She is interested in studying interactions between different species within specific marine ecosystems, such as kelp forests or coral reefs.

Lydia appreciated the practical experience she gained through this role and the opportunity to contribute positively to her community. Reflecting on her journey, she wanted to offer some advice to students considering similar experiences, emphasizing, "I would definitely recommend studying abroad or participating in volunteer opportunities. It's an excellent way to explore your interests, gain valuable skills and make connections with people from all over the world."



Professional Science Master's Concentration in Environmental Informatics

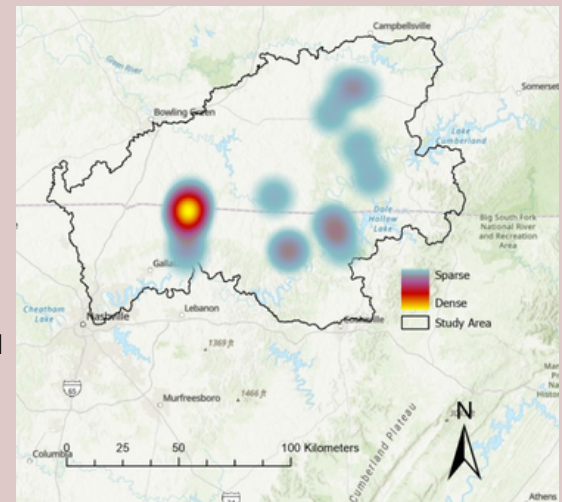
Jacob Landfield recently accepted a position with the South Florida Water Management District (SFWMD), a division of Florida Department of Environmental Protection, to work in the Project Operations and Assessment Section. This position, created by the Northern Everglades and Estuaries Protection Program (NEEPP), is part of the Comprehensive Everglades Restoration Plan (CERP). Jacob's work describes the inputs from the Kissimmee River watersheds, through the Lake Okeechobee watersheds and out to the Florida Everglades or the Caloosahatchee and St. Lucie river watersheds. The PSM program provided him with the knowledge he needed for the assessment of this interconnected natural system.

For his PSM project, Jacob is presenting a detailed assessment of the S-191 Basin (S-191). S-191 flows into the northeast portion of Lake Okeechobee. This is an advanced assessment conducted by the SFWMD helping explain the contributions of nutrient flows into Lake Okeechobee. Jacob's current work aims to gather information to determine the most impactful nutrient sources causing the water quality problems, find what remains to be done to improve water quality and advise on actions for future planning.



The SFWMD's water quality field staff currently sample 894 sites twice a month across the 16-county region stretching from Orlando to the Florida Keys. Jacob and his project team proposed to add some additional sites as well. The alteration of the Everglades drainage began in the 1800s, and this altered inputs of total nitrogen and total phosphorus to the wetland. Modern development of South Florida has been observed to cause further degradation in the watersheds that feed the Florida Everglades. Since 1995, work has been done to restore the waters, and there are several other types of projects that help to lower the total loading, but much work is yet to be completed.

Stone Fagan utilized a maximum entropy modeling (Maxent) software package to forecast potential geographic distribution of the Karst Snowfly (*Allocapnia cunninghami*), an imperiled insect species. This model will serve as a tool to guide conservation efforts and allow conservation professionals to focus their search to areas of suitable habitat. This will allow interested parties to formulate more informed resource management decisions. Stone collaborated with state and federal natural resource management professionals in order to obtain datasets relating to environmental variables relevant to the Karst Snowfly's habitat. Both the environmental variable data and species presence data were processed according to Maxent specifications and compiled into the software. The model outputs were interpreted through spatial and statistical analysis in order to determine the significance level of each environmental variable. The intended deliverable for this project is a tool for users to employ when making decisions regarding the preservation of the species of interest.



Doctor of Philosophy

Environmental Sciences

Concentrations in Agriculture, Biology, Chemistry, Geosciences and Integrated Research

Peter Blum is an environmental sciences – biology Ph.D. candidate advised by Justin Murdock in the Department of Biology. Peter's work focuses on how adult freshwater insects transport persistent organic pollutants to terrestrial ecosystems and how pollutants move through food webs. The historically contaminated streams and Woods Reservoir at Arnold Air Force Base in southern Tennessee serve as the study sites for this research. His research is focused on the persistent organic pollutants, polychlorinated biphenyls (PCBs). Once used in many industrial capacities, PCBs are banned endocrine-disrupting compounds which have been implicated in reducing the reproductive success and immune function of animals. Organisms retain PCBs from environmental exposure and diet, causing long-lived, predatory animals to be more at risk of PCB biomagnification. Fish consumption advisories are common in waters that contain PCBs, which reflects ongoing concerns for human and wildlife exposure.



Peter's dissertation focuses on PCB movement from streams and reservoirs to terrestrial food webs through emergent adult freshwater insects. This work studies the entrainment pathway of PCBs in stream food webs and how organism stoichiometry of carbon, nitrogen and phosphorous influences the accumulation of PCBs in tissues and flux rates out of streams. Additionally, this research aims to understand which groups of insects are the most critical in the export of PCBs, the sources of PCBs in food webs and how stoichiometry influences retention and bioaccumulation can help manage PCB-contaminated sites.

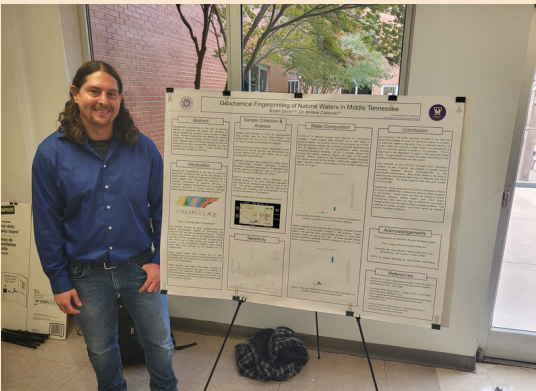


Apart from his Ph.D. work, Peter is involved in several research collaborations, including how the aftermath of tornados in Tennessee and Kentucky may influence water quality and the life history of rare caddisflies (*Pycnopsyche rossi*). Peter plans to pursue a career in freshwater resources management or teaching at a primarily undergraduate institution.

Bryant Davis is an environmental sciences – integrated research Ph.D. candidate advised by Andrew Callender in the Department of Chemistry. Bryant's project is "Geochemical Fingerprinting of Natural Waters in Middle Tennessee." Geochemical fingerprinting is an analysis of chemical species present within natural waters to determine both the source and alteration of these systems. These chemical fingerprints are defined as specific patterns of analytes unique to each body of water. This research examines the presence of metals in surface waters that are located within various watersheds of Middle Tennessee. Water bodies from these regions were chosen due to differences in local geology. Geographic Information System (GIS) was utilized to screen which watersheds should be included in

this analysis by calculating the percentages of each of the primary bedrocks. Grab samples were obtained from various locations in order to obtain an identity of each respective system. Each of these grab samples was then analyzed for trace metals to ensure that no analytes exceed EPA requirements. Statistical analyses were then utilized to determine how these watersheds differ chemically.

Bryant obtained two undergraduate degrees at Tennessee Tech in GIS and environmental chemistry before continuing his education in pursuit of his Ph.D. A fun fact about Bryant that most do not know: Bryant used to be a professional wrestler, and in his free time still tries to stay involved in the wrestling community.



Alumni Updates

Russ Skogland (Ph.D. '15) and his wife went back overseas to visit their son for Christmas after taking a summer trip in July to Europe. They visited many Christmas markets in Germany, Czech Republic, Poland, Belgium, France, Switzerland and the Netherlands. They also visited some sobering sites such as Berlin, Auschwitz, Treblinka and Birkenau Extermination camps.



Russ continues to teach Biology during spring semesters at Cumberland University in Lebanon, Tennessee, and he continues to enjoy retirement from Tennessee Wildlife Resources Agency.

Steven Hewett (P.S.M. '16) resigned from his job at the City of Clovis, New Mexico, and is now working in the Planning and Economic Development Department for Macomb County, Michigan as a GIS Specialist. He started the job in November 2022 and is living in St. Clair Shores, Michigan.



Kristin Willis (B.S. '18) is currently working at Burgess Falls State Park (BFSP) as a park ranger. She also serves as the volunteer coordinator, and she welcomes anyone needing volunteer hours to sign up. This is also a great opportunity for anyone interested in becoming a ranger. Volunteer dates are listed on the BFSP webpage under upcoming events. She has also returned to Tennessee Tech to begin her master's of professional studies in media and strategic communication.

Grady Wells (Ph.D. '19) is a visiting professor of biology at Sewanee: the University of the South. He taught Ichthyology last fall (Advent Semester) and taught Ecology during the Spring (Easter Semester). He also



teaches Field Biology every semester. The photo shows his Ichthyology students sampling fishes of Boiling Fork in Cowan, TN. The class was assisted with electrofishing help from Tennessee Wildlife Resources Agency.

Anna Webb (B.S. '19) just took a new position in April 2023 as the forest health & protection entomologist for the U.S. Forest Service. She is one of two entomologists in Region 4 of the Forest Service, also known as the intermountain region, based out of Boise, Idaho.

Caroline Curtis (B.S. '21) completed her master's degree in May 2023 through the Tennessee Tech College of Education's job-embedded program. She is currently in her second year teaching full-time at her alma mater, William Blount High School, in East Tennessee. She sponsors the school's Key Club, runs a Mario Kart Club, and is a member of staff committees, like the Teacher Morale Committee. One of her current projects is to clean up and maintain the campus forest located behind the school building. This project will include trail clean-ups and building educational structures, like bridges and workspaces.



Cody Godwin (Ph.D. '21) finished his Ph.D. in December 2021 and started his new job at New Mexico Highlands University (NMHU) in Las Vegas, New Mexico, in January 2022. He teaches Genetics, Zoology and Advanced Ecology for graduate students. He always wanted to explore the Southwest U.S. and enjoys living in this region of the country. The NMHU position was for a visiting assistant professor, so he looked for a more permanent position and was selected by Santa Fe College in Gainesville, Florida to fill a tenure track position in their natural science department. Santa Fe College was where he started his academic career and holds a special place in his heart. It's also where he started doing field work with freshwater turtles. Now he is back in Florida working with his previous advisor (now colleague) studying the same system and species. He is currently promoting research with a dedicated group of undergraduates and plans to continue natural history studies in Florida. He encourages potential collaborators or Florida visitors to contact him anytime.



Graduates & Alumni Updates

2022 - 2023 Graduates

Bachelor of Science

Jo Brown
 Carolyn "Grace" Cooke
 Ashley Daniel
 Luke Fraley
 Jesse Griffith
 Christopher Ingham
 Isabella Kinsey
 Kati Lowe
 Rebecca McDonald
 Zachary Merritt

Hailey Nicks
 Elliot Payne
 Charleston Pritchett
 Savannah Smith
 Mallory Williams
 Jake Woody

Professional Science Master's

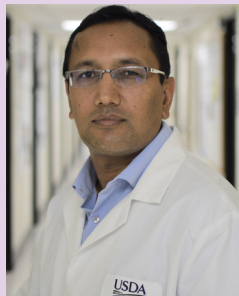
Joseph Cook
 Garrett "Stone" Fagan
 Jeremy Hooper
 Matthew Keegan
 Madison "Kate" Moffitt
 Chantelle Rittmaier
 Nicole Wood

Doctor of Philosophy

Samantha Allen Lesta Fletcher
 Sabrina Buer Rachel Kaiser

Continuation of Alumni Updates

Sunil Rawal (Ph.D. '21) is working as a postdoc – research chemist/environmentalist at the USDA- ARS Coastal Plain Soil, Water, and Plant Research Unit in Florence, South Carolina, where he lives with his wife and daughter. He is currently working on developing new technology to recover and concentrate phosphorus from livestock manure in anaerobic digester effluents in combination with nitrogen treatment using the anammox process for extraction of high-purity phosphorus products. Further, he is working on electrochemical recovery for ammonia from wastewater with the combination of gas-permeable membrane technology. Dr. Rawal is also involved on developing a new method using microbial fuel cells for producing energy and clean water from waste products.



Sabrina Buer (Ph.D. '22) graduated with her doctoral degree in July 2022 and was thrilled to participate in the hooding ceremony in December. She was hired by Tennessee Tech in November 2022 to serve as the program coordinator for the National Science Foundation Research Traineeship Program entitled Engendering the Spirit of Gadugi at the Food-Energy-Water (FEW) Nexus. This grant focuses on training holistic scientists and engineers to work with rural, Appalachian and indigenous communities to tackle problems under the FEW umbrella.



Please consider making a donation to the School of Environmental Studies Student Scholarship Fund

To give, navigate to the link here, and designate School of Environmental Studies Student Scholarship Fund.

Thank you so much for your generosity in helping students in the School of Environmental Studies for years to come!



www.tntech.edu/giving

10-Year Anniversary



On March 24, 2023, we enjoyed an event in honor of the 10-year anniversary of the School of Environmental Studies. The event included a catered meal by Blue Coast Burrito, a silent auction and musical entertainment by Chapel Bell and Honeybrook.

We enjoyed catching up with the many students, alumni, faculty and staff in attendance. It was rewarding to reflect on the last 10 years of events and accomplishments for the school while also looking forward to the future.

Over the past decade, our students, faculty and staff have celebrated more than 100 graduates, explored other countries, studied endangered species, mapped and analyzed a variety of habitats and moved on to make a difference in environmental and sustainability initiatives.

All proceeds and donations from the auction and event will go toward supporting the newly founded School of Environmental Studies student scholarship fund.

School of Environmental Studies Faculty and Staff (L to R):
Hayden Mattingly, Samantha Allen, David Hajdik, Irene Mauk, Tammy Boles and Steve Sharp



Thank you to all of our generous sponsors and donors as well as everyone who joined us for the 10-Year Anniversary event!

Faculty Spotlight

Justin Murdock
Professor of Biology



Tell us a bit about your professional and educational background and how it led you to Tennessee Tech.

My education/training background includes a year at Coffeyville (Kansas) Community College, a B.S. in environmental science from the University of Kansas, an M.S. in Wildlife & Fisheries Science from Texas A&M University, a Ph.D. in biology at Kansas State University, and a postdoctoral research position at the USDA National Sedimentation Laboratory in Oxford, MS. I moved from Oxford to Tennessee Tech in 2012 to fill a role as an aquatic ecologist in the Department of Biology.

Tell us about your current role as a professor in the Department of Biology.

In addition to teaching, I am the advisor of the department's wildlife and fisheries science: conservation biology concentration, and I am heavily involved with the ESS program as adjunct faculty and serve on several ESS program committees. I am the research lead of the Biodiversity and Ecology focus area in Tennessee Tech's Water Center.

What courses do you teach at Tennessee Tech, and what do they entail?

I regularly teach Limnology (freshwater ecology) and Phycology (the study of algae). I also teach graduate courses in Stream Ecology, Biogeochemistry and Advanced Microscopy.

What research projects are you currently working on?

I have several ongoing projects and research activities right now. The largest current project my students and I are involved in is a collaboration with the USDA, The Nature Conservancy, and three other universities assessing how to best restore wetlands in agricultural watersheds to optimize both functional recovery (specifically nutrient retention and carbon sequestration) and wildlife habitat. This work is focused in western Tennessee and Kentucky. Another project in our lab is working with Arnold Air Force Base measuring pollutant transfer (i.e., PCBs and PFAS) from contaminated sediments in Base streams out into the terrestrial ecosystem through emerging aquatic insects. Specifically, we are interested in pollutant movement into the resident federally endangered gray bats. Recently, we have also begun working on harmful algal blooms in the Ohio River. We are collaborating with four other universities to assess the conditions that promote toxic algal growth in the river and develop a model for the U.S. Army Corps of Engineers that will predict when and where toxic blooms will occur in the Ohio and other large U.S. rivers. Additional ongoing projects in the lab include working with other Tennessee Tech faculty developing methods to better quantify microplastics in wastewater effluents, working with state and federal agencies in North Carolina investigating the cause of a mysterious river mussel die off in North Carolina and a long-standing personal hobby of advancing techniques in infrared microspectroscopy (shooting algal cells with a tiny laser) to understand algal biochemistry response to environmental changes at the cellular level. As you can ascertain, much of my ongoing research is done vicariously through my graduate students.

What is a fun fact about yourself?

Two things outside of work that I enjoy are distance running (five marathons and counting) and brewing beer. These things are not mutually exclusive as one necessitates the other. I also have triplets who are juniors in high school who keep me grounded, and who help me craft my jokes for classes through responding with various stages of eye rolling and groans.

School of Environmental Studies Faculty and Staff

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