

# SOES

School Of Environmental Studies

## Newsletter

### Message from the Director

As you will see when you pause to read the various reports about current students and alumni from the School of Environmental Studies, many good things are happening. Students are engaged in stimulating projects. They are also involved in important research. They participate in practical and valuable internships. And they are finding meaningful employment and stepping into exciting careers! Alumni continue to contribute to the preservation of the planet and to the good of their communities in so many ways. We continue to be proud of the accomplishments of our students (current and former) and of the commitment of our faculty and staff in providing an academic environment in which they can flourish.



*Steve Sharp*

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# BACHELOR OF SCIENCE

## Environmental & Sustainability Studies

### Student Internships

**Chloe Green** is an ESS major with a concentration in environmental science-natural resources. She is currently interning with Farmer Morgan LLC. After Chloe graduates in May, she will begin working with the firm full-time as an environmental technician, working alongside their environmental engineer. Chloe will be working on environmental design, field verification, construction-related documents for environmental testing and documents developed in conjunction with other employees. She will also be responsible for assisting with fieldwork, including methane and water quality testing and design and drawing preparation for engineering projects to meet the client's needs.



environmental science-natural resources. She is currently interning with Farmer Morgan LLC. After Chloe graduates in May, she will begin working with the firm full-time as an environmental technician, working alongside their environmental engineer. Chloe will be working on environmental design, field verification, construction-related documents for environmental testing and

**Megan Flynn** is an ESS student with a concentration in environmental science-natural resources. She completed an internship in the Summer of 2021 with Straughan Plumbing & Septic in Farmington, Missouri, where she studied and applied knowledge of wastewater treatment. She learned the environmental regulations and laws required for septic systems and necessary field testing, such as soil conditions. After learning the material, she began working with the field instructors to assist in installing systems. She assisted with calculations regarding water usage and system planning related to environmental conditions. She even helped with installing the systems. While working, she also learned about the environment inside the septic tanks. Megan's field instructor taught her the importance of bacteria and the properties of water within the tanks that work together to purify the water. As well as the tank conditions, proper soil conditions are essential for filtering wastewater.



In the future, she hopes to use the knowledge that she has gained from her internship to improve water quality or work with wastewater purification. The knowledge and hands-on applications she learned will help her achieve this goal.

**Drew Williamson** is a senior ESS student with a concentration in environmental science-natural resources. He works with local lawyer and Tennessee Tech adjunct professor Matthew McClanahan. Mr. McClanahan currently teaches the ESS 3000-Environmental Law class at Tennessee Tech. Drew works with Mr. McClanahan to learn more about what he does daily as a lawyer, focusing on the many different areas of law, including environmental. Mr. McClanahan practices law, teaches, is active in the local agricultural communities and serves as the executive director for the Tennessee Association of Conservation Districts. Drew is also planning to become well immersed in the rules and regulations of environmental conservation with the potential of law school in his future. Drew has attended court several times with Mr. McClanahan to observe. They also attended the Tennessee Cattleman's Association Convention in mid-January.



**Jonah Lawson** is an ESS student with a concentration in environmental science-biology. Jonah has interned at Cummins Falls State Park for two summers as a seasonal interpretive recreationalist. His primary responsibilities included giving interpretive talks for guests and providing the park with general maintenance. He presented many programs on plant identification, geological formations and herpetology to educate the general public on the beauty of Tennessee. When he was not presenting programs, Jonah informed guests about park safety. He also removed litter, repaired fences, recut the trail and applied pesticides to invasive plant species. Additionally, he planted Cummins Falls crop field that included pumpkin, sorghum, sunflower and squash. These experiences have helped Jonah develop a fondness for botany, and he intends to pursue positions related to the flora of Tennessee after graduation.





# PROFESSIONAL SCIENCE MASTER'S

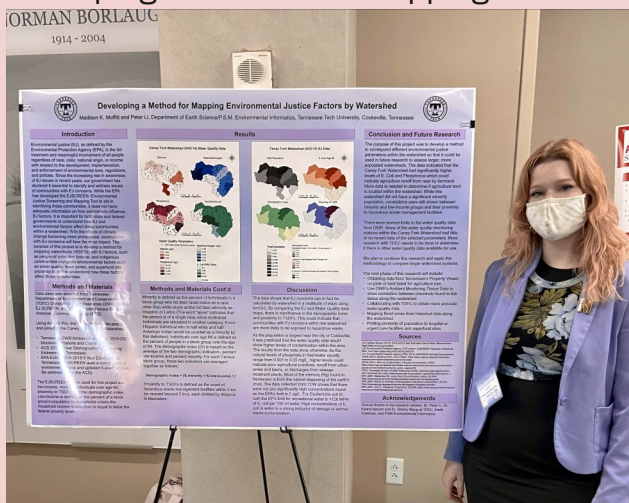
## Concentration in Environmental Informatics

### Current Student Features

PSM student **DeLayne (Lawson) Miller** works in the Office of Sustainability at Tennessee Tech University. DeLayne received her B.S. in Mechanical Engineering from Tennessee Tech in 1985. Afterward, she lived and worked in Alabama for 20 years before returning to her hometown of Cookeville, Tennessee. DeLayne has worked at Tennessee Tech for 12 years and has been the university's sustainability manager for the past seven years. Once DeLayne decided to pursue a master's degree, the PSM program with a concentration in environmental informatics was the one that best fit the type and variety of projects her office works on. Taking only one or two classes a semester helps her juggle work and four children, three of whom are current students at the university. Currently, students in DeLayne's office are developing a tree inventory for the campus. A big part of the project will be included in an application for the entire campus to become an arboretum. Information gathered so far, including coordinates of each tree, is being loaded into a GIS map used primarily by dendrology classes in agriculture and biology.



**Madison Moffitt** is in her final year of the PSM program. Over the last two years, Madison has worked with the School of Environmental Studies as a graduate support assistant, where she has assisted in writing the SOES newsletters and with the Earth Sciences Department as a teaching assistant, where she has taught laboratory classes for several geology courses. Madison has also worked alongside the Tennessee Department of Environmental Conservation (TDEC) to better understand the relationship between environmental justice (E.J.) factors and watersheds. Her research project focuses on developing a method for mapping Tennessee watersheds and quantifying their relative E.J. factors, such as people of color, low-income and indigenous communities, alongside environmental factors such as water quality, flood zones and superfund site proximity. The goal of her research is to use ArcGIS Pro and data obtained from the Tennessee Department of Environment and Conservation's (TDEC) Division of Water Resources (DWR), E.P.A.'s EJ SCREEN, and United States Census Bureau's American Community Survey (A.C.S.), to develop a spatial and statistical methodology as an environmental justice tool for watersheds in Tennessee. Madison will present part of her research at the Tennessee American Water Resources Association's Symposium this spring and continue with her work with TDEC until she graduates in Summer 2022.





# DOCTOR OF PHILOSOPHY

## Environmental Sciences

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



**Martine Patiance Bowombe Toko** is an environmental sciences-agriculture student. Martine is from the Republic of Cameroon in Central Africa. Her hometown is Mbanga in the Littoral Region. She is currently working under the guidance of her advisor, Douglas Airhart, a professor

of horticulture in the School of Agriculture. Martine's research focuses on periodical cicadas and damage caused by female egg-laying activities to young field-grown trees in Tennessee nurseries. Her project aims to prevent or control periodical cicada oviposition damage associated with nursery tree crops. To accomplish this goal, two major priorities will be addressed:

1) Evaluation of some new or typical insecticide treatments to manage periodical cicada adults using screen cages or shade house settings.

2) Assessment of young nursery trees damaged by female periodical cicada adults (Brood X, 2021\* and Brood XIX, 2024\*\*) in cooperating field nurseries.

Additionally, a short part is to examine insurance claim damage evaluations from several nurseries affected during the 2008\*\*

(Brood XIV) and 2011\*\*

(Brood XIX) emergences. During the 2021 cicada emergence, Dr. Airhart and Martine made several trips to collect adult



periodical cicadas at the TVA Melton Hill Dam in Lenoir City, Tennessee and the Panther Creek State Park in Morristown, Tennessee. Insect collection consisted of handpicking or netting of live adult periodical cicadas. Insects were placed in laundry mesh bags with feeder trees and then brought to Tennessee Tech's farm for experimentation. Information collected during 2021 was presented at the annual meeting of the Tennessee Entomological Society (TES) in McMinnville, Tennessee, and the meeting of the Chestnut Hill Garden Club in Chestnut Hill, Massachusetts. After graduating from the PhD program, Martine would welcome a career opportunity in research or teaching in agriculture and crop protection.

(\* ) emergence year of 17-year cycle cicada: *Magicalcanda septendecim*, *M. cassinii*, and *M. septendecula*

(\*\* ) emergence year of 13-year cycle cicada: *Magicalcanda tredecim*, *M. neotredecim*, *M. tredecassini*, *M. tredecula*

**Robert Brown** is an environmental sciences-biology student. His work focuses on mitigating nutrient pollution in freshwater and marine ecosystems. Wetland restoration practices are implemented by the



USDA Natural Resources Conservation Service's Wetlands Reserve Program (WRP) to enhance nutrient retention within floodplains of the Mississippi River Valley to reduce nutrient inputs into the Gulf of Mexico. With funding from the USDA and The Nature Conservancy, and in collaboration with other graduate students and professors, Robert is collecting soil cores from WRP easements across west Tennessee and Kentucky to measure nutrient retention potential of different restoration practices. Robert's dissertation focuses on scaling nutrient cycling rates within and across WRP management areas while considering feedbacks between wetland nutrient retention, greenhouse gas emissions and nutrient delivery to WRP easements from tributaries of the Mississippi River. Assessment of Mississippi River tributaries has also led to an unexpected opportunity to assess potential impacts of tornados on stream water quality after the disaster in Mayfield, Kentucky, in December 2021, which is upstream of Robert's study sites. Ecological patterns can change rapidly



with changes in global climate and less predictable weather events. Assessing ecological patterns during floods and natural disasters will help researchers better understand how natural, degraded and restored ecosystems respond to climate shifts. Robert is also interested in understanding ecosystem changes through a

lens of food web connections that link elements and organisms. He plans to pursue career opportunities in ecological research or environmental education while continuing collaborations to publish his ongoing WRP monitoring efforts. Robert's advisor is Justin Murdock.



# PARTNERSHIPS

## ESS Capstone Partners with the Tennessee Nature Conservancy



The 2021-2022 Capstone students continued to partner with the Tennessee chapter of **The Nature Conservancy (TNC)** staff at the **Bridgestone Nature Reserve** at Chestnut Mountain. They focused on GIS research, renewable energy implementation and planning an educational event for small forestland owners.

The class conducted spatial analysis using ArcGIS to determine the boundaries of the property and identify the best locations for solar and wind power installations. They also used GIS to

create a database of landowners in the Cumberland Region that they will contact for the small forestland owner event.

Their workshop titled “Learning The Land: Private Woodland Workshop” was held at Tennessee Tech’s Appalachian Center for Craft on April 23 and offered sessions on such topics as forest management, grants and funding, and identifying native and invasive species.

These postcards were designed to be sent out to small forest landowners in the Upper Cumberland.



## Co-op with U.S. Fish and Wildlife Service

Tennessee Tech's **Center for the Management, Utilization and Protection of Water Resources** is developing a new partnership with the U.S. Fish and Wildlife Service (USFWS). This partnership is designed to provide students with experiential learning and allows the USFWS to provide paid internships to them each year. Students will have the opportunity to gain employment, course credit and experience in directed research with a faculty sponsor or by being embedded at USFWS field stations or National Wildlife Refuges, where they can help with a broad range of hands-on activities. The cooperative agreement will be finalized over the summer, with the first opportunities available by the fall of 2022.



# ALUMNI UPDATES



**Douglas A. Wymer** (Ph.D. '02) recently founded **Southeastern Accreditation Consultants** and serves as CEO and lead consultant. In this role, he collaborates with colleges and universities to support them along their accreditation journey. This comes after more than 20 years of academic experience, including nearly five years as a chief academic officer and participation on many visiting teams with the Southern Association of Colleges and Schools Commission on Colleges.

**Russell Skoglund** (Ph.D. '15) will retire March 2022 after 37 years with the Tennessee Wildlife Resources Agency and two years with the Florida Game and Freshwater Fish Commission. He has been a wildlife officer, wildlife biologist and wildlife manager. Russell has also been an adjunct professor at **Volunteer State University** and **Cumberland University**. He will continue to teach at Cumberland University. He and his wife plan to travel around the western United States and Europe.

**Chuck Sutherland** (P.S.M. '16) recently got married! He also taught a geology course at Tennessee Tech in the fall of 2021 and continues to work as the director of informatics at the **Upper Cumberland Development District**.

**Faranak Mahmoudi** (Ph.D. '18) started a new position as a senior scientist at **Q2 Solutions**, a biotechnology company in Ithaca, New York. Faranak is developing methods in LC-MS/MS for the quantification of small organic molecules in biological matrixes such as human and animal tissue or blood.

**Roger Applegate** (Ph.D. '19) has retired from the Tennessee Wildlife Resources Agency and is now living in Bangor, Maine. He will continue to work in wildlife conservation and teach at local colleges and universities.

**Natalie Robbins** (P.S.M. '19) is still working at **Vanderbilt University**. She is currently involved in a project conducting a geophysical survey of civil war battle sites from the Battle of Nashville.



Featured is a photo of her summer work crew at the Shy's Hill battle site with the ground-penetrating radar. In April, Natalie was voted onto the board for the Tennessee Geographic Information Council (TNGIC).

**Brittany Burke** (P.S.M. '19) left her position at Wiser Imagery Services to pursue new opportunities. She has since joined the GIS team at **CTC Technology and Energy** as a geospatial analyst and team lead. With a fully remote position, she intends to travel around the United States to see all that it has to offer.

**Will Ponder** (B.S. '20) is currently a ski patroller at Massanutten in Virginia. He has accepted a position as a full-time mammalogist for the mid-Atlantic **NEON** domain based in Front Royal, Virginia. He primarily manages field crews carrying out small mammal sampling protocol, but also manages tick-borne and mosquito-borne pathogen sampling as well as ground beetle diversity surveys. Will received his red patrol jacket after the customary "graduation walk" where you climb one of the slopes with your skis on. Patrolling has taught him to work calmly in high-stress medical situations and fostered his personal development.





# SOES UPDATES

## Awards & Updates

**Hayden Mattingly**, a professor in the School of Environmental Studies, has been inducted into the **2020-2021 Wings Up 100!** The 2020-2021 Wings Up 100 roster is an elite group of 38 Tennessee Tech researchers who brought in at least \$100,000 in external funding for their research and activities during 2020-2021.

**Tennessee Tech** was one of three public universities in the state to be named a **College of Distinction**. Tech is being recognized by Colleges of Distinction for its dedication and commitment to providing engaged, hands-on education.

PhD student **Nick Masto** was awarded the **Spencer T. and Ann W. Olin Foundation Wetlands and Waterfowl Research Fellowship** by Ducks Unlimited Inc. and Ducks Unlimited Canada. Nick's research focuses on behavioral and landscape ecology of mallards across the non-breeding period. He uses GPS backpack-style transmitters which track their movement across the landscape in real time. His research will help refine regional conservation planning tools and help facilitate wetland restoration for habitat features most limited to waterfowl during their non-breeding period.



## Alumni Updates

**Annabelle Dempsey** (B.S. '21) is currently living in Cookeville, Tennessee. She started a new position as an environmental consultant with the **TDEC's Division of Water Resources** in the summer of 2021. Her job duties include reviewing source water and wellhead protection plans, performing geospatial analysis and educating the public on source water protection. She has been caving, hiking, doing various forms of photography and working on personal projects in her free time.



**Riley Roberts** (B.S. '21) is currently living in Kingston, Tennessee. He recently accepted an environmental geologist position at **Arcadis** in Knoxville, Tennessee. He says he looks forward to using the knowledge obtained through his course work at Tennessee Tech and applying it to his field.

**Fiona Hayward** (B.S. '21) was recently promoted from an intern in the city of Lebanon's stormwater department to **GIS tech I** in their GIS department. Fiona spends a lot of her time using Network Analyst to build more efficient routes for the city's public safety departments. When she is not working on routing, she works on higher-profile projects for the mayor and his department leads.

**Kitty Phillips** (B.S. '21) recently began a partnership with a farmer to raise beef cattle. Kitty and her family also sold their house, moved into an apartment and bought 40 acres in Hilham, Tennessee, to build a house on. Currently, they have 17 heads and expect to grow their herd to 40 over the next year! Kitty is currently working on her Ph.D. in environmental sciences-integrated research at Tennessee Tech.



# FACULTY INTERVIEW

Jeff Schaeffer  
Water Center Director



**Tell us a bit about yourself and your joint appointment in the School of Environmental Studies and The Water Center:**

I serve as director of the Tennessee Tech Water Center, and if you wanted to think of us as a water-focused research think tank, you would not be far off the mark. But, we also love science communication and outreach, so we strive to make learning connections with students. I have only been on campus for a little over two years but saw a chance to strengthen that connection via a faculty appointment with the School of Environmental Studies. I am very honored to have been offered a place with them. Water is interdisciplinary, and the school is very interdisciplinary, so it was a natural fit.

**What course do you teach at Tennessee Tech, and what does it entail?**

I am presently teaching a course in Water Sustainability that focuses on current wicked water problems and how and why they occur. We also look at potential solutions and what factors drive societal choices.

**What aspects of teaching this course do you enjoy most?**

There are two things! The first is that we have discussions in which students gain experience with critical thinking and self-expression. The other is that the assignments are activities you would carry out on the job. For example, we answer stakeholder letters, put together briefings for the branch chief, and give presentations on current events.

**Why is it important for our students to understand the issues presented in this course?**

Because water is the next oil.

**What projects are you currently working on at The Water Center?**

We currently administer over 30 faculty research grants that range from rare fish conservation to nanostructure of reverse osmosis membranes. If it is water-related and a priority for our federal and state management agencies, we work on the problem. The nice part is that at Tennessee Tech, you can always find someone with the right expertise on just about anything. I personally work on remote sensing, fish hatchery water quality and hope to begin a significant study of caves as climate refugia.

**What is a fun fact about yourself?**

A few years ago, I fell into a chance to travel to Botswana. It was a life-changing experience in that every plant and animal was new to me. You can bounce from the largest freshwater delta in the world, The Okavango, to the Kalahari Desert with no surface water. All in the space of a few miles. But it was also the people; I met folks with no formal education who could speak five or six languages. People band together to overcome crushing poverty in an extreme environment where everything bites, plants included. I now go back as often as I can and try to visit a new place each time.

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