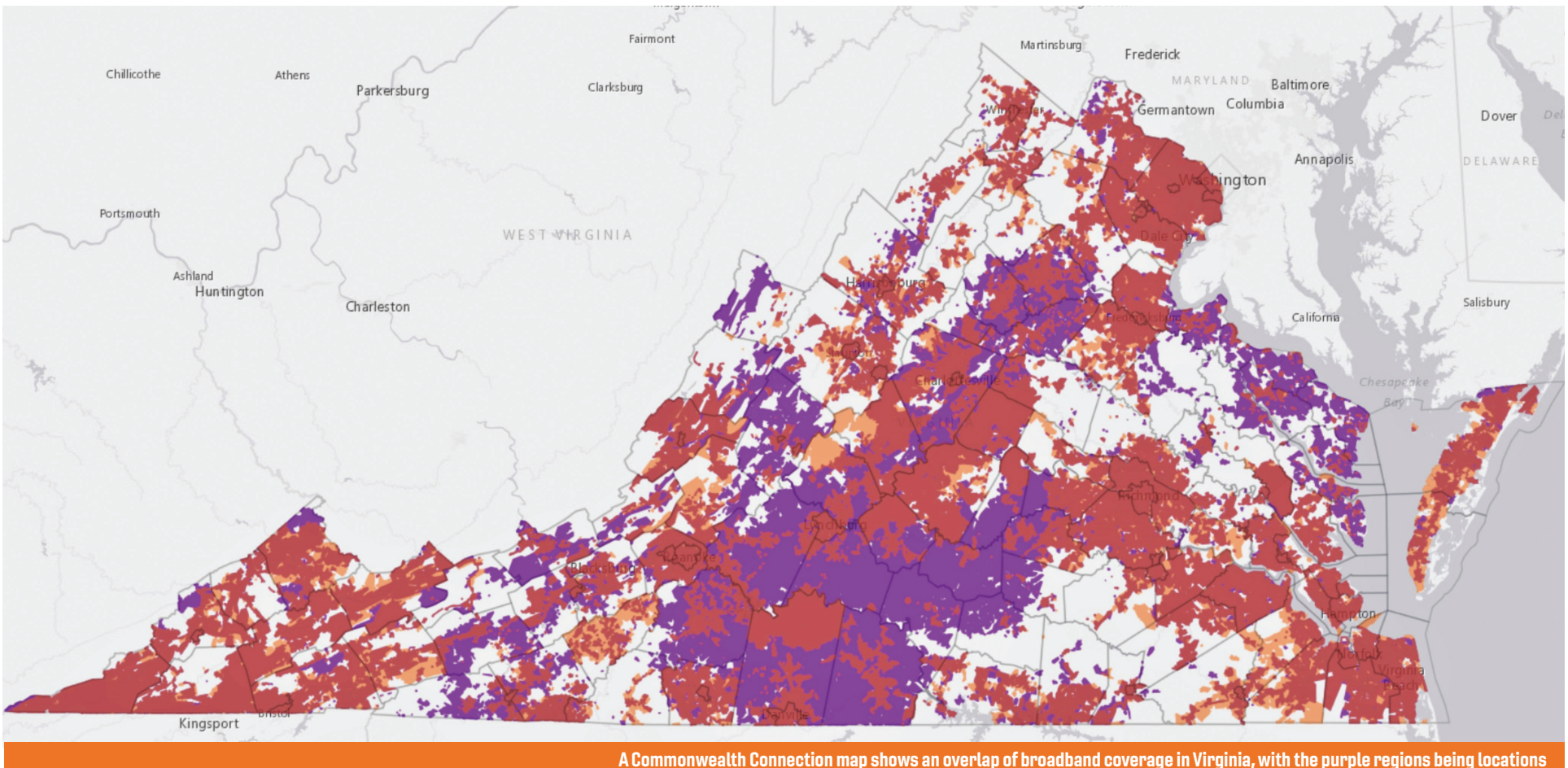
CNRE NEWS Fall 2023

COLLEGE OF NATURAL RESOURCES AND ENVIRONMENT
VIRGINIA TECH



A Commonwealth Connection map shows an overlap of broadband coverage in Virginia, with the purple regions being locations where the Center for Geospatial Information Technology challenged FCC reportage of broadband access.

CNRE efforts bring an estimated $250 million in additional funding to improve broadband access in Virginia

The call, as it usually does, came at the worst possible time.

"The Virginia Department of Housing and Community Development contacted us on Jan. 4th, asking for our help," said Brandon Herndon, director of the Center for Geospatial Information Technology (CGIT) "They wanted to use our map of broadband coverage throughout Virginia to challenge a national map that was being used to distribute $42 billion dollars of federal funds for broadband improvements."

Their timeline? Ten days.

Shaking off the cobwebs from an abbreviated holiday break, Herndon's team of research faculty went to work comparing its map of broadband access in the state — the Commonwealth Connection — to the national broadband map utilized by the Federal Communications Commission (FCC).

Six months later, the results of CGIT's efforts came in: $1.4 billion in federal allocations to enhance broadband throughout the commonwealth, with representatives from the Virginia Department of Housing and Community Development estimating that CGIT's challenge garnered approximately $250 million in additional funding.

IMPROVEMENTS IN BROADBAND INFRASTRUCTURE

The COVID pandemic put a national spotlight on the importance of broadband for working, going to school, and receiving health care and other services. The pandemic also revealed the gaps faced by many individuals and communities in accessing the high-speed internet that many Americans take for granted.

To enhance and improve broadband access in the country, the U.S. Senate committed $42 billion to the Broadband Equity, Access, and Deployment (BEAD) Program in 2021.

To determine which regions in the U.S. were underserved, the FCC utilized the Broadband Serviceable Location Fabric, a nationwide map of locations where fixed broadband service is — or could be — installed.

The CGIT team, situated in the Department of Geography, took a different approach to measuring broadband access in Virginia. Utilizing some 3.8 million specific address points, the CGIT team produced a consumer-accessible map that provides a granular depiction of broadband access.

"Although internet service providers were required to submit location-level coverage data, the FCC reporting deadlines resulted in many of them submitting simple coverage information based on census block reporting," Herndon said. "This resulted in many locations showing as 'served' for broadband which were still lacking in coverage."

These efforts align with the center's mission to utilize geospatial science technologies to improve the quality of life, environment, and community through strategic partnerships with stakeholders and communities in the state.

"CGIT has been a leader in delivering geospatial expertise for many years at Virginia Tech," said Professor Tom Crawford, chair of the Department of Geography. "Their work to identify and rectify gaps in broadband coverage in rural communities exemplifies our commitment to improving the economy and human well-being throughout Virginia."

ALIGNING ONE MAP TO ANOTHER

With the FCC announcing the allocation of BEAD funds in early January, Herndon's team had to figure out how to align CGIT's map of broadband access in Virginia with the map that the FCC was utilizing. That alignment would allow the researchers to identify regions and locations to "challenge" on the FCC coverage map.

"What we had to do was connect all of the address points — 3.8 million address points — to the parcels identified by the FCC model," said Herndon. "We were able to map each point and align them to a parcel where broadband service was located. We did the same thing with our addresses, and that gave us an apples-to-apples comparison of the two approaches."

The CGIT team ended up challenging 180,000 parcel points, with the FCC conceding approximately 80,000 underserved locations. Those challenges resulted in a final allocation of $1.4 billion dollars of BEAD funding to Virginia.

Virginia Department of Housing and Community Development Director Tamarah Holmes said the contributions of CGIT were integral in increasing allocation dollars to the state.

Brandon Herndon (at far right) was on hand to accept CGIT's 2023 Governor's Commonwealth Technology Award at the Commonwealth of Virginia Innovative Technology Symposium in September.

"CGIT's analysis of statewide broadband coverage gave us critical information we needed to more effectively challenge the national broadband map to accurately reflect unserved areas in Virginia and increase federal funding coming to the commonwealth," said Holmes. "It's impossible to pinpoint an exact number, but we estimate this partnership with CGIT led to an additional $250 million in funding to improve broadband access in the state."

For the CGIT team, the task of working toward a better, more accurate map of broadband access in Virginia isn't over.

"While the money has been allocated, there are still problems in the current FCC coverage map," said Herndon. "Right now, we're in the midst of coding, designing, and setting up a challenge portal that will allow nonprofits, internet service providers, local governments, and jurisdictions the chance to challenge remaining inaccuracies within the FCC coverage map. This is one last chance to make sure the places that need these funds to improve broadband will be able to access them."

Once the challenge portal is created, the group will shift its focus toward enhancing the maps utilized by the FCC, so that national maps in the future will more accurately depict underserved areas of broadband access throughout the country.

From the dean's perspective

Research is built upon the thrill of discovery, the joy of curiosity, and the need to address a problem or an issue. It begins with a well thought out proposal and results in a thorough and defensible body of work. Research is demanding of talent, time, and resources but stands as a major tenant of a leading land-grant university like Virginia Tech and, hence, the college. In this issue, you will read about some remarkable researchers and the exciting work that is taking them around the globe.

Faculty in the Department of Fish and Wildlife Conservation are making exceptional contributions and impacts through their ongoing research programs. For the last fiscal year, departmental research expenditures approached the $9 million mark (as measured and reported to the National Science Foundation). This level of external research funding is an impressive achievement at the university and leads our academic units in the college.

Across all departments and centers in the college, the portfolio of funding agencies has continued to evolve and diversify, reflecting the broader interests and importance of our work. The emergence of the global One Health movement exemplifies the interconnections between people, animals, plants, and their shared environments, bringing additional focus and significance to our research efforts.

Sponsored research earned through the work of our faculty supports the majority of graduate students in the college. Successful research proposals typically include funding for graduate student tuition and stipends, laboratory or fieldwork support, paid undergraduate positions, supplies and equipment, and travel. They lead to presentations at professional meetings and scholarly publications in high-impact journals for both faculty and graduate students.

Dean Paul Winistorfer (at center) visited with alumni Zak Miller '04 (at left) and Shawna Miller '04 at the Domaine Carneros winery in Napa, California. The Millers are proprietors of Earthshine Wines, a boutique winery.

Forestry alumni Bob Warring '81 (at center) and Tom Snoddy '00 (at right) connected with Dean Paul Winistorfer at the Kennedy Tree Farm in Buckingham County, Virginia. Kennedy family members are long-time friends and supporters of the college.

Thank you to our faculty, who must often balance research, teaching, and outreach responsibilities, while also contributing to service activities of the department, college, university, and professional organizations.

Also making an impact are CNRE alumni, and I had the wonderful opportunity to get out this fall to visit with alumni across the U.S. Seeing a working forest at the Kennedy Tree Farm in Virginia and learning about making wine with alumni vintners in Napa, California, made me appreciate the work of our college more than I might in a typical day in the office. Managing, stewarding, and sustaining our natural resources for the benefit of all is a high calling and a rewarding career.

Whether you are new on the job or a seasoned CEO, we'd like to hear from you. Your experiences and stories help us gain insight into recruiting the next generation of natural resources professionals, stay current with our evolving disciplines and the needs of employers, frame research questions, and create Extension programming. Contact us and tell us what you do; it will help us be better and create the future of the college.

Warm regards from our faculty, staff, and students.

Paul Winistorfer
Dean

CNRE alumni Ethan Crockett '08 (top photo, at center) of Bartlett Tree Experts and Lauren Stull '05, M.S. '07, M.P.A. '07 (bottom photo, at left of table) of the U.S. Forest Service talk with current Hokies at the fall CNRE Career Fair. More than 350 students and 56 unique employers were on campus for the annual event.

The Welcome Back Bash has become a much-loved tradition and the college's official "welcome back" party and kick off for the fall semester. All students, faculty, and staff are invited, and alumni and friends of the college are always welcome, too!

CNRE NEWS | Fall 2023
COLLEGE OF NATURAL RESOURCES AND ENVIRONMENT
cnre.vt.edu

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Wildlife
through the lens

Wildlife conservation major Sydney Haney on location in a bog in the Conecuh National Forest in Alabama.

A simple favor changed Sydney Haney's life: at Elkton Middle School, she was allowed to borrow a camera from teacher Dave McCartney. The result was the discovery of two passions: photography and wildlife.

"I fell in love with photography," said Haney, a senior majoring in wildlife conservation. "I explored wildlife and nature through the lens. Having those pictures helped me learn more about the species that were around me and their ecosystems. At the same time, having a greater interest has made me seek out places to take pictures."

After graduation, Haney hopes to keep working with both of her loves: wildlife and cameras. She shared two of her favorite images with us, and you can see more of her work at sydneyhaneyphotography.godaddysites.com.

One of Haney's favorite photographs: sunrise at Reddish Knob, overlooking Augusta County and Rockingham County, where she grew up.

A northern pygmy salamander Haney snapped while "herping" during her Wildlife Field Techniques class.

A HOKIE PACKAGING MAJOR FACES REALITY...TELEVISION

The world of reality competition shows has a new participant: a program with designers aiming to use sustainable materials in the packaging industry.

Zachary Weston, a senior packaging systems and design major, recently appeared on the YouTube show, "Pack It! The Packaging Recycling Design Challenge." The show challenges two contestants to design and create eco-friendly solutions to real-world packaging problems.

Weston and a fellow contestant were tasked by show host Cassie Stephens to design and create packaging for a produce subscription box. Raspberries, cucumbers, lettuce, cilantro, dragon fruit, and even a pointy pineapple had to be preserved — and protected through a drop test — in an attractive and user-friendly package.

Weston, a student in the Department of Sustainable Biomaterials, talked about his experiences on camera, the importance of remembering ventilation for produce, and what motivates him to make a difference.

What were some of the highlights of your experience?
The crew was great. They made it very easy and comfortable for us to do our work. It was a funny experience doing package design with a hair and makeup team on standby. I'd be in the middle of doing something and they'd say "stop" and adjust my hair, brush my face, or straighten my clothes. They were constantly working to make sure we looked good in every shot.

What do you wish you had done differently?
I wish I had put vent holes in my box. Emma made the same mistake, and we both realized it after we were finished. It's one of the first things you learn in packaging, but somehow it slipped both our minds.

I guess that I was so shocked running into a produce box — on a film set, nonetheless — that ventilation completely slipped my mind.

What motivates you as a packaging major?
When I design, I want to create things that have an impact, that make the world a better place, and packaging lets me do that.

Companies are hiring people who can innovate, who can think harder about the challenges of nonrecyclable single-use plastic and come up with clever designs to limit plastics going into landfills. With packaging, I can create beautiful designs while helping the environment. **Read the full story at cnre.vt.edu/fall2023mag.**

Host Cassie Stephens (at left) talks with senior Zachary Weston on the set of "Pack It!"

Photo courtesy of The Paper and Packaging Board.

Have skills, will travel

Summer internships challenge and reward students seeking real-world experience and adventure

There's no better way to see if a job is the right fit and get the attention of a future employer than an internship. These transformational opportunities offer students the chance to gain valuable work experience while applying what they've learned in classes and labs. This past summer, CNRE Hokies were heading into the woods, out on the water, and into the digital space, doing everything from assessing threatened species to analyzing data to cruising timber.

Ethan Elder, WestRock, Covington, Virginia

Desraeli McBride, American Oystercatcher Project, Eastern Shore of Virginia

Akye Johnson, NASA's Langley Research Center, Hampton, Virginia

Lily Casteen, U.S. Fish and Wildlife Service, Utqiagvik, Alaska

Brandy Ayesu-Danso, Esri, Charlotte, North Carolina

Freddie Kauffman, Chincoteague National Wildlife Refuge, Chincoteague, Virginia

A landmark achievement:
FISH AND WILDLIFE CONSERVATION NEARS $9 MILLION IN EXTERNALLY SPONSORED RESEARCH EXPENDITURES

A rise in external research investments has seen the Department of Fish and Wildlife Conservation total nearly $9 million in annual externally sponsored research expenditures over the 2022-2023 academic year. This success has helped expand the department's strong and diverse research portfolio, which has broad impacts on both Virginia and the world.

The department has received grants from prestigious organizations such as the National Science Foundation (NSF), National Institutes of Health (NIH), and National Aeronautics and Space Administration, all of which are serving to elevate the reputation and impact of faculty at the university and beyond.

"As a land-grant university with a global reach, our aim is to have our faculty and students at the forefront of collaborations on challenges facing both the commonwealth and the world," said Joel Snodgrass, professor and head of the department. "We have a call to bring our expertise to the challenges of biodiversity conservation, while also forging collaborations that will return benefits to the state of Virginia."

Collaborations with other departments, colleges, centers, and institutes have been a critical part of building the department's research portfolio. Partnered research with the Fralin Life Sciences Institute; the Center for Coastal Studies; the Global Change Center; the Center for Emerging, Zoonotic, and Arthropod-Borne Pathogens; and the Invasive Species Working Group has been a key driver of grant funding. The Conservation Management Institute has also played an important role in strengthening collaborations between Virginia Tech and local, state, and federal agencies.

Along the way, external fellowships have enhanced the graduate student experience in the department. Jonathan Low, Hailey Conrad, and Thomas Bustamante were recognized with NSF awards, while Mikayla Call and Mariana Castaneda-Guzman each received Virginia Sea Grant Graduate Fellowships.

The impacts of the department's commitment to conservation research and some recent high-profile grant awards can be found throughout this newsmagazine:

- Our center feature story highlights Marcella Kelly and Brett Jesmer's work searching for big cats and deer in the jungles of Belize.
- On the back page, we detail Luis Escobar's NIH-funded award to explore the risks that vampire bats pose in rabies spillover, as well as Ashley Dayer's NSF-funded project to explore how to increase access and inclusivity in ornithology.
- Inside the issue, William Hopkins' research is revealing the unusual parenting habits of hellbenders in Virginia streams. Francesco Ferretti is using big data to understand how protected marine areas are helping shark populations, and Holly Kindsvater is seeking to better understand how summer flounder are adapting to a changing environment.

Professor Emmanuel Frimpong (second from left) coordinated an NSF-funded research project to gain a better understanding of the bluehead chub.

These stories and others to come reflect the department's enduring commitment to pursuing research that explores the conservation of aquatic and terrestrial ecosystems at a global scale, while also serving the citizens and protecting the natural spaces of Virginia.

MEET THE NEXT GENERATION of wildlife conservationists

KAITLYN THEBERGE

For graduate student Kaitlyn Theberge, understanding the impacts that fisheries management decisions have on lobsters starts with a deep dive into statistical modeling.

"For my master's thesis, I ran a series of models to simulate how two lobster species — the American lobster and the European lobster — respond to different fisheries management decisions," said Theberge. "I compared how two types of protections for egg-bearing females affect factors that may be important for reproductive success in each species."

To further her research, Theberge received the 2023 John A. Knauss Marine Policy Fellowship, awarded by the National Oceanic and Atmospheric Administration's Sea Grant Office.

"This research comes at an interesting time for both species," said Theberge, who shared her research at the International Conference and Workshop on Lobster Biology and Management in Fremantle, Australia, this year. "My hope is that research results can help decision makers consider some of the impacts of management choices to inform future discussions."

TRUMAN COLLINS

Undergraduate student Truman Collins has been using camera trap data to understand the distribution of margays, an arboreal wildcat that lives in Central and South America.

(Left to right) Kaitlyn Theberge with research collaborators Tonje Sordalen, Kim Halvorsen, and Assistant Professor Holly Kindsvater.

Truman Collins received a CNRE research fellowship to travel to Belize.

"I'm looking through data from Professor Marcella Kelly's camera trapping project in Belize, which focuses on the abundance and distribution of cat species in Central America," Collins explained. "My project is looking at the distribution of margays to try and determine patch occupancy, densities, and preferred habitat types."

Collins received an undergraduate research fellowship from CNRE to travel to Belize and experience the tropical forest environment firsthand.

"Due to the elusive nature of these cats, there has been very limited research done on them, and their population needs a reassessment that considers the loss of habitat in their home ranges," said Collins. "This fellowship has allowed me to pursue research that I am truly passionate about."

Big teeth, bigger data

Assistant Professor Francesco Ferretti (at right) and Brendan Shea retrieve a drop camera used to film sharks and other fish underwater.

CNRE researchers are assessing the efficacy of shark sanctuaries by developing a modeling system that utilizes publicly accessible fishing data to determine shark catch and mortality rates. Their findings represent an important step in utilizing data science to tackle oceanic conservation challenges.

"Shark sanctuaries are coastal areas designated by countries as places where the targeted fishing of sharks is prohibited," said Brendan Shea, a Ph.D. student in the Department of Fish and Wildlife Conservation. "My initial ambition was to use publicly available data to look at these sanctuaries from a high-level perspective, understanding how much fishing is occurring in these areas and what the potential risks are to sharks."

That goal led Shea to collaborate with Assistant Professor Francesco Ferretti. To estimate catch and mortality rates for oceanic shark species, the pair utilized positioning data of fishing vessels from Global Fishing Watch, an open-access website that provides a global view of commercial fishing activities around the world to advance ocean governance. The group also collected publicly available data from regional fisheries management organizations to create a model that would estimate the impacts of longline fishing on seven species of open-ocean sharks.

Silky sharks are one of the species considered in a recent study that uses geospatial analysis to better assess ocean conservation strategies. Photo courtesy of Simon J. Pierce.

"This is an illustration of how we're transitioning from fisheries science to fisheries data science," said Ferretti. "In the age of big data, we've demonstrated that we can do applied conservation and management research, and it is work that is applicable to many other aspects of fisheries management at large and even global scales." **Read the full story at cnre.vt.edu/fall2023mag.**

WHERE IN THE WORLD?

What you're seeing is part of largest living structure on earth, so big that it can been seen by astronauts orbiting in the International Space Station. Do you know where this photo was taken? The Great Barrier Reef, off the coast of Australia! Sustainable biomaterials student Skye Weichbordt helped collect health data on the reef as part of the Hokies Abroad Australia-Tasmania and Queensland trip. Travelers learned about sustainability and ecological restoration strategies while participating in hands-on service learning projects and field activities on the tropical Queensland coast and the temperate island of Tasmania.

Hope takes root IN UGANDA

A Fulbright grant will extend Sarah Juster's research on how agroforestry and tree-based interventions can help refugees in Africa.

In front of a mud brick house, a woman started a fire using wood harvested from a grove of nearby acacia and river bushwillow trees. When the fire was hot enough, she set a pot over the center to boil water for beans, a vital food source that will take hours to cook.

This daily ritual — enacted by many of the 1.5 million refugees displaced in Uganda — raises critical questions about how countries, communities, and humanitarian actors can efficiently and effectively provide safety and food for refugees fleeing conflict, while also maintaining and utilizing the environments and ecosystems where they reside.

To tackle these questions, Sarah Juster, a doctoral student in the Department of Forest Resources and Environmental Conservation, has been researching how agroforestry — the integration of trees and shrubs into crop and animal farming systems to enhance environmental and economic outputs — can be successfully utilized to improve the day-to-day experiences of refugees living in the Imvepi Refugee Settlement in northern Uganda.

"The refugee situation in Uganda is unique because they've established open settlements," said Juster. "People in the U.S. are surprised to see these because there is a perception that refugees typically live in tightly packed, urban camps. In this case, refugees are given small plots of land to build homes and grow food while they are in the settlement."

To further her research of agroforestry strategies, processes, and outcomes, Juster came to Virginia Tech to collaborate with Professor and Extension Specialist John Munsell, an expert in using agroforestry techniques to tackle natural resources challenges.

"Sarah's research focuses on how and why agroforestry improves human welfare, environmental health, and regional security in regions of mass displacement," said Munsell. "Her work combines site-based planting and canopy assessment and planning parameters with humanist research focused on priority setting for households, as well as how refugee-focused organizations can better achieve their goals."

Sarah Juster (at right) and a resident of the Imvepi Refugee Settlement engage with a photo-based tool to assess the experiences of people living in the settlement.

Juster and Munsell are also developing a photo-based data collection tool, asking participants to rank photographs as a means toward understanding their subjective experiences. Juster also aims to research the dynamics of where refugees in the settlement go when they forage for firewood.

"It's my favorite part of my research," Juster said. "I took a few walks with refugees this summer and it was fascinating to see the forests through their eyes. In particular, there was a whole ethnobotanical side of their experience, where they are collecting different plants for medicine or food and bringing them back to their homes."

Juster — a recipient of a CNRE graduate travel grant this year — will be presenting her research to the 5th International Congress on Planted Forests in Nairobi this November. Her Fulbright grant will fund her research in Uganda from March through November 2024. **Read the full story at cnre.vt.edu/fall2023mag.**

A new geospatial intelligence certificate is being offered to Virginia Tech students

Students are now eligible to receive the U.S. Geospatial Intelligence Foundation's Geospatial Intelligence Certificate (USGIF GEOINT). This program, situated in the Department of Geography, will provide students with training on how to utilize geospatial technology to tackle environmental, security, and natural resource management challenges.

Collegiate Assistant Professor Santosh Rijal of the Department of Geography will coordinate the USGIF GEOINT certificate.

"The USGIF GEOINT credential signals to employers that a student has acquired a suite of competencies, including geographic information systems, remote sensing, spatial analysis, and intelligence applications," said Professor Tom Crawford, chair of the Department of Geography.

The USGIF GEOINT certificate program will provide students with rigorous training in the applications of geospatial technology, including environmental resources monitoring, satellite imagery assessment, and emergency response optimization. The program is coordinated by Collegiate Assistant Professor Santosh Rijal, and any undergraduate student enrolled at Virginia Tech is eligible to pursue the USGIF GEOINT certificate. **Read the full story at cnre.vt.edu/fall2023mag.**

ON THE PRO

Sitting on the damp, jungle floor in western Belize during yet another brutally hot and humid day, David Lugo began adjusting a digital single-lens reflex camera.

He crawled on all fours toward the front of the camera to test it when he saw a subtle movement out of the corner of his eye. He turned his head, and, roughly 50 yards down a narrow trail, a solitary jaguar was watching him. They stared at each other for 30 seconds, then the jaguar quietly disappeared into the jungle's underbrush.

"It was insane," Lugo said. "Not many people get to see them on foot, so it was one of those experiences that you'll probably never have again in your life. I was very lucky."

Lugo, a graduate student in the Department of Fish and Wildlife Conservation, is one of several students, both graduate and undergraduate, involved in a comprehensive research project centered on jaguars, pumas, and ocelots in this Central American country.

Professor Marcella Kelly and Assistant Professor Brett Jesmer, both in the fish and wildlife department, are leading the efforts to protect jaguars — deemed "near threatened" on the International Union for Conservation of Nature red list — other big cats, and other species of animals.

The felines are notoriously shy, rarely show themselves during daylight, and roam over large swaths of land. Such traits make them extremely challenging to study.

But Virginia Tech's team has a plan.

The field team for big cat research in front of their house in Sylvester Village, Belize, after a day conducting trail maintenance and camera trapping. Hokies pictured are team leads Darby McPhail (front row, at left) and David Lugo (front row, at right), and assistant team lead Lucy Weate (second row, at third from left).

Catching cats with cameras

Kelly, who started studying in Belize in the mid-1990s, began a jaguar camera project in 2000 in which she and her team used remote-triggered cameras to capture images of jaguars, pumas, and ocelots — a process called "camera trapping." Animals are "trapped" when a camera sensor picks up heat and movement and takes a photo.

The images from various camera traps in Belize allowed the researchers to analyze spot patterns, specifically of jaguars. Because spot patterns differ for each jaguar, researchers were able to estimate population size, sex ratios, and densities.

Improved camera technology over the years has allowed Kelly and her team to expand their study sites in Belize. They currently oversee 200 camera trap stations, using 400 cameras — two at each trap — across an 800-square-mile area.

"Before remote camera technology was a thing, there was no way to really estimate population sizes for these elusive species like jaguars and, honestly, most wild cats," said Kelly, an affiliate of the Fralin Life Sciences Institute. "It was very difficult to get any sense of whether the population was increasing or decreasing.

"The idea was that maybe we could do this remote camera technique on a jungle species since you can't ever really see them in the field. It's very rare that you can go in the field and actually see a jaguar. The remote camera technique was just fantastic. It worked really well."

"It was insane," Lugo said. "Not many people get to se foot, so it was one of those experiences that you'll pr have again in your life. I was very lucky."

Expanding the project's scope

Last year, Kelly wanted to expand Virginia Tech's research presence in Belize, so she invited Jesmer, an expert on ungulates, or hooved mammals, to participate. They decided to analyze the behavior, distribution, and abundance of white-tailed deer and red brocket deer — food sources for big cats in Belize.

"I've been wanting someone else to come down for years to help tackle the prey items because we all know that most of what it's all about for jaguars is really if they have enough prey and are not hunted, they'll probably do fine," Kelly said. "And even though there's like a million studies on white-tailed deer here in the U.S., there are almost none in Central America.

Jesmer and graduate assistants Johny Tzib and Annie Stevens are focusing first on the deer species before expanding to peccaries, or wild pigs, and tapirs.

This past summer, they were able to capture eight deer by darting them in the rump with a dart that injects a sedative. They then put GPS collars on the animals, collected a variety of biological samples, including a blood sample that allowed them to assess the animal's health, and let them go.

"The GPS tracking collar allows us to understand their movements and habitat preferences," said Jesmer. "They also give us a way to monitor their survival because we'll know when they die, and then we can go in and see why they died. Was it malnutrition, an act of predation, or disease?"

Though the research only started in late May, the team is already noticing some patterns. Deer traditionally are more active at dusk, dawn, and during the night than in the middle of the day. In Belize, they seem to be more active during daylight hours, possibly because their predators, jaguars and pumas, are more active at night.

Students aiding the effort

Lugo and Darby McPhail, another graduate student, are continuing to gain valuable experience while working on their master's degrees. Kelly goes to Belize twice a year for a month at a time, but she leaves most of the field operations there in the hands of Lugo and McPhail, who work several months in Belize during a year.

Graduate student Annie Stevens uses a VHF receiver and directional antenna to locate a deer wearing a GPS collar.

OWL for big cats in Belize

see them on
probably never

A camera trap captured two jaguars in courtship in the jungle of Belize.

The work can be grueling. They continuously perform trail maintenance to get to their camera traps, a task that involves extensive use of chain saws and machete chopping teams in 100-degree heat.

They also oversee undergraduate students from both Virginia Tech and the University of Belize who are helping with the project. They train students on machete usage, make sure that the students collect the photo data from the cameras properly, and then, once they return to Blacksburg, help them sort, analyze, and file the data in a lab in Cheatham Hall.

"It's the whole experience for the undergraduates," said Lugo, whose research focuses on mammalian community dynamics in Belize. "It's not necessarily just going there and doing work, but they're getting this cultural exchange with people from Belize. They also get to learn valuable wildlife techniques, something that they can apply to other internships throughout their career."

Lugo and McPhail also collaborate with nongovernment organizations, create presentations for local schools, and give outreach presentations to local communities on the importance of their work.

"I would say it's the most important part of what we do," said McPhail, who is pursuing a master's degree in wildlife science and whose research focuses on pumas. "Without public support, without the knowledge that we're gaining, none of what we do really matters.

Beyond the boundaries

Kelly expects all these research projects to continue to expand, even across borders. She, McPhail, and Lugo have met with officials from Belize, Guatemala, and southern Mexico to talk about transborder conservation and collaboration.

"We're into wildlife conservation and natural resource conservation," Kelly said. "But there's another aspect to where we really are trying to push the envelope on how to create better ways to estimate densities or just survey better and to provide advice and protocols for local officials to preserve these species — and protocols for other projects that might want to do something similar."

A white-tailed deer in Belize wears a GPS tracking collar as part of a research effort to collect data on habitat use and predator-prey interactions.

Seeing these shy animals will always be a challenge, but the conservation efforts of Virginia Tech researchers will lead the way for generations to come. **Read the full story at cnre.vt.edu/fall2023mag.**

A CNRE ALUMNUS REMEMBERS

Lee Spradlin '73, M.S. '75 Bachelor of Science in forestry and wildlife | Master of Science in forestry

What have you been doing since you graduated?

In September 1973, after graduating in June, I married my "second grade sweetheart" and fellow Hokie, Kathy Dye. We stayed in Blacksburg to complete our master's degrees. In June 1975, we moved to Lewisburg, West Virginia, where I was employed as a forester for Westvaco Corporation and where our daughter was born. I took a job as an area manager for Continental Forest Industries in 1981, and we moved to Powhatan, Virginia, where our son was born. In 1988, I rejoined Westvaco as a forester, and we moved to Lynchburg, Virginia. I retired in November 2015 after a truly wonderful 40-year career as a forester. In August 2021, we moved to Lititz, Pennsylvania, to be closer to our son and his family. Throughout these years, I was active in our church, scouting, the Society of American Foresters (SAF), and the Lions Club. I am still active in our church and SAF and, for the last several years, have been active with the local Appalachian Trail (AT) clubs, primarily doing trail maintenance. I completed a 20-year section hike of the AT, summitting Mount Katahdin in August 2018. Kathy and I have made it to all 50 states and a few European counties. We hope to do more traveling and to spend as much time as possible with our four beautiful granddaughters and their parents.

What is your fondest memory?

My fondest memories from college include dating Kathy and attending German Club dances and home football games together, marching with the Highty-Tighties at the inaugurations for both Governor Linwood Holton in1970 and President Richard Nixon in 1973, and going into Shultz Dining Hall after band practices playing "Tech Triumph." Attending forestry spring camp at the Holiday Lake 4-H Center as a junior brings back many fond memories as well.

What is the most amazing thing that you learned? What professors inspired you?

One of the most amazing things I learned occurred on a mountain top during a forest ecology field exercise with Professor Dick Vasey. All of a sudden, I could see how so many natural phenomena and the forestry courses I was taking were all interrelated. Other professors who inspired me were Bob Adams, who had actually worked as a forester; Al Sullivan, who was able to make even forest statistics fun; Henry Mosby, my wildlife professor, who was like listening to your grandfather tell amazing stories; Harold Burkhart, whom we got to know well during spring camp; and, of course, my graduate committee members Harold Burkhart, William Leuschner, and David Wm. Smith. I did not know it at the time, but Dave Smith would become my mentor, and he and his wife Linda have been two of our very best friends for life.

If you could go back in time, what's the one thing you would tell your undergraduate self?

If I were to go back and do it all over again, I would tell myself, "Relax, don't take yourself so seriously, and have more self-confidence." I'd also say, "After graduation, be sure to become an active member of your professional society and stay connected to Virginia Tech!"

Lee Spradlin as a Hokie undergraduate and proud Highty-Tighty in 1971.

HOMECOMING

ABOVE:
Emma Claire Heh, a wildlife conservation major and president of the Natural History Collections Club, was on hand to help future Hokies dissect owl pellets and identify the bones they found.

Graduate students from the packaging systems and design program pose with everyone's favorite tailgate guest, the corrugated HokieBird. (From left) Sean Hobbs, Ana Lucia Contreras, Saewhan Kim, Mary Paz Alvarez, and Nicolas Dario Navarro.

Alumnus John Doughty '70 (at far right) talks with Keith Goyne (at far left), associate dean, and Andrew Ickes, assistant dean of advancement.

Want to make an impact through philanthropy?
HERE'S HOW TO GET STARTED

Hokies give back. We make things happen and we make the world a better place.

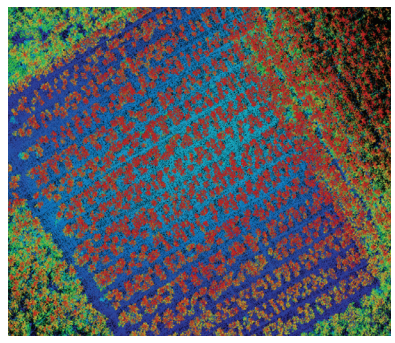
It's who we are and what we do. It's also what philanthropy is all about.

Giving is one way that anyone can make a difference, whether it's helping to purchase equipment, building a lasting legacy that will continue to change lives, or jumpstarting the work that will be a force of positive change.

We want to meet you where you are and share the possibilities, because everyone has different life experiences, passions, causes, and resources.

So whether you've been planning for some time to make a gift that will support what you care about or are just interested in learning about the options, read on and reach out with ideas or questions.

Looking for an easy way to get started? Support CNRE on Giving Day: February 21-22, noon to noon. It's a 24-hour celebration where Hokies around the world make their impact felt at Virginia Tech.



This LIDAR image of a loblolly pine plantation was captured by Assistant Professor David Carter. A gift from the Acorn Alcinda Foundation is funding research at the Kennedy Tree Farm, where Carter's team is managing a LIDAR-informed/precision thinning research trial.

I WANT TO...	Provide the basic equipment that students need every day for field experiences and labs	Make college possible by providing a scholarship	Fund student or faculty research in an area or topic that I am passionate about
	 Saving the planet means being hard on equipment, so departments are continually replacing and upgrading basic equipment, like the hip waders and nets used by Ichthyology class students.	 Beyond Boundaries Scholarship recipient and current meteorology major Hunter Manley (at left) and Brent Keefer '87, M.S. '88, a CNRE alumnus and Beyond Boundaries supporter.	 Graduate student Darby McPhail has worked on a variety of research projects (including the study of big cats in Belize), opportunities made possible by the graduate fellowships she received that allowed her to focus on academics.
WHY IT MATTERS	If you're an alum of the college, you know what it's like when your hands are dirty and your feet are wet and you are in the moment, learning. Think about all the equipment you needed — from compasses to hip waders — and what you had to buy on your own: helmets, safety vests, measuring tapes, and a good pair of boots! We need new equipment every year to replace what's worn out or damaged and it's hard for some students to find the money to buy the items they need to learn and stay safe and dry.	Maybe you benefited from a scholarship when you were a student — or maybe you know how hard you and your parents worked to ensure that you could attend a school like Virginia Tech. Even with financial aid, many students have trouble covering their costs of attendance. Others miss out on the kind of experiences that transform lives like research or overseas study because they don't have the money or don't have the time because they must spend a significant amount of their time working.	Research has the power to change the world. Undergraduate research projects give students the chance to engage in scientific inquiry and gain the skills that will help them stand out when applying to graduate school or for their first job. Graduate student fellowships allow the best and brightest students to purse an advanced degree and work closely with a faculty researcher on finding solutions to our most complex problems. You can also get a research program off the ground by providing start-up funds or pave the way for additional discoveries from faculty who are already making significant advances in their fields.
HERE'S HOW TO HELP	Support CNRE or your academic department on Giving Day! It's a great time to give because participation unlocks more funds for the college. Gifts of all sizes are pooled together and used for the most immediate needs, including equipment, support for learning activities, and emergency assistance for students.	Give to the college's general scholarship fund; it will assist a student who is most in need with a one-time award. Endow an undergraduate scholarship. Because only the interest is spent, the gift will continue to support students in perpetuity. You can also name the endowed fund after a family member, friend, or mentor and honor their legacy for generations to come. Support the Beyond Boundaries Scholarship program for high achieving, underrepresented students. The university matches all gifts, dollar-for-dollar.	Give to the college's Undergraduate Research Fellowship program. Endow a graduate fellowship that will support students for years to come. Supply start-up or seed money for a faculty research project or funding for a project that is already underway —we can share plenty of options to match your interests.

WHAT'S YOUR JOB?

MACKENZIE MCMILLAN '19 Packaging engineer for Diageo PLC, Plainfield, Illinois

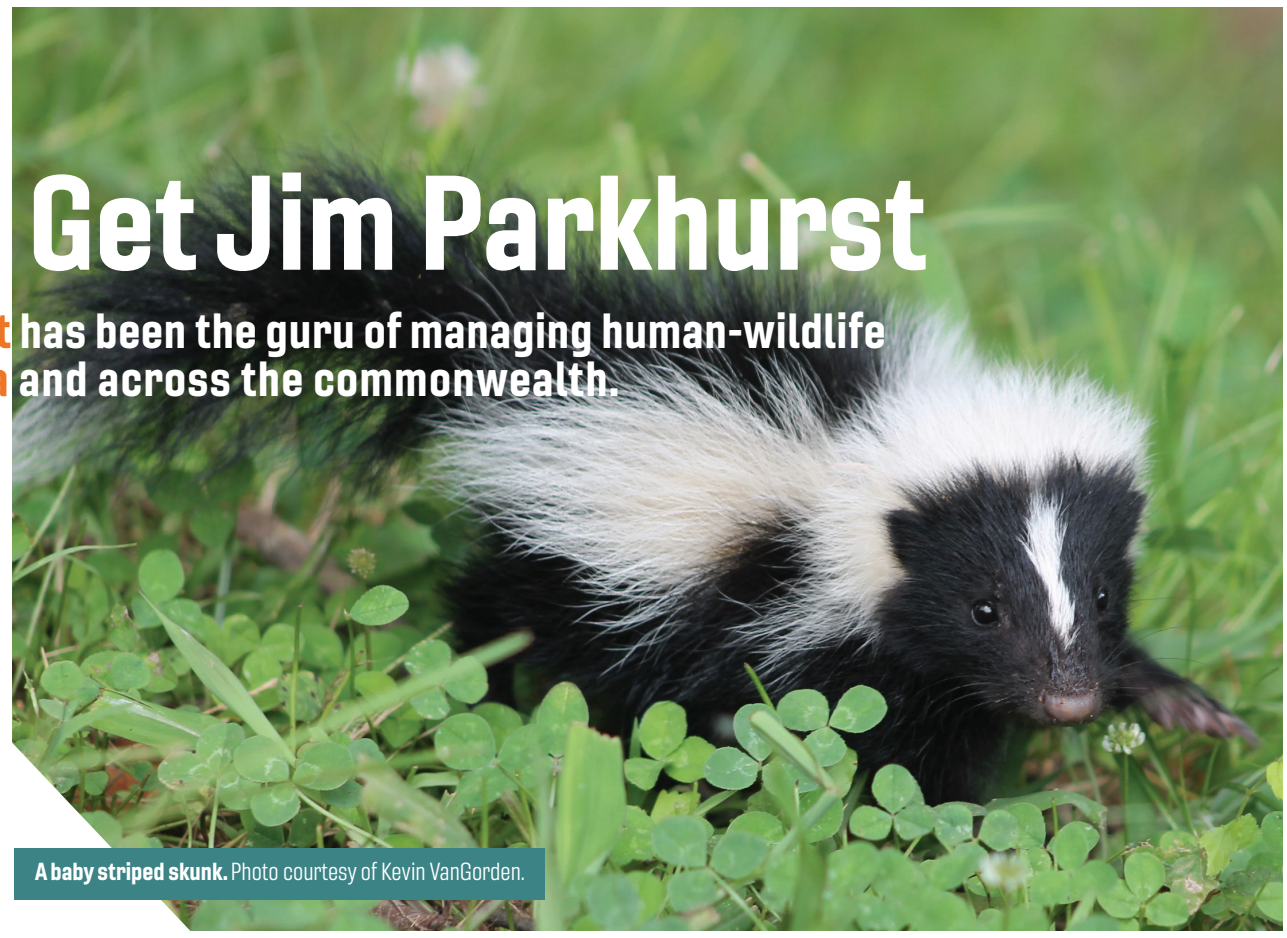
As a packaging engineer, I have the opportunity to conduct trials at various bottling sites to ensure that we are able to provide quality innovative and sustainable packaging through our commercialization process. One of the most exciting things about my role is that I'm able to work on and influence the packaging of well-known brands. It's rewarding to see a product on the shelf that I was a part of bringing to life.

I'd tell future packaging systems and design majors that the learning doesn't stop after you graduate. Always be eager to keep learning and keep seeking out opportunities to improve yourself in the field!

MacKenzie McMillan represented Diageo at the CNRE Career Fair in September.

Got wildlife? Get Jim Parkhurst

For more than 30 years, Parkhurst has been the guru of managing human-wildlife encounters in Southwest Virginia and across the commonwealth.



A baby striped skunk. Photo courtesy of Kevin VanGorden.

I was the victim of a human-wildlife encounter.

As I filled in the first tentative hole that offered a gateway under the back porch, I hoped that my visitor would not return. A few weeks later, it announced its annexation of the property with repeated sulfur-smelling spritzes.

Stressed and angry that the sanctity of my home was invaded, I was uncertain about what to do next. I tried everything to persuade my visitor to leave. It became a war, and it was horrible.

I imagine the skunk felt the same.

Commiseration and practical advice arrived through Jim Parkhurst. The associate professor and Virginia Cooperative Extension specialist has built a 35-year career around solving and preventing the problems that arise when people and wildlife find themselves in close quarters.

Human-wildlife encounters on the rise

Parkhurst spends approximately 70 percent of his time managing wildlife-human encounters. Over the years, and in addition to his human clients, he has worked in some capacity with deer, bears, turkeys, grouse, elk, skunks, raccoons, opossum, coyotes, bats, snakes, squirrels, and vultures.

He is the go-to guy in Southwest Virginia and across the commonwealth, called upon by public officials, the media, and residents when squirrels chew through power lines, foxes appear in backyards, or bears wander into busy intersections.

Parkhurst acknowledges that human-wildlife conflicts are on the rise because of increasing numbers of humans and animals converging in populous areas. Additionally, many wildlife species display exceptional adaptability and appear quite comfortable living in proximity to humans.

Take for, example, the headline-grabbing bears. Black bears have always been in and around the commonwealth, especially in the mountains west of Interstate 81. As their numbers slowly increased, bears expanded their range and are now moving south and east, traveling from the mountains into the Piedmont and onward to the shores of the Chesapeake Bay.

As a result, the trash, bird seed, compost, and pet food people place outside their homes have become easy meals for bears exploring new neighborhoods.

"The ready availability of all those attractants can entice a bear that may be dispersing and looking for new territory to stop," said Parkhurst. "And maybe it wasn't an issue before because there weren't as many bears, but as they're expanding, it's becoming a bigger issue, particularly in areas where people have not had to really deal with them before. You got away with it in the past. Today, you're not getting away with it anymore."

Associate Professor Jim Parkhurst (at left) and students in the Ecology and Management of Wetlands Systems course visited a nearby wetland area at Blacksburg's Heritage Park.

Helping people adjust to changing landscapes

One reason human-wildlife encounters are on the rise is that it's not just wildlife that are on the move. As Virginia's urban population grows, people are building homes and developing areas that were once rural or forested land and are still home to many species of wildlife.

"In other cases, you recommend human behavioral fixes. Many conflicts are pretty easily resolved without the need to capture or handle the animal."

Problems can start with routine behaviors that are part of our everyday lives. People take out the trash, feed pets on the porch, and top off backyard bird feeders, not thinking about the wildlife that are still living in and around their new home.

As a result, humans are responsible for creating some of their own issues. On the positive side, they also have the ability to understand why wildlife may be coming on their properties and learn how to prevent further conflicts.

Throughout his career, Parkhurst has spearheaded a variety of prevention efforts. In past years, he's traveled throughout Virginia, providing professional development to regional Extension agents and speaking with residents and community groups when "hot topics" arise.

Currently, he's working to take prevention into the digital space by preparing a series of monthly Zoom sessions. Extension agents can join him to discuss their top priorities such as chronic wasting disease, deer and bear management, and collaborations with landowners.

Parkhurst has also partnered with the Virginia Department of Wildlife Resources on projects ranging from developing statewide management plans for elk and boating access to advocating for the toll-free Virginia Wildlife Conflict Helpline. Help is now only a phone call away at 855-571-9003 for residents and communities with wildlife questions and concerns.

"For many of those kinds of calls, you spend your time doing the education," said Parkhurst. "In other cases, you recommend human behavioral fixes. Many conflicts are pretty easily resolved without the need to capture or handle the animal."

"I kind of look at these things as always an opportunity. How can we improve? How do we elevate people's understanding: their knowledge and respect for wildlife? What are the mechanisms that we can use to promote better coexistence?"

And always, he said, "A little bit of help can make a difference. We've got to make the effort to try to help people."

And, I guess, even skunks. **Read the full story at cnre.vt.edu/fall2023mag.**

Finding flounder in a changing ocean

This summer, a $300,000 federal grant from the National Oceanographic and Atmospheric Administration (NOAA) and Virginia Sea Grant funded research to explore the population dynamics and distribution of summer flounder, a marine flatfish valued by both those who fish for recreation and Virginia's fishing industry.

"This project started with a conversation," said Wildlife Conservation Assistant Professor Holly Kindsvater. "While I was visiting the Virginia Seafood Agricultural Research and Extension Center, I found out that a fourth-generation seafood company was right next door. I asked [L.D. Amory Co. Inc. President] Meade Amory what was on the top of his mind, and he said summer flounder."

That conversation led to a collaborative project between Virginia Tech, government agencies, and fisheries stakeholders that aims to better understand how summer flounder are adapting to a changing environment and how those adaptations could impact an industry that supplies flounder to restaurants and consumers.

Hailey Conrad, a graduate student who received an National Science Foundation Graduate Fellowship for her work on the project, was able to go on a NOAA trawl survey, where she collected samples from hundreds of summer flounder, gathering key data on size, sex ratio, age, and population health of the species. **Read the full story at cnre.vt.edu/fall2023mag.**

Graduate student Hailey Conrad studies a summer flounder as part of a NOAA grant aimed at better assessing the population and ranges of the species.

ZOOMING IN ON MICROPLASTICS

We use plastic in almost everything. Scientists have long believed that plastics may never fully biodegrade. They simply break down over time into smaller and smaller pieces.

What happens as these tiny particles deteriorate and move around the world? How will they affect our health and the health of other living creatures? What changes can we make to reuse and repurpose plastics more effectively?

These questions are at the core of emerging fields of study for Virginia Tech researchers, including Jennifer Russell, assistant professor in the Department of Sustainable Biomaterials.

Russell works in the area of circular economy, an economic model that aims to reduce or eliminate waste and promote the continuous use of resources, as well as create new economic benefits, such as job creation and cost savings.

Plastic, in the form of polyurethane foam, is at the center of one collaborative project that Russell is supporting. Polyurethane foam, a cushioning agent, is used in products from office chairs to mattresses and sneakers. But that comfort comes at a cost: the foams are incredibly difficult to recycle.

"We need to reframe what we see as waste and what we understand to be valuable," she said. "Plastics are incredibly valuable, but they can also cause great damage to the environment and human health if we don't manage them properly." **Read the full story at cnre.vt.edu/fall2023mag.**

A tire particle found in a sample of water collected from Stroubles Creek is magnified using a scanning electron microscope.

Jennifer Russell, assistant professor in the Department of Sustainable Biomaterials, is studying polyurethane foams, which are incredibly difficult to recycle.

Virginia Tech study reveals reason hellbenders are disappearing

The gigantic, slimy salamanders known as hellbenders, once the apex predators of many freshwater streams, have been in decline for decades, their population constantly shrinking. No one knew why. William Hopkins, professor in the Department of Fish and Wildlife Conservation and director of the Global Change Center, suspected the hellbenders' plight had connections with environmental changes engineered by humans.

Hellbender males select nesting sites on stream bottoms and guard the eggs laid there by females — and occasionally the salamander dads snack on the eggs, consuming them before they ever get to hatch. A study that Hopkins led, conducted through eight years of snorkeling in ice-cold Southwest Virginia streams, determined that in deforested areas, hellbender fathers are far more likely to eat their entire brood than in areas that still have lush foliage.

This behavior, known as filial cannibalism, probably evolved as a survival tactic for enduring harsh conditions. Prior to Hopkins' results, scientists were not aware that hellbenders' filial cannibalism drastically increased in cleared lands, actively speeding the species out of existence.

"This is an animal that has been resilient over millions and millions of years, and something that we're doing to the planet is severe enough that it's causing them to disappear, and disappear quickly," Hopkins said. "I feel like we have an obligation to solve this problem." **Read the full story at cnre.vt.edu/fall2023mag.**

Professor Bill Hopkins prepares to gently return a hellbender back to its underwater home in a Virginia stream after taking measurements.

College of Natural Resources and Environment WELCOMES THREE NEW FACULTY MEMBERS

CARRIE FEARER joined the Department of Forest Resources and Environmental Conservation as an assistant professor this fall. Her research focuses on forest health and ecosystem adaptions to invasive pests and pathogens.

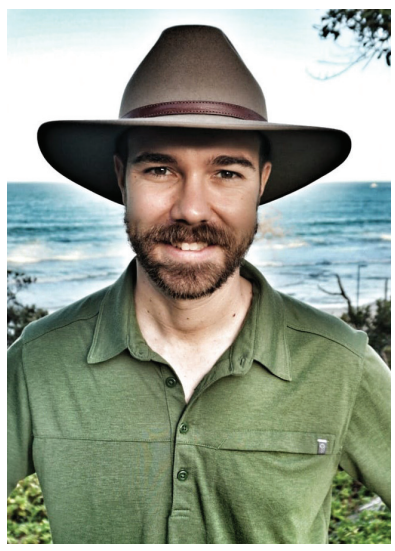
"My research focuses on broad-scale forest health and how that is impacted by non-native, invasive pathogens and pests," said Fearer, who received a doctorate in environmental science from The Ohio State University. "I'm especially focused on the question of host resistance with an emphasis on identifying trees and tree defense mechanisms that are critical for disease prevention and forest restoration."

Fearer has been studying the emergence of beech leaf disease, which is impacting numerous beech tree species throughout the U.S. She has contributed research correlating the disease with a non-native nematode, a microscopic worm species, though there remains some debate about what the causal agent for the spread is.

More recently, Fearer conducted postgraduate research utilizing the U.S. Forest Service's Forest Inventory Analysis database to determine demographic changes of northeastern forests as a result of pathogen and pest invasions to better understand the effects on carbon storage and sequestration capacities in forests.

Carrie Fearer

Kiara Winans



Michael Berry

KIARA WINANS joined the Department of Sustainable Biomaterials (SBIO) as a collegiate assistant professor in October. Winans' expertise is in industrial ecology.

"As an industrial ecologist, I view the world through the lens of materials and energy flows in natural and built environments," said Winans, who received a doctorate in soil, water, and ecosystems sciences and biological and agricultural engineering from the University of Florida. "My work focuses on systematic evaluations to mitigate environmental and societal impacts while increasing economic, material, and energy efficiencies."

Winans was previously a lecturer at the University of California, Davis, where she co-created and co-directed the Industrial Ecology Program while working on implementing and developing life-cycle assessment methodology to tackle research questions related to various industries.

"I'm enthusiastic about becoming a part of the SBIO community; working alongside faculty, staff, and students; and contributing my knowledge and experience to our growing body of work in the department," said Winans, "Especially in areas like life-cycle analysis and the circular economy, as well as other instructional offerings in industrial ecology."

MICHAEL BERRY will join the Department of Forest Resources and Environmental Conservation as an assistant professor during the spring semester. Berry has a multidisciplinary background in forestry, civil engineering, and business with a focus on forest operations, utilization, and management.

"My primary research area is in forest harvesting operations and the influence of these operations on the overall forestry supply and value chains," said Berry, who received a doctorate in sustainable forest management from Oregon State University. "My work lies at the confluence of forest operations and business development. I utilize engineering problem-solving methods and operational analysis techniques to optimize forestry operations and supply chains to best meet market demands."

Berry has been working as an engineer and program manager for the National Park Service in northern Arizona and southern Utah. Prior to that, he served as a research fellow and lecturer in forest operations for the University of the Sunshine Coast in Australia, where he worked on forest operation projects and research throughout the country.

CNRE Hokie Highlights

RISING SEAS MEAN LESS SPACE FOR PEOPLE AND NATURE

Assistant Professor Anamaria Bukvic of the Department of Geography is the principal investigator for a project designed to understand the dynamics between human and natural systems to predict how communities and ecosystems in the mid-Atlantic coastal regions will adapt to the challenge of rising seas.

Funded by the National Science Foundation, the project will combine geospatial information and survey data to investigate the potential for coordinated migration of social and ecological systems facing a "squeeze" between rising seas and urban development.

While many studies consider the impacts of rising seas on natural and human systems separately, what stands out about our work is a focus on the coupling of those two systems and how that coupling influences their shared mobility," said Bukvic. **Read the full story at cnre.vt.edu/fall2023mag.**

Assistant Professor Anamaria Bukvic (at right) and former graduate student Aaron Whittemore

Brian Strahm named fellow of the Soil Science Society of America

Professor Brian Strahm

For his contributions to the research of forest soil dynamics and their impacts on carbon sequestration, Professor Brian Strahm of the Department of Forest Resources and Environmental Conservation has earned the title of fellow of the Soil Science Society of America (SSSA).

Strahm's research considers forest productivity, sustainability, and environmental quality with a focus on the interactions of minerals, organic matter, plants, and microbes in forest and soil ecosystems.

"The SSSA community has been an inspiration to me," said Strahm. "It is truly humbling to receive this recognition, and I'm excited to continue my work with all of the great students and collaborators who have helped make this honor possible." **Read the full story at cnre.vt.edu/fall2023mag.**

Luis Escobar receives NIH award to study rabies transmission from wildlife to humans

Assistant Professor Luis Escobar

Luis Escobar, assistant professor in the Department of Fish and Wildlife Conservation, has been awarded a Mentored Research Scientist Development Award by the National Institutes of Health to study the spillover of a wildlife disease that can severely impact human health: rabies.

He'll be studying vampire bats in Latin America, and, although these bats are not currently found in the U.S., the rabies virus they carry is rapidly expanding northward. A key question Escobar hopes to answer is why the disease spreads in some geographic areas more than others. **Read the full story at cnre.vt.edu/fall2023mag.**

BIRDS AREN'T THE ONLY CREATURES WHO FLOCK TOGETHER

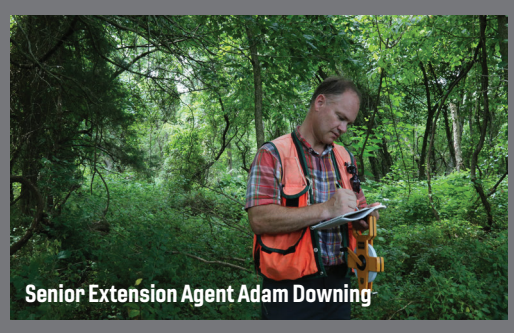
Associate Professor Ashley Dayer of the Department of Fish and Wildlife Conservation is the co-principal investigator for a collaborative project funded by the National Science Foundation that will increase access and inclusivity in ornithology.

The project aims to understand the diversity and culture of three ornithological societies in order to recommend changes and resources needed to foster more welcoming and supportive organizations.

"As a social scientist focused on bird conservation, inclusive research, and diversifying the field of science, I'm excited about this opportunity to work with the societies to co-produce evidence-based affinity groups," Dayer said. **Read the full story at cnre.vt.edu/fall2023mag.**

Associate Professor Ashley Dayer

ADAM DOWNING RECEIVES LEADERSHIP AWARD



Senior Extension Agent Adam Downing

Senior Extension Agent Adam Downing was the recipient of the 2023 Gerald P. McCarthy Award for Leadership in Environmental Conflict Resolution.

The award, presented by the Institute for Engagement and Negotiation, is given to an individual who demonstrates leadership in preserving and protecting Virginia's natural spaces through collaborative work.

Downing was honored for his work as an Extension agent and for co-leading the Generation NEXT program, which aims to help family forest landowners make informed and intentional decisions about passing their forest legacies on to the next generation.

Nominate someone (or yourself!) for an alumni award by Jan. 10, 2024:

CNRE Recent Alumni Award
CNRE Distinguished Alumni Award

For more info, contact Tara Nepper at tnepper@vt.edu or 540-231-5484.

SAVE THE DATE FOR THIS SPRING:

CNRE Awards Banquet
March 27, 2024
The Inn at Virginia Tech
Registration will open in January 2024.

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