

SOES

School Of Environmental Studies

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Newsletter

Message from the Director

Greetings and welcome to the Summer 2018 edition of the SOES Newsletter. Here in Southwest Hall we are currently surrounded by construction projects, including the new laboratory science project across the street which will be Tennessee Tech's first LEED-certified building. All of this construction reminds me of the good work that our students, faculty, staff, alumni, board members and others are doing to continue building quality educational experiences into our three academic programs. SOES graduates have a strong foundation from which to launch their environmental careers and we are happy to share some of their stories here. Special thanks to Natalie Robbins and Irene Mauk for their writing and design work on the newsletter. Please stay in touch and keep on "building"!



Hayden Mattingly

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BACHELOR OF SCIENCE

Environmental & Sustainability Studies

Capstone Experience



The scenery at **Tennessee Tech University's Appalachian Center for Craft** located near Center Hill Lake is picturesque, but Craft Center Director Debra Ruzinsky wanted to make the facility and its operations more environmentally friendly. She called on Steve Sharp in Tech's School of Environmental Studies for help.

"It was the perfect opportunity for our senior students to put together their skills as problem solvers and their knowledge of sustainability to come up with some potential solutions," Sharp said.

His senior environmental and sustainability studies students partnered with the Craft Center for their capstone project, developing solutions for outdoor lighting, recycling and composting, a new building boiler system and student shuttle transportation

alternatives.

"I was really impressed with their energy and ideas," Ruzinsky said. "It was a great meeting of the minds for them to turn their knowledge and ideas into proposals that could actually work for our campus."

For the students, it was a chance to work with a client and to think through the process of making spaces more sustainable in an in-depth way, going as far as finding funding for their proposed improvements.

The Craft Center already had a recycling program, but the students recommended updating and increasing the number of bins on the campus as well as adding a compost tumbler that could deal with food waste and provide fertile soil for the garden.

"We thought that would be a simple fix that could really go a long way in helping their sustainability," said student **Lindsay Mills**. "They were very receiving of our ideas and excited about what we shared."

To fund the new receptacles, the students helped the Craft Center develop a proposal to present to **Tech's Sustainable Campus Committee**, which manages student fees that go toward campus sustainability efforts.

Lighting on the campus was another area the students found solutions for, identifying LED solutions that would offer not only more light to campus areas in the evening but would also be more efficient.

Because the Craft Center shuttles students from Tech's main campus to its Smithville location, an alternatively powered bus was also an area where sustainability could have an impact. Currently, the Craft Center shuttle travels nearly 4,000 miles per month with students on board. Sharp's students found a prototyped electric option that could be available soon, as well as a compressed natural gas bus the Craft Center could convert to. The students also identified potential rural transit grants that could be considered to help with funding.

"The boiler on our campus, which plays a big role in the heating and cooling system, is about 30 years old, so the students took a look at that and had several conversations with our facilities crew here to talk through our needs as well," Ruzinsky said.

Not all of the options the students found can be implemented right away. Ruzinsky will be meeting with Tech's Sustainability Manager DeLayne Miller to work through the student proposals to see what can be done first. For the students it was a chance to see how their education could be applied in their next step, whether career or further education.

"I think for me, I would like to be out in the field. Researching and planning is part of it of course, but in a career, I really want to be part of putting plans like this in place and seeing the execution of ideas like this that impact sustainability," said student **Elias Vaden**. "It was really interdisciplinary, learning and working with different kinds of people."

Article modified from an original by Bailey Phonsnasinh.

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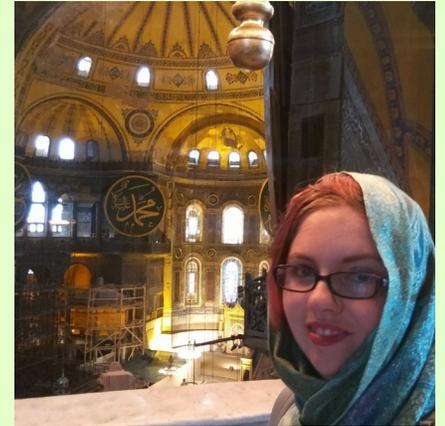
PROFESSIONAL SCIENCE MASTER'S

Concentration in Environmental Informatics

Czarinna Clay is entering the second semester of her master's degree program. She graduated from Tech in Summer 2017 with her B.S. in earth sciences with a focus in geology and B.S. in biology with a focus in botany. Last semester, she began working with Alfred Kalyanapu and Tania Datta in the civil and environmental engineering department and Water Center to develop a GIS tool for the **Tennessee Department of Transportation (TDOT)**. She is using ArcGIS to map vegetated median locations on interstates and highways. The goal of this project is to create and run a tool that can accurately map vegetated medians using free and accessible data in a way that is transferrable to multiple locations. In its current form, the tool employs raster



calculator, multiple layers of selection queries, and a refinement process, which converts the raster calculator product into filled polygons. The tool produces fairly accurate locations of vegetated medians using only a raster file and roads file. In the fall, she will be attending a conference with Alfred Kalyanapu to present her research. Also beginning in the fall, Czarinna will begin teaching labs for the earth sciences department as a part of her graduate assistantship under the Diversity Fellowship.



Tech Students Take Advantage of PSM Fast Track

Jessie Eglinton is a senior geoscience geographic information systems major. He began the Fast Track during the first semester of his junior year. The **Fast Track Program** allowed him to take courses at the graduate level to simultaneously satisfy undergraduate and graduate degree requirements. This opportunity allows him to graduate with his undergraduate degree on time, while also earning 6 of 33 required graduate credits. To go along with the Fast Track Program, he is currently taking advantage of the **Credit Banking Program**. This program allows



him to take one more master's-level course per semester during his senior year of undergraduate studies that only counts towards his P.S.M.-EI degree. Outside of school, Jessie has been married to his wife Olivia for two years and they have a year-old son named Asher. Jessie knew that he did not want to be in school for an extended period, while balancing work and family, so he found the Fast Track Program to be a good fit. He plans to eventually become a GIS manager of a mapping department, so the business and leadership skills he gains will work alongside his GIS knowledge to make him a more effective manager.

Joseph Bentley is a second-semester senior in wildlife and fisheries science. After taking Theory of GIS I in Spring 2018, he discovered his interest in spatial analysis. He enjoys learning about ecology and biology but throughout his time as a wildlife and fisheries science student, he realized he is stronger in other fields, such as technical work, analysis and problem solving. Joseph found that the P.S.M.-EI Fast Track was the perfect fit for him to incorporate his environmental and conservation interests with his more technical academic strengths. The amount of flexibility the P.S.M.-EI allows career-wise also made it a good fit for Joseph. He is excited to be getting a head start on his P.S.M.-EI, while finishing up his bachelor's degree.



DOCTOR OF PHILOSOPHY

Environmental Sciences

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

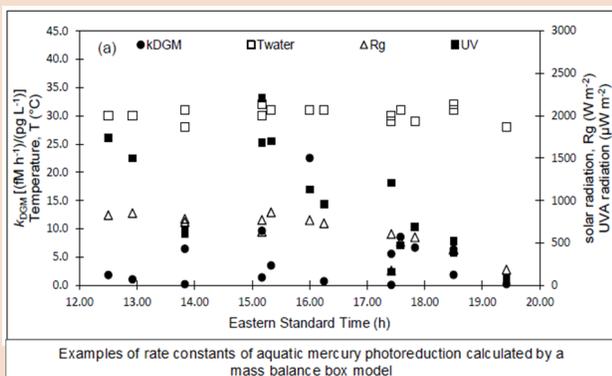


Lesta Kocher (right) pictured with Gina McCarthy (left), former Administrator of the USEPA, at the 13th ICMGP

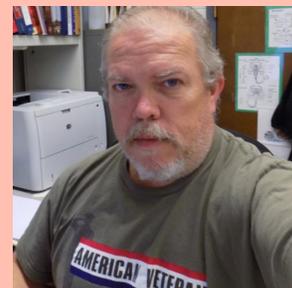
Lesta Kocher is an environmental sciences-chemistry student studying the oxidation-reduction (redox) photochemistry of mercury in aquatic systems. Mercury is a toxic heavy metal element with several oxidation states. Because mercury exists in different stable oxidation states, redox reactions are important to the element's chemistry and to the distribution of mercury in various environmental compartments of the Earth's surface. Lesta's research

combines field, lab, and modeling work to try and paint a true environmental picture of the photochemical redox cycle of aquatic mercury. She has developed a mathematical model to calculate the photochemical kinetics of aquatic mercury reduction using field data. She is currently attempting to identify various mercury redox pathways in aquatic media relevant to natural surface waters. Lesta is using cold vapor atomic fluorescence spectroscopy in the lab to monitor the production of reduced gaseous elemental mercury. She is also using spectrophotometric analysis of mercuric mercury with dithizone to follow the change of mercuric mercury concentrations in photochemical experiments. Lesta has presented her modeling research at both regional and national American Chemical Society meetings. She was a moderator at the 13th International Conference on Mercury as a Global Pollutant (ICMGP) in Providence, RI. She will also present her current research at the

14th ICMGP in Kraków, Poland. Lesta's advisor is Hong Zhang.



Bob Baggett is an environmental sciences-biology student studying two species of wolf spiders from Arizona, the Mexican Wolf spider (*Rabidosa santrita*) and *Pardosa valens*. His primary research focus is on movement patterns, microhabitat and ecological relationships between the two

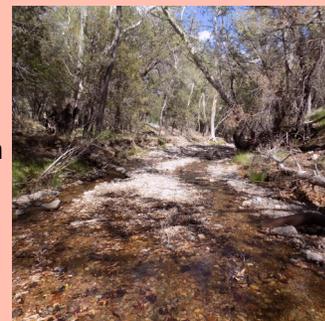


species. Both species are considered to be riparian spiders, as they are commonly found within 3 meters of streams. Bob's research involves desiccation trials, humidity and temperature preference trials, substrate preference and mark-resighting for movement studies. The mark-resight study was the most time-consuming of the research trials, as it involved marking between 75-150 spiders each season, releasing them back into their natural environment and then conducting daily checks to look for the marked spiders. This procedure provided data on the total distance moved, as well as the potential home range of the species.



Each check was conducted randomly one to two times a day, with some checks occurring at night, because *R. santrita* is primarily nocturnal. From his research, Bob will be looking at the possibility of these two spider species being bio-indicators of climate and weather change. This

area of Arizona experiences monsoon rains two months out of the year, which change the slow-flowing streams to whitewater rapids. Bob is investigating whether the spiders can sense when the rain is coming and move to safety beforehand. Bob's advisor is Chris Brown. (Ed. Note: As this issue of the newsletter was going to press, we received the sad news that Bob passed away on September 16, 2018.)



PARTNERSHIPS

SOES and the Community

SOES Celebrates Earth Day

Students and faculty celebrated Earth Day 2018 at two separate events around Cookeville. On the Tech campus, students from The Evergreen Society, SOC 3600 Environmental Sociology class and EVSS 6010 Environmental Social Policy class participated in Earth Day. Students from EVSS 6010 presented environmental policy analyses that they completed as a part of their final class paper. Their topics included the identification of policy holes in the implementation of the Endangered Species Act, Nashville's urban planning woes and environmental justice issues.

At the **Cookeville Higher Education Campus (CHEC)** Earth Day event, Earth Sciences faculty member **Peter Li**, SOES Director **Hayden Mattingly** and environmental sciences doctoral student **Cody Godwin** were among the musical performers.



250K Tree Day



The Evergreen Society and EVSS 6010 Environmental Social Policy class partnered with the **Rotary Club of Cookeville** to plant 300 trees around Cookeville on February 24, 2018. This effort was a part of the **Tennessee Environmental Council's 250K Tree Day**. A variety of saplings were planted, including pine, poplar and oak trees. The **Tennessee Environmental Council** estimates that 434 acres of new tree canopy will be gained across the state as the trees mature. The group planted trees on the TTU campus in Sherlock Park as well as at the Putnam County Sports Complex next to Cookeville High School.

Environmental & Sustainability Studies

ALUMNI UPDATES

Doug Wymer (Ph.D. '02) serves as the vice president of academic affairs at **Lake-Sumter State College** in Leesburg, Florida. From 2002-2012, he was the director of the environmental sciences program at **The University of West Alabama**. From 2013-2016, he served as the head of the Department of Biology and Environmental Sciences and later as dean of baccalaureate studies and academic support at **Pensacola State College**.



Clayton Morgan (B.S. '15) is working for a nonprofit called **National Ecological Observatory Network (NEON)** in their Oak Ridge, Tennessee, office. He spends his time traveling between Oak Ridge, the **Great Smoky Mountains National Park** and the **Mountain Lake Biological Station** in Virginia. He gathers data and observations on various species including plants, mosquitos and ground beetles.

Todd Kuiken (Ph.D. '07) is a senior research scholar at **North Carolina State University** in the Genetic Engineering and Society Center. He evaluates and designs new research and governance strategies to address the biosafety, biosecurity and environmental opportunities/risks associated with emerging genetic technologies. He is a member of the **United Nations Convention on Biological Diversity Ad-Hoc Technical Expert Group on Synthetic Biology**, a member of the human practices executive committee of the **International Genetically Engineered Machines Competition** and a founding member of its biosafety/biosecurity committee. He has gone on to provide expert testimony for a variety of agencies and has been featured on **NPR's Science Friday**.



Chuck Sutherland (P.S.M. '16) is still working at the **Upper Cumberland Development District**. He also works with the **Cumberland County Planning Committee** to create maps, aiding with discussions on regional planning. He works with the **Cumberland Trail Conference** as well, doing presentations about cave resources. Chuck is a founding member and board member of the **Friends of Virgin Falls 501(c)3** nonprofit organization. He continues to aid the **Upper Cumberland Tourism Association**, providing written articles and photographs, and provides analysis and data for his friends at **Tennessee Parks and Greenways Foundation** and **The Nature Conservancy Tennessee Chapter**.

Ian Jasitt (P.S.M. '16) has accepted a position as a laboratory technician I with the **Tennessee State Department of Health**, where he started working in August.

Johnathan Davis (Ph.D. '10) was recently promoted to associate professor of biology at **Young Harris College**. He was granted tenure and also serves as the program coordinator for the environmental science major.



Natalie (Knorp) Burger (Ph.D. '17) has been working in the **TDOT Mitigation Office** since July 2017. She received a promotion in June. In March 2018, she married her husband, Ryan, and they live in Nashville, Tennessee, with their husky, Riley, and their guinea pig, Star Lord.



Aeric Gunnels (B.S. '14) recently graduated with his master's in architecture from **Virginia Tech**. His thesis involved creating architecture that revealed natural phenomenon and responded to the natural climatic conditions of the site.

For the past three months, **Kate Moffitt** (B.S. '17) has been living in Barcelona, Spain, helping kids learn English. When she returns to the states, she will be starting a job with **R&D Services** in Cookeville, Tennessee.





Graduates & Internships

2017-2018 Graduates



Bachelor of Science

Briana Baines
Jacob Gentry
Molly Kamer-Hensley
Lindsay Mills
Johnathan Nixon
Gabrielle Pack
Emily Samples
James Scott
Jedidiah Scott
Shelby Thomas
Elias Vaden
Tully Watson
Levi Williams
Kristin Willis

Professional Science Master's

Samantha Allen
Ernesto Sanz

Doctor of Philosophy

Natalie Knorp
Kendall Moles
Lasantha Rathnayake

Alumni Updates

Amy Stafford (P.S.M. '17) is interning with **Oak Ridge National Laboratory** in the **Environmental Protection Services Division**. Her work consists of conducting spatial analyses of ORNL stream riparian zones and developing methods to quantify the key indicators of those riparian zones' overall health and level of impact. Amy also recently spent 11 days in Uganda with a local church group, distributing water filters through TiVa water, working with Wentz Medical Clinic to provide health services in Gaba, and doing community outreach with a school in Luwero and an orphanage in Gaba.

Zack Taylor (B.S. '17) is working at **Y-12** as a waste management specialist, where analytical chemistry and environmental standards (RCRA) play a large role in his job. He is recently engaged to his fiancé, Tori.

Emily Samples (B.S. '18) and **Elias Vaden** (B.S. '18) have received jobs through **Americorps** on the **American Conservation Experience (ACE)**. The job will last three months. They will be living in Asheville, North Carolina, in a community house with other workers. They will be assigned jobs and transported to various locations to backpack in and camp for days.

Undergraduate Internship

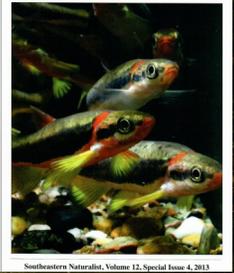
Mike Bolan interned with the **Tennessee Tech Water Center** running the total suspended solids (TSS) test. The other tests he performed included analyzing water samples for total and ortho phosphorus, ammonia and occasionally metals. He drove to various contracted companies within Cookeville to collect and test their storm and wastewater.



FACULTY INTERVIEW

Hayden Mattingly, Ph.D.
SOES Director

Ecology and Conservation of
the Threatened Blackside Dace,
Chrosomus cumberlandensis



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Can you tell us a little bit about your academic and professional background prior to coming to Tennessee Tech?

I received a bachelor's degree in biology with a minor in mathematics from Western Kentucky University, a master's degree in biological sciences from Old Dominion University, where I studied freshwater stream fish ecology in Trinidad, and a doctoral degree in fisheries and wildlife from University of Missouri, where I studied stream fish conservation in the Ozarks. During summers of my undergraduate years, I worked as a fisheries technician for Kentucky Department of Fish and Wildlife Resources. While completing my doctoral studies, I was employed as a full-time temporary faculty member at Southeast Missouri State University and Morehead State University for three years before accepting a tenure-track position in the Department of Biology at Tennessee Tech in 2001. So, Tennessee Tech is my third OVC school...hopefully I won't be moving around the conference in the future!

What research grants do you have ongoing at the moment?

We have several studies in progress right now, primarily focused on conservation of fish and crayfish in Tennessee. First, we are studying environmental DNA detection and habitat requirements of the pygmy madtom in the Clinch and Duck rivers. We are also conducting a survey of the Barrens darter and bluemask darter in the upper Caney Fork River watershed. We just received funding to conduct a life-history study of the Brawley's Fork crayfish in the Stones River watershed. Finally, we are starting a new project to characterize the aquatic resources at Arnold Air Force Base.

What advice do you have for students who are interested in getting involved in research, and do you have any opportunities available to students?

My advice would be to talk to your professors about what they're doing for research projects and volunteer to join their team if you are interested in one or more of their projects. We can even offer special topics or independent study credit for student research activities. I have been working regularly with undergraduates in my research projects and would welcome any new students who might enjoy studying freshwater streams.

Much of your work involves endangered species. Do you have any particular success stories on that front that you want to highlight?

The blackside dace is a small stream fish found in Kentucky, Tennessee and Virginia in headwater mountain streams. It is federally protected as a threatened species. Over a period of 6-8 years, we conducted quite a bit of research at Tennessee Tech on blackside dace and also collaborated with researchers in other agencies and universities to increase the knowledge base for the species. Then, we worked with *Southeastern Naturalist* to produce a special issue of their journal devoted to blackside dace ecology and conservation. The special issue contains a dozen articles on blackside dace that have helped resource managers make informed decisions in their efforts to protect and restore healthy populations of blackside dace and their stream habitats.

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