

SOES

School Of Environmental Studies

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Newsletter

Message from the Director

Welcome to the Summer 2019 edition of the SOES Newsletter! Hayden Mattingly (Ph.D.) received a non-instructional assignment for this year, so I am serving as acting director until May 2020. We're happy to welcome David Hajdik, professor, to the SOES. Be sure to read the interview with Mr. Hajdik on the last page of the newsletter. Capstone students worked with Chuck Sutherland (P.S.M. '16) and the Upper Cumberland Development District to study illegal dumping in the Upper Cumberland. P.S.M. students' projects took them from Puerto Rico and the U.S. Virgin Islands to Iceland, while Ph.D. students worked on research related to water quality and wildlife. We love to get updates from our alumni, so please make sure you share any new and exciting news with us. I want to thank Irene Mauk and Bailey Carter for putting the newsletter together.



Tammy Boles

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BACHELOR OF SCIENCE

Environmental & Sustainability Studies

Capstone Experience

The 2018-19 Environmental and Sustainability Studies capstone students completed their two-semester project regarding illegal dumpsites in the Upper Cumberland. As reported in the 2018-2019 winter newsletter, the students prepared recommendations to address the issue of illegal dumpsites. In April, the group presented their findings to a group of interested individuals, including staff and faculty from Tennessee Tech, as well as representatives from the **Upper Cumberland Development District (UCDD)**, **Tennessee Department of Environment and Conservation (TDEC)**, **Keep Putnam County Beautiful Clean Commission (Clean Commission)** and **McMinnville Breakfast Rotary**.

The capstone group offered recommendations based on successful practices for prevention of illegal dumping, including onsite practices at existing sites, such as posting



Spring 2019 Capstone Group Photo

From L to R: Jordan Durham, Connie Robbins, Logan Pack, Melody Culver, Alyson Chin, Madison Lester, Phillip Fox, Gage Patterson, Michael Bolan, Anna Webb

informative signage, creating physical barriers and installing cameras. The team also offered proposals regarding community education, training for law enforcement regarding litter laws and information provision for public officials regarding the adverse health and economic effects of illegal dumpsites, as well as information about available grants.

During the spring semester, the team collected data from existing dumpsites for inclusion in a GIS database. These data include such things as volume and type of trash present, topography, visibility and distance from solid waste



convenience centers. The final piece of the project included a site cleanup in White County facilitated by Shannon Reese of the Clean Commission and White County Executive Denny Wayne Robinson.

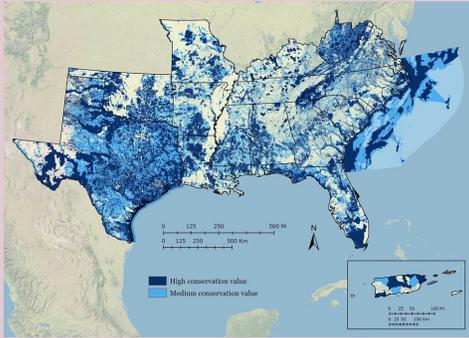
Students were encouraged to know that the project should continue to expand because of the enthusiasm generated at the presentation. In fact, data are still being collected on additional dumpsites for inclusion in the database created by the team.



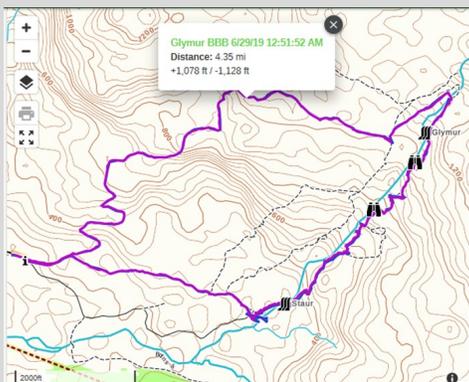
PROFESSIONAL SCIENCE MASTER'S

Concentration in Environmental Informatics

Daniel Adams is going into his last semester as a professional science master's student and is projected to graduate in December 2019. He received his B.S. in Geosciences with a focus on Geographic Information Systems (GIS). Daniel currently works for the **US Fish & Wildlife Service**, which is where many of his collaborative effort projects with Tennessee Tech have originated. Some of his favorite projects include a machine learning approach to identify freshwater habitat for species reintroduction and another favorite being an internal assessment of the usage of LiDAR data for hurricane response. One of his main responsibilities at work is the development and refinement of the **Southeast Conservation Adaptation Strategy Blueprint**. The blueprint is a product meant to help natural resource managers preserve our nation's wildlife by identifying key lands and waters to connect natural corridors over political boundaries. He has been working in depth on developing the latest version for the Caribbean (Puerto Rico and U.S. Virgin Islands). After wrapping up his P.S.M.- E.I. degree, Daniel plans to continue his civil service while also pursuing a doctoral degree at some point.



Brittany "Belle" Burke, is entering the last semester of her professional science master's degree program. She previously graduated from Tech in Spring 2017 with a B.S. in Wildlife and Fisheries Science. For her required internship course, Brittany sought out something bigger than what would have been provided to her via Tech. **Global Treks & Adventures LLC** provides students with the opportunity to gain experience in action research, in the field data collection and a publication writing process, all while studying abroad. For one week in June, Brittany traveled to the



Close up of Glymur Hike (2nd tallest waterfall in Iceland)

western region of Iceland to collect GIS data on various hiking trails in order to develop maps for an **Iceland Trail-Guide**. Since her return home, Brittany has been working toward developing basic vector reference maps, elevation profile graphs and interactive GIS story maps and web maps. In order to integrate her undergraduate degree, Brittany has also taken on the task of writing a narrative section of the common wildlife encountered in Iceland for the publication. She hopes to use both degrees to pursue a career in the environmental field.



DOCTOR OF PHILOSOPHY

Environmental Sciences

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

Chioma Ekechi is an Environmental Sciences-Chemistry Ph.D. student. Her research focuses on the detection and identification of microplastics in freshwater (Center Hill Lake and Pigeon Roost Creek), wastewater and biosolids via Fourier Transform-Infrared (FT-IR) Imaging. FT-IR Imaging enables the fingerprint vibration of the microplastic to be used for its identification and subsequent classification.



The ever-increasing demand for manufactured goods has led to increased use of synthetic, single-use polymers (plastics). Plastics degrade and lose their parent properties over time, metamorphosing into smaller fragments less than 5 mm in diameter referred to as microplastics. Microplastics can be transported from one place to another and are found across such different environmental compartments such as marine water, fresh water, wastewater and soil systems. Microplastics have also been known to accumulate in terrestrial and aquatic organisms, with the potential for bioaccumulation and biomagnification. They are also vectors for pollution, as chemicals have the tendency to adsorb onto microplastic particles.



Chioma intends to investigate, via Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS), for the potential of microplastics to act as vectors for the transport of

psycho-stimulants in the environment. This portion of the research entails investigating the adsorption of selected psycho-stimulants onto microplastic pellets and determining concentration via LC-MS. Chioma's advisor is Tammy Boles (Ph.D.'09).

The Tennessee Tech Biology Department has continually banded and studied resident Canada geese since 1998.

Richard Pirkle, a Senior Instructor in the Department of Biology and an Environmental Science-Biology Ph.D. student, joined Professor Dan Combs on the project in 2015. His research has two main branches.



First, Richard is utilizing Tennessee Tech's large, long-term database to analyze trends in hunting and the effect on social structure in a resident goose flock. Canada geese "mate for life" but recent increases in hunting pressure result in a large proportion of the population forming secondary pair bonds. The disruption in pair bonding may influence breeding patterns, and understanding the influence on hunting of resident Canada geese flocks is important for management of the goose populations. Richard is also interested in the effect of both short-term and long-term brooding stress and how this influences nest site selection. Canada geese often nest on small ponds but move their



broods to larger ponds to form brood aggregates for protection from predators. Other geese will nest on large ponds with multiple other pairs of geese while brooding on the same pond. Previous research by former graduate students at Tennessee Tech has shown that socially dominate birds choose to avoid nesting with other geese despite

the risk in moving a young brood and the lack of protection afforded by brooding with other individuals. Richard plans to use corticosterone levels in goose fecal material to estimate short-term stress and white blood cell counts and ratios to understand long-term stresses.

PARTNERSHIPS:

Earth Day, PSM Certificates and Awards & Recognition

CHEC Earth Day Celebration



On April 27, 2019, the **Cookeville Higher Education Campus (CHEC)** celebrated their Second Annual Earth Day Celebration. Tennessee Tech's SOES partnered with VolState Community College for this event; for example Tennessee Tech's Hayden Mattingly (Ph.D.) coordinated the bands that played for the event. This was a free event for the public that featured, a green market, artists, live music, local



national theme was, "**Protect Our Species,**" and the local event focused on Upper Cumberland species; Gray Bat (*Myotis grisescens*), Rock Gnome Lichen (*Gymnoderma lineare*) and the Cumberland Darter (*Etheostoma susanae*).



PSM Certificates

The **Tennessee Higher Education Commission** recently approved the PSM Environmental Informatics program to offer two certificate track options. This allows students the option between Managerial Environmental Informatics and Technical Environmental Informatics. The certificate program will begin Fall 2019 semester.



Awards & Recognition

We would like to congratulate environmental and sustainable studies faculty member **Tammy Boles (Ph.D.'09)** on being featured on C&EN for her opioid research. We would also like to congratulate her on earning tenure and a promotion!

Check out the article at: <https://cen.acs.org/environment/water/opioids-down-drain-scientists-tracking/97/i16>



Left: The lab Tammy Boles and her team used to monitor opioids in wastewater

ALUMNI UPDATES

The School of Environmental Studies



Keith Gibbs (Ph.D. '13) recently accepted a tenure-track position at **Western Carolina University** in the Department of Geosciences & Natural Resources. He will begin teaching in the fall with emphasis on water resource management and conservation. His research will focus on aquatic resources in the Appalachian Mountains.

Chuck Sutherland (P.S.M. '16), the **Upper Cumberland Development District's director of informatics**, had a recent journal publication titled "Perceptual basemaps reloaded: the role basemaps play in eliciting perceptions." He has also given multiple presentations in the Upper Cumberland area and prepared a guidebook for the **National Speleological Society (NSS)** convention that was hosted in Cookeville, Tennessee, in June 2019.



Samantha Allen (P.S.M. '18) is currently pursuing her Ph.D. in the Environmental Sciences, Integrated Research program. She lives in Cookeville, Tennessee, with her husband, Daniel, and their 2-year-old son, Tucker. Their second son Jack was born in July of this year. Her doctoral research is with the **Arnold Air Force Base** in Tullahoma, Tennessee, and focuses on stream water quality, land use and aquatic species distributions. In her free time, Samantha enjoys photography, spending time outdoors with her family and getting involved with their church and community in Cookeville.



Kristin Willis (B.S. '18) recently started working at **Cummins Falls State Park** as a seasonal interpretive ranger. She is enjoying her time there learning about the history of the park, the safety precautions they take to keep everyone safe, the honeybee hives and the interpretive programs they offer at the park.



Kevin Turner (Ph.D. '17) recently accepted a position with **The City of Nashville** as an Environmental Compliance Officer 1.

Amy Stafford (P.S.M. '17) started a job at **Idaho National Laboratory** as an environmental compliance management professional in the National Environmental Policy Act (NEPA) group. She also traveled to Zimbabwe with her church to develop partnerships with various Zimbabwean organizations and groups. They did work in youth and professional development as well as teach sustainable agriculture methods to local farmers.

Roger Applegate (Ph.D. '19) is continuing his work as a research leader with **Tennessee Wildlife Resources Agency (TWRA)**. He focuses on game bird and mammal ecology, human dimensions of wildlife and wildlife health. His current projects include conducting a human dimensions survey of deer hunters in the West Tennessee chronic wasting disease zone and is writing chapters for two books. In the future, he hopes to obtain a faculty position teaching wildlife ecology, wildlife health and wildlife physiology.

Graduates & Alumni Updates

2018-2019 Graduates



Bachelor of Science

Mike Bolan
Alyson Chin
Micah Conaster
Alyssa Dalton
Michaila Evans
Noah Kaye
Currie Nowell
Gage Patterson
Connie Robbins
Savannah Shanklin
Hannah Thompson
Anna Webb

Professional Science Master's

Taylor Hauser
Javion Lee
Natalie Robbins
Jake Usher

Doctor of Philosophy

Roger Applegate
John Johansen
Faranak Mahmoudi
Uttam Sharma Phuyal
Grady Wells

Continuation of Alumni Updates



Natalie Robbins (P.S.M. '19) is working as an Advanced Short-Term Research Opportunity (ASTRO) intern at **Oak Ridge National Laboratory**. She is working on projects in the environmental and facilities divisions.

Javion Lee (P.S.M. '19) is working as an **environmental scientist**. He does technical writing as a Phase 1 Environmental Site Assessment writer as well as site visitor for the same assessment. Javion also conducts architecture & engineering reconnaissance and migratory bird evaluations.



Anna Webb (B.S. '19) moved to Pullman, Washington, to pursue her master's in entomology at **Washington State University**. Her program is two years long, and her thesis will determine if increased levels of CO₂ can aid as a Varroa mite deterrent on honeybees.



FACULTY INTERVIEW

David Hajdik, M.S.
Professor
Faculty Head, Men's Living & Learning Village



Tell us a bit about your educational and professional journey that led you to Tennessee Tech University.

I received a bachelor's degree in Geography from the other UT (University of Texas at Austin). My first master's degree was from Colorado State University in Natural Resources/Recreation Management, which today is called Human Dimensions of Natural Resources Management. My second master's degree is from UT (University of Tennessee) in Library and Information Science. Currently, I am finishing coursework in a Ph.D. program within Leadership & Organizations from Johnson University in Knoxville. My work experience is primarily in outdoor leadership and public lands positions. I have worked for city parks and recreation departments, the other UT, and a private company as an environmental educator and outdoor recreation instructor (backpacking, river running, rock climbing and skiing). I worked three years for Winter Park Ski Area in Colorado as a year-round employee in various roles, but primarily I got to ski in the winters and hike in the summers at 10,000 feet above sea level! I worked for 24 years with the National Park Service as a U.S. Park Ranger working with people and wildlife in places like Rocky Mountain, Yellowstone, Yosemite and Death Valley National Parks and the Natchez Trace Parkway here in Tennessee. I came to Tech in 2007 as a tenure-track faculty member in the Volpe Library. My hobbies include hiking, kayaking, running and skiing with my family.

What courses do you teach?

National Parks and Protected Public Lands, and Human Dimensions of Natural Resource Management. I have also taught Introduction to Law Enforcement for the Criminal Justice concentration in the Sociology & Political Sciences Department.

What two courses did you develop and what do they entail?

The National Parks and Protected Lands class involves an overview of conservation efforts for public and private lands primarily in the United States. The national park idea and wilderness areas as managed entities were conceived here in the United States. In the course we also look at state parks, wildlife refuges, natural areas, indigenous lands and private conservation efforts. The Human Dimensions course looks at the many disciplines and perspectives that make up managing public lands especially from a human standpoint. Mitigating impacts of humans on public lands is not only a scientific management challenge, but a people management challenge. Some of these perspectives are recreational, social, economic, legal, environmental and recreational.

Can you inform us on your duties as a faculty head of a learning village and what village you are involved with?

Starting in 2013, I took on the role as faculty head for the Men's Living & Learning Village or community set in Browning-Evins Halls. Our logo is The CAVE which stands for community, academics, veracity and excellence. The Faculty Head oversees academic and community programs that promote student success: retention, classroom performance and graduation. Along with other faculty heads, I developed a process within Tech Connect to enable faculty heads to monitor residents' academic success and to attempt to intervene when they are not attaining benchmarks and are identified as at risk academically.

Tell us about your transition into the School of Environmental Studies?

Wow, it has happened so quickly that I don't know what to say, except I am excited with the opportunities and new challenges this transfer offers. One of my passions throughout my life has been with the outdoor environment and conservation and environmental matters, especially with our national parks and with our Tennessee state parks and natural areas.

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