



FORESTRY ALUMNI CLIMB TO NEW HEIGHTS

CNRE's top-ranked program prepares a new core of leaders primed for success

Boasting a forestry program that has been ranked No. 1 in the U.S. for the second year in a row as well as a strong legacy in preparing graduates for top-level positions in the Virginia Department of Forestry, the College of Natural Resources and Environment continues to lead the way in preparing students for careers in forestry-related professions.



Bettina Ring ('86) and Rob Farrell ('88, '03 M.S.) are the most recent alumni to lead the Virginia Department of Forestry. Ring was named Virginia Secretary for Agriculture and Forestry while serving as state forester. Farrell had served as Ring's deputy before being promoted to state forester.

Bettina Ring ('86) began her career at the Virginia Department of Forestry as a trainee forester and moved up through several positions over the next 14 years, including six years as deputy state forester. She left to work in leadership roles at several nonprofits across the country but returned to lead the department as state forester in 2014.

"From a very young age, I fell in love with trees and the outdoors," she explained. "I spent all my time playing outdoors and knew I wanted to do something in the environment. I was pulled to trees in particular."

Ring brings a wealth of experience to her new job as Gov. Ralph Northam's Secretary of Agriculture and Forestry. "I was surprised and humbled when I was asked to consider the cabinet position," she said. "The governor has a strong interest in conservation and balancing economic development with environmental protection. There is so much we can do to advance both agriculture and forestry."

Many professors and colleagues from Virginia Tech have inspired Ring. "Dr. David Smith is an incredible man who served as a mentor for me over the years," she said. "My dendrology professor, the late Dr. Peter Feret, was my

college advisor and later became a colleague when we established the Virginia Urban Forest Council. He was very influential, and his legacy lives on."

"Virginia Tech taught me the importance of building relationships and having the support of colleagues and mentors," she added. "The Department of Forestry often hires Virginia Tech graduates, and I love watching them grow into great leaders. I'm pleased to see how the college has become so inclusive and forward thinking."

Ring continued the tradition of mentorship among Hokies when she began working side-by-side with then-deputy state forester **Rob Farrell** ('88, '03 M.S.). "I first met Rob when he was in graduate school and I was an urban forester," she recalled. "I noticed how talented and professional he was, and I remember thinking 'I'm going to hire him one day!' I was thrilled when I became state forester and got to work with him."

Farrell, who was appointed to the state forester position vacated by Ring, has been with the agency for 18 years and has prior experience as an urban forester and arborist. He worked his way up through the department, first as an area forester in Gloucester County and then as the assistant director for Forestland Conservation before

being named deputy state forester in 2012. Now, as state forester, Farrell will set the tone and vision for the agency under Gov. Northam.

In addition to new responsibilities, Farrell is looking forward to continuing work on initiatives in urban forestry, hardwood management, and timber theft, and a new strategic plan for the agency that he began as deputy state forester.

"As deputy, I saw everything that went on in the agency and how we fit into the bigger picture, but getting to see the national picture and how we fit into that along with other state agencies is going to be the most interesting thing," Farrell said. "I'll be working with the National Association of State Foresters and spending more time at the General Assembly than I ever have."

Farrell credits his education at Virginia Tech with providing the skills he needed to advance through the ranks. "It was an honor to even be considered for the state forester position, and I think being part



Area Forester Molly O'Liddy ('14), shown using an increment borer to extract a core sample from a loblolly pine tree, works with landowners to help them achieve their management goals.

of that community was influential. Virginia Tech is involved with every part of natural resources management in Virginia, so having the science background and the network of people to draw on has been vital," he said.

Ring and Farrell aren't the only Virginia Tech graduates to hold prominent positions in the Department of Forestry. Among others, **Carl Garrison** ('78) and **James Garner** ('58) have both served as state forester. **John Carroll** ('77) was deputy state forester and **James Bowen** ('67) served as both assistant and deputy state forester. Dozens of alumni, however, have acquired the skills and knowledge needed to succeed among the ranks in the Department of Forestry.

Molly O'Liddy ('14) is an area forester in Hampton Roads. In addition to helping landowners to achieve their management goals and working on projects with local community groups and agencies, she is also a certified wildland firefighter.

"If I hadn't gone to Virginia Tech, I wouldn't have the job I have now," she explained. "The classes and subjects give you a baseline so you can take what you learned and build from it toward whatever career you choose. I really love what I do. The department encourages you to try new things and explore what you're passionate about. As I gain more experience, there's room to move up and do all sorts of different things."

Terry Lasher began his career as a forest research technician with the forestry department at Virginia Tech.

(Continued on page 2)



Eastern Regional Forester Terry Lasher ('01) (left), who started his career as a forest research technician at Virginia Tech, credits faculty mentors with encouraging him to get his bachelor's degree.



At the top of our game

The college has remained at the top of College Factual's list of U.S. programs for the study of natural resources and conservation since 2015. Our forestry program in the Department of Forest Resources and Environmental Conservation been ranked No. 1 for the second consecutive year. We should all be very proud of this sustained effort and drive toward excellence that is the foundation of the college. My gratitude and thanks go to our faculty and staff who give it their all each and every day. Their disciplinary passion coupled with an unwavering commitment to our students, their research and discovery efforts, and their work across the commonwealth are simply awesome in every regard.

Success begets success, and we know that prospective students are applying to our programs because of our national rankings. We received a record number of applications and made a record number of offers to high-achieving high school and transfer students for fall 2018. The quality of our applicant pool is ever increasing. Preparation and success in high school is necessary in today's competitive environment.

Our Department of Sustainable Biomaterials was selected as one of three exemplary departments at Virginia Tech last year. Award criteria were focused on maintaining



Bettina Ring (center) is one of several alumni highlighted in this issue's cover story. Ring, pictured with Department Head Jay Sullivan (left) and Dean Paul Winistorfer, visited campus in April to give a presentation for the Department of Forest Resources and Environmental Conservation's spring seminar series.

exemplary teaching and learning environments. The department today has the largest undergraduate enrollment of any such program in North America. Congratulations to our colleagues in Sustainable Biomaterials — well done!

The college's Sustainability Institute received a 2018 Governor's Environmental Excellence Award and was the only academic program recognized in the sustainability category. The foundation of the Sustainability Institute has been an intensive two-week training program open to all majors at Virginia Tech. Funded with a corporate gift from the Ingersoll Rand Foundation, the Sustainability Institute has been a very successful three-year pilot program. If this educational opportunity is to resume at some point in the future, we will need to secure a permanent funding source.

Thank you to those who participated in Virginia Tech's first annual Giving Day. Your generous support enabled the college to raise the second highest level of giving among all colleges at Virginia Tech!

Our alumni are making contributions in many organizations, agencies, and corporations around the world. We are so very proud of those alumni serving in our state agencies, stewarding the commonwealth's resources. We are thankful for our close working relationship with the Virginia Department of Forestry, and we are especially proud of our alumni who have served and are serving that agency.

From the Chesapeake Bay, to Antarctica, to Bangladesh, to the Paris Climate Conference, the college is engaged locally, regionally, nationally, and globally. From my perspective, we are staying true to our core but embracing opportunities around us. We are committed to our work in the commonwealth but know that resource issues globally are complex and will require the work of many to enable a sustainable future. The biggest risk we have as an organization is not moving forward, so forward we go with a very strong tailwind of success and excellence in all we do. As I have said many times, it is legitimate for us to aspire. What do you aspire to?

Best wishes for a great summer. I hope you will stop on campus if you are nearby; we would enjoy seeing you!

Warm regards on behalf of our faculty, staff, and students,

Paul M. Winistorfer
Dean
pstorfer@vt.edu

(Continued from page 1)

Forestry alumni

Faculty mentors there, including Mike Aust and Jim Johnson, encouraged him to get his bachelor's degree in forestry, which he did in 2001. After graduation, he joined the Virginia Department of Forestry, where he has served in several positions around the state. Lasher is now the agency's eastern regional forester.

"Virginia Tech set me up in a great way with my education and professional contacts," he said. "My mentors there saw something in me that I didn't recognize in myself, and they helped me build the confidence I needed to advance. They encouraged me to be a leader and gave me the tools I needed to do so."

According to Jay Sullivan, professor and head of the college's Department of Forest Resources and Environmental Conservation, encouragement is at the heart of Virginia Tech's forestry program. "We seek to prepare all of our students for leadership roles in whatever path they take after leaving Virginia Tech. We pride ourselves in giving them hands-on, practical experience that is consistent with the land-grant mission of the university."

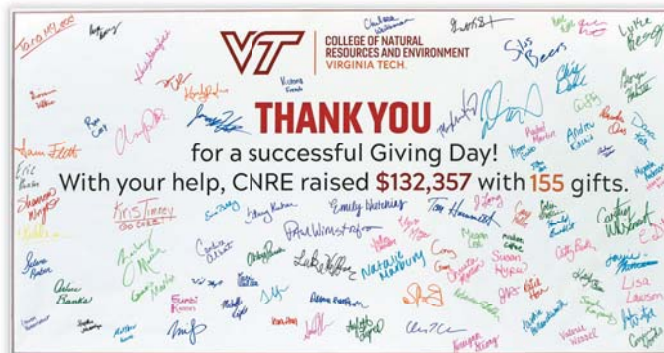
CNRE raises \$132,357 and completes challenges for inaugural Giving Day

Supporters demonstrated their affinity for the college in a big way during the university's first-ever Giving Day on March 20-21. For the inaugural 24-hour event, the college received \$132,357 in gifts from 155 donors. This level of engagement unlocked participation challenge gifts from Willie Taylor, Mike Hincer, Mike and Kathy Melo, and the Morton and Spapperi Family Foundation.

To put this level of success in perspective, CNRE's amount raised is second among all Virginia Tech colleges that participated in Giving Day. Overall, the university raised more than \$1.6 million from the generosity of 4,841 Hokies.

"It was especially meaningful to have our alums, friends, faculty, staff, parents, and students participate in Giving Day," said Emily Hutchins,

chief advancement officer. "Every gift matters, regardless of size, and can have a tremendous collective impact for the college and our students."



Students, faculty, and staff signed a thank you banner following the inaugural Giving Day event.

Donors could designate their Giving Day gifts for specific funds such as the CNRE Annual Fund, an academic department, or the college's Leadership Institute. The funds will be used to support scholarships, experiential learning activities, professional development opportunities, faculty research, and more.

The day after the event, students, faculty, and staff were invited to grab a donut and sign a thank you banner in the Cheatham Lounge. According to Hutchins, "This was a fantastic first effort, and we are already thinking about how to increase engagement for 2019!"

CNRE NEWS

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Sustainable biomaterials honored as exemplary department

The Department of Sustainable Biomaterials was honored with a 2017 University Exemplary Department or Program Award by Virginia Tech's Center for Excellence in Teaching and Learning. The award recognizes efforts and achievement in maintaining exemplary teaching and learning environments for students and faculty.

"The award is a great honor," said Department Head Bob Smith. "We're in a discipline where students have to get their hands dirty to do what we do. Our faculty and staff work extremely hard to make sure the students have experiential learning opportunities."

The department provides students with multiple avenues for gaining hands-on experience, such as internships with industry partners as well as the Wood Enterprise Institute, a two-semester program in which students design, manufacture, market, and distribute a real product.

"We firmly believe that you learn by doing," Smith said. "We have a long history of students participating in undergraduate and graduate research, studying abroad, and completing internships and summer positions with companies that lead to jobs after graduation. Because of that, we're constantly changing our program based on feedback from both students and industry representatives to make our students more competitive candidates."

Increasing enrollment and a continuing emphasis on a "hands-on, minds-on" approach to education have driven the hiring of an assistant professor and two instructors in the department. Smith hopes that the additional faculty will help the department continue serving students in new and innovative ways that will set them up for success in the future.

Department Head Bob Smith (left) accepts the 2017 Exemplary Department Award from Interim Provost Cyril Clarke.

"This generation of students is very sensitive to environmental issues and wants to make a difference," Smith said. "This is a great profession for students to do that in a setting with just as much demand for jobs as engineering or business."



Students gain global perspective at Climate Change Conference



Virginia Tech's delegation included (left to right) Katherine Bland, Professor Randolph Wynne, Hannah Wynne, and Senior Research Associate Carol Franco.

Virginia Tech sent its first-ever delegation to the 2017 U.N. Climate Change Conference (UNFCCC), where representatives from governments around the world converged to discuss climate change and its many facets. Virginia Tech was granted the status of an Observer Organization, which is reserved for universities and nongovernmental organizations.

The delegation was led by Carol Franco, a senior research associate in the Department of Forest Resources and Environmental Conservation, who has participated in the UNFCCC as a delegate from the Dominican Republic since 2012. Two students from Franco's Climate Change and International Policy Framework course also attended, enhancing their coursework about the science, causes, impacts, policies, and mitigation of climate change.

"Virginia Tech is able to take students and expose them to high-level global climate change policymaking. There they can present their research, network, and access potential future work opportunities," said Franco, who spearheaded efforts within the college to gain Virginia Tech's Observer Organization status.

Biological systems engineering master's student Katherine Bland, one of the two student delegates, considers the experience to be essential to anyone who is interested in influencing policy. "The immense sense of purpose blanketed with necessity is electrifying. I was able to learn more about climate policy, and international policy in general, by living in it for a week than I think I would ever be able to learn from lectures," she said.

Professor Randolph Wynne, a member of the delegation, said, "Our participation enables engagement by students and faculty members at the technical, cultural, and political nexus of climate change adaptation and mitigation. As a scientist primarily engaged in the technical details of environmental monitoring, I had the unique experience of attending the UNFCCC with my daughter, Hannah, an international studies major in the world politics and policy option."

Researchers address riverbank erosion in Bangladesh



Members of the research team examine erosion along the Lower Meghna River in Bangladesh during a January 2018 field visit, accompanied by local villagers. Pictured are (left to right in center of photo) Munshi Khaledur Rahman (in black jacket), Tom Crawford (in blue shirt and gray slacks), and Scott Curtis of East Carolina University (in blue shirt and blue slacks).

Coastal residents in Bangladesh are losing their homes and farmland at an astonishing rate due to riverbank erosion, which affects roughly 1 million people and displaces 50,000 to 200,000 every year. Professor Tom Crawford and postdoctoral associate Munshi Khaledur Rahman of the Department of Geography are part of a team working to develop a predictive model for major erosion events similar to that for hurricanes in the U.S.

"We want to understand how coastal erosion is linked to precipitation patterns and how humans are continuing to secure their livelihoods in the face of erosion," Crawford said. "Ultimately, we'd like to be able to develop a predictive early-warning model that will help alert villagers if rainfall and erosion are going to be particularly bad in a given year."

The team, which includes researchers from three other universities, is conducting a three-year study funded by the National Science Foundation on coastal erosion, human vulnerability, and adaptation strategies to promote resilience in the face of erosion disturbances.

In January, team members visited two villages that will serve as study sites, where 400 households will be surveyed. Crawford and Rahman will also use satellite images captured between 1988 and 2018 to plot spatiotemporal patterns of erosion and generate location-specific annual rates of erosion and erosion variability.

"We're trying to bring science into the real world and solve real-life problems," Rahman said. "We hope that the findings of this study will benefit the communities in Bangladesh that are suffering due to riverbank erosion and address global environmental issues through scientific contributions to the discipline."

Reunion 2018: Our first-ever reunion weekend

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- Behind-the-scenes campus tours
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for more information
and to register.



Timberbeast returns!

The Virginia Tech Forestry Club revived its annual Timberbeast competition this year after a short hiatus, hosting teams from six schools at the New River Valley Fairgrounds in February.

The approximately 85 competitors at the timber sports event came from Clemson University, North Carolina's Montgomery Community College, the University of North Carolina at Chapel Hill, Virginia Tech, the University of Tennessee, and West Virginia University.

"Timber sports events like Timberbeast give students a unique chance to engage with students from other schools, meet people who are entering the forest industry the same time as themselves, and talk about forestry issues as addressed from the perspective of different schools, all while in a more casual atmosphere than formal conferences," said Justin Mays, president of the Forestry Club. Mays, a senior forestry major, considers this informal networking to be very valuable for students.

Jacob Truxell, a senior building construction major who took first place in the men's axe throw, said, "It brought a lot of excitement to us as a team to be able to bring Timberbeast back." Hokies also placed first in the archery, women's cross cut, women's knife throw, and DBH (diameter at breast height) estimation events. Virginia Tech's team placed third overall, behind Clemson and Tennessee.

In addition to hosting the competition, the Forestry Club partnered with Log a Load for Kids and Power Zone in Christiansburg to run a raffle during the event, raising \$1,695 for Carilion Children's Hospital in Roanoke.

The Virginia Tech team went on to compete in the Southern Forestry Conclave, the biggest annual forestry



Wildlife conservation major Leah Wood took second place in women's bowsaw competition at Timberbeast 2018. Photo by Jesse Booker

sports competition in the region, held this year at Abraham Baldwin Agricultural College in Georgia. The Hokies had an outstanding showing, taking second place overall, with top three finishes in the following events: pole classification, compass and pace, axe throw, men's bowsaw, chain throw, women's crosscut, Jack and Jill crosscut, underhand chop, log roll, and pole fell.

Students excel at Amazing Packaging Race



Virginia Tech's student attendees gather at their Pack Expo booth.

Eighteen of the college's packaging and systems design students attended Pack Expo Las Vegas, one of the largest trade shows for the packaging industry. Senior **Jayne Little** was a member of the first-place team in the event's eighth annual Amazing Packaging Race competition, while senior **Landon Holbert** served on the second-place team.

In the competition, which is modeled after TV's "The Amazing Race," teams of students from different universities visit companies' booths and complete a series of challenges that test their problem-solving abilities. Each team member has a different role; both Little and Holbert were tasked with documenting the progress of their respective teams on Twitter. Holbert attributes his team's second-place finish to effective delegation of roles. "We had a very focused and driven group that was ready to delegate tasks to those who were best at them," he said.

Little and Holbert agreed that the opportunity to network with prominent members of the industry opportunity was too good to pass up. "Pack Expo is a great opportunity for networking with potential employers, as well as other students in packaging schools across the country," Little said.

Famularo well prepared for Oak Ridge National Lab internship



Joseph Famularo ('17 B.S. water: resources, policy, and management) put his studies into action right after graduation in a Science Undergraduate Laboratory Internship at the U.S. Department of Energy's Oak Ridge National Laboratory in Tennessee. He hiked along streams, collecting data that became a high-resolution microhabitat suitability model. He used a geospatially autonomous backpack mapping system for data collection, which allowed him to spend extended time in nature, hiking and camping in the Smokies while meeting like-minded scientists from around the world.

Famularo credits his fish ecology course with preparing him most for the internship. Associate Professor Emmanuel Frimpong, who taught the course, mentored Famularo and encouraged

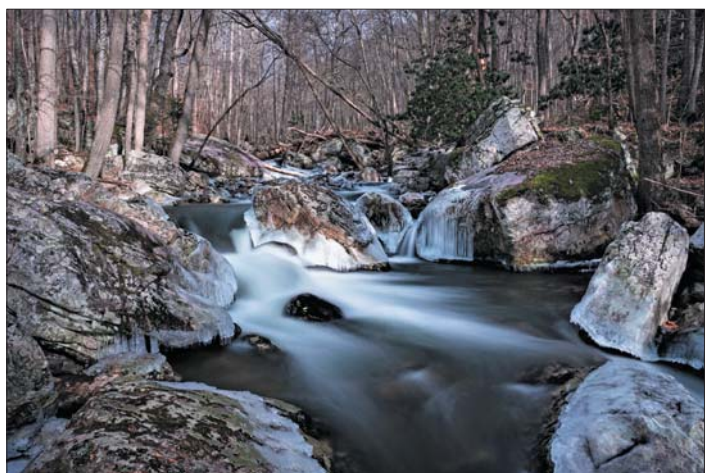
him to pursue the internship at Oak Ridge. Famularo recognizes many other courses for their practical application in the field, such as fisheries management, principles of watershed hydrology, global change ecology, remote sensing, and watershed assessment, management, and policy.

"The degree program did an excellent job of preparing me for a range of water-related professions and research," Famularo said. "I went from studying fish ecology and stream restoration one semester to urban stream nutrient dynamics the next."

Famularo worked alongside alumnus Ryan McManamay ('07 M.S. biological sciences, '11 Ph.D. fisheries and wildlife sciences), who leads the Integrated Water-Energy-Ecosystems Team at Oak Ridge. Their work on the backpack system for characterizing microhabitat integrates environmental data into GPS coordinates, which can be used to characterize the habitat suitability for the Tennessee dace, a threatened fish species.

"It was incredibly rewarding to see the results from the backpack system translated into a map of habitat suitability," Famularo said. "The struggle of lugging that backpack system through densely vegetated creeks was often laughable, sometimes it was downright exhausting, but in the end, it was very fulfilling."

Thrift's photo earns second place honors

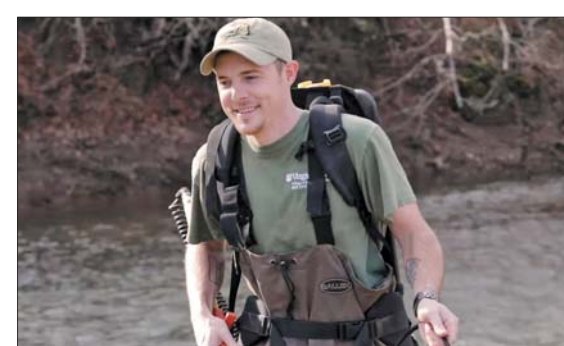


Cole Thrift's photo of Little Stony Creek took second place in the Virginia Outdoor Writers Association's photo competition.

Geography senior **Cole Thrift** took second place in the Virginia Outdoor Writers Association's Annual Collegiate Undergraduate Photo Competition, sponsored by Dominion Energy and Cooperative Living Magazine. His photo, taken just below Cascade Falls in Giles County, depicts Little Stony Creek as it thaws out after a long cold spell in January 2018. Water breaks through ice to create a stunning mid-winter landscape.

Thrift's interest in photography was peaked after participating in a cinematography project in high school. He began exploring it as a serious hobby when he came to Virginia Tech; he has since purchased his own camera and taken two photography classes. Thrift earned honorable mention in last year's photo competition.

Overcoming obstacles



Chanz Hopkins has faced a variety of challenges in life, but owing to hard work, perseverance, and support from his family, he will graduate with a degree in fish conservation and start a new career with the Virginia Department of Game and Inland Fisheries. See Chanz's story at bit.ly/2EAPdos.



Wynne earns national recognition for remote sensing applications in forestry



Professor **Randolph Wynne** received a Society of American Foresters award recognizing his research in remote sensing applications that have resulted in significant advances in forestry. In his nomination of Wynne for the society's annual Award in Forest Science, Professor Harold Burkhart cited Wynne's mastery of remote sensing topics, technically sound research, and eagerness to mentor students and recognize collaborators. "Randy strictly adheres to the highest professional standards when developing and carrying out research projects, most of which are done in collaboration with others or with graduate students. His work has great scientific merit and is of tremendous practical value," Burkhart wrote.

Wynne's research has addressed two main themes: improving the accuracy of land-use and land-cover classifications, and applying the remote sensing method LIDAR (Light Detection and Ranging) for forest monitoring and modeling. Direct results of the research include better ways to identify forests and the natural and anthropogenic changes that affect them, plus improvements to spatially explicit information that improves silvicultural decision-making.

"I guess all I ever had in mind from the start was to help our profession better understand, and thus manage, forests," Wynne said. "It is gratifying to feel that I have made a difference!"

Stauffer honored with Wildlife Society award for teaching excellence

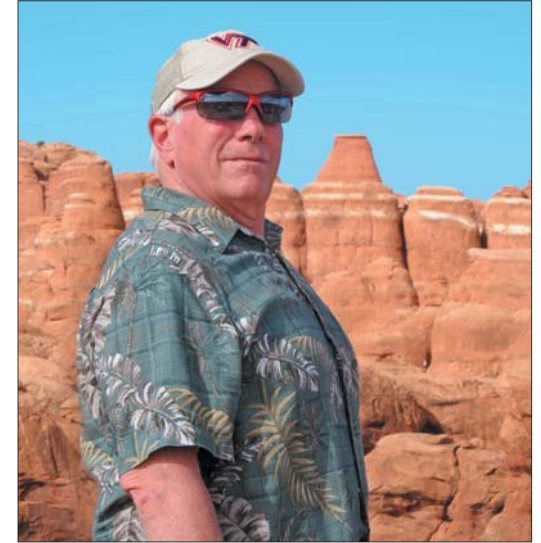
Professor **Dean Stauffer** was honored with the Excellence in Wildlife Education Award from The Wildlife Society. The award is given to faculty who exhibit exemplary teaching and contribute to the improvement of wildlife education for undergraduate and graduate students.

Stauffer believes the key to being a successful educator is building a rapport with students. "I tell my students, 'If my office door is open, stop by.' I love having one-on-one time to work with my students, and there is nothing more rewarding than helping a student master something they've struggled with."

"I like all the aspects of my job, but I think teaching is really where I can have the most impact," Stauffer continued. "I've taught approximately 2,500 students over the years, and I hope that I've been able to influence how they look at natural resources and help prepare them as the next generation of natural resources managers."

Stauffer has also taught 37 weeklong workshops on wildlife habitat evaluation, population management, and population estimation through the U.S. Fish and Wildlife Service, the Kenya Wildlife Service, and the Department of Wildlife Management at the University of Chihuahua in Mexico.

"I was delighted that I received this award," he added. "It's an honor to have validation from my peers for the work I've been doing my whole career."



Hart recognized by Hokie Wellness



Stephanie Hart, director of the college's Advising Center, received a Hokie Wellness Supervisor Spotlight Award for encouraging and supporting healthy habits. The staff members who nominated Hart praised her for modeling and encouraging a culture of wellness in the center, empowering others, promoting growth and development, and stimulating teamwork while also being sensitive to an individual's personal needs.

"I am so honored that the staff members took the time to nominate me for this award," Hart said. "I believe strongly in servant leadership and that a large part of my role as a supervisor is to serve those I work with."

Sustainability Institute earns governor's award

The college's Sustainability Institute earned a 2018 Governor's Environmental Excellence Award in April for its significant contributions in environmental and conservation leadership.

As a three-year pilot program, the Sustainability Institute offered a boot-camp style professional development program to help undergraduate students transition into workplace-ready professionals. Open to students from all majors, the intense, two-week program utilized employer challenges with



industry experts to teach students how to solve problems and communicate effectively with a "sustainability lens." Students who completed the training were eligible for summer and semester-based internships with partner organizations. A total of 132 students representing more than 60 different majors have completed the training, with more than half securing an internship through the institute.

Institute Director **Angie De Soto** accepted the program's bronze medal at the Environment Virginia Symposium in Lexington. "We are honored to be recognized at the state level for this unique approach. I am so proud of our students and thrilled to see the impacts they are already making in the workplace," she said.

NEW COLLEGE FACULTY



Adam Coates
Assistant Professor
Department of Forest Resources and Environmental Conservation
Ph.D. (2017), M.S. (2006), B.S. (2003)
Clemson University

Special interests: Impacts of wildland fire on ecosystem processes and properties, linked to topics such as restoration ecology, fuels, fire behavior, silviculture, soils, wildlife habitat, and water quality



Luis Escobar
Assistant Professor
Department of Fish and Wildlife Conservation
Ph.D. (2014), M.S. (2012)
Andres Bello University, Chile;
M.S. (2011), D.V.M. (2009)
San Carlos University, Guatemala

Special interests: Disease ecology; spatial epidemiology; fish and wildlife epidemiology; ecological niche modeling; biogeography



Santosh Rijal
Visiting Assistant Professor
Department of Geography
Ph.D. (2017) Southern Illinois University;
M.S. (2011) University of North Dakota;
B.S. (2007) Institute of Forestry,
Tribhuvan University, Nepal

Special interests: Geographic Information System (GIS); remote sensing; spatial analysis; land condition disturbance; ecosystem services; natural resource management



Stella Schons
Assistant Professor
Department of Forest Resources and Environmental Conservation
Ph.D. (2017) Virginia Tech; M.B.A. (2010),
M.E.M. (2010) Yale University;
B.S. (2005) Campinas State University, Brazil

Special interests: Natural resource economics and management; international conservation and development; forest management and business; forest finance; rural credit; community forest enterprises; community-based monitoring systems



Li Shuai
Assistant Professor
Department of Sustainable Biomaterials
Ph.D. (2012) University of Wisconsin-Madison;
B.E. (2007) Southwest University of Science and Technology, China

Special interests: Biomass fractionation; catalytic conversion of biomass to fuels and chemicals; lignin chemistry and lignin valorization; modification of cellulose, hemicellulose, and lignin; biomass-based polymers and composites

Future of coastal marshes lies with private property owners

A study published in the Proceedings of the National Academy of Sciences finds that coastal easements that protect marshland are not favored by private landowners, who will be integral partners in efforts to save coastal marshes in the face of climate change and rising sea levels. Whether landowners decide to leave room for marshes to move inland or instead build seawalls means either protecting tidal wetlands and their ecological benefits or losing them altogether.

The researchers, including Ashley Dayer, assistant professor of human dimensions in the Department of Fish and Wildlife Conservation, and colleagues at the University of Connecticut, surveyed more than 1,000 owners of Connecticut coastal properties and found that landowners whose properties flooded during Hurricane Sandy were 1.4 times more likely to say they would be willing to sell their vulnerable land outright. However, the researchers also noted that fewer than 100 properties in the study area were acquired during federal buyout programs implemented after recent hurricanes, though many more were eligible.

If land protection agreements aren't the answer, what offers more promise for the future of marshes? Surveyed landowners responded favorably to two strategies.

Under restrictive covenants, an entire neighborhood agrees to forgo building seawalls, which can be damaging because the walls can divert erosion and flooding to adjoining properties and natural habitats. Under future interest agreements, landowners agree to accept fair market value of their property at the time of signing if future flooding reduces the value by more than half.

The results of the study offer broad implications for how to best design programs to mitigate climate change effects. "Our findings indicate that current conservation strategies may not interest enough landowners to allow marsh migration at the scales needed to mitigate losses from sea-level rise," Dayer concluded. "Less common strategies that have more support from landowners will need to be considered. This is yet another example that incorporating information about human interests and behaviors into conservation planning is essential to securing conservation outcomes."

As sea levels rise, coastal property owners will have a pivotal role in protecting tidal wetlands and their ecological, economic, and recreational benefits.

Photo by Chris Elphick, University of Connecticut

Study highlights conservation needs of fish species recently discovered in Southwest Virginia

The Clinch dace, a species of minnow first discovered in Tazewell County, Virginia, in 1999, is currently in the state's highest tier of imperilment. Michael Moore ('16 M.S. fisheries and wildlife sciences) led a team of undergraduate students in a study that offers suggestions for further methods of study and conservation efforts.



The tiny Clinch dace, an extremely rare species typically found in forested streams, can serve as an indicator of water quality.

Photo by Rebecca Bourquin

The study compiles data collected on the Clinch dace from 70 stream segments in Tazewell and Russell counties. Moore compared the search for these 2-inch, black-striped minnows to a treasure hunt, explaining that even with effective capture techniques, detection is difficult because of the species' rarity. The team found the Clinch dace in less than 10 percent of the studied streams, an indication that conservation efforts are vital.

Professor Donald Orth, co-author, noted that there are many things that can be done to help protect Clinch dace populations in the area. "Forested areas near the streams protect the waterway, prevent erosion, and provide shade that keeps the water cool, so any permits that would allow renewed or expanded timber harvesting or surface mining should be scrutinized to ensure they avoid changing the forest cover or water quality," he said.

Efforts continue to learn more about the Clinch dace and its conservation. Master's student Rebecca Bourquin is collecting DNA samples from eight Clinch dace populations noted in the study to determine their genetic similarities and differences. She hopes that her work will help researchers and conservationists augment existing populations to prevent further extinctions.

Team creates system to forecast water quality

Two college faculty members have joined with ecologists, social scientists, geologists, and engineers to create a system that will help accurately predict drinking water quality. The team was awarded a \$1 million National Science Foundation Smart and Connected Communities grant to develop a system that can create a real-time water forecast for Falling Creek Reservoir near Roanoke, Virginia.

The system will collect multiple real-time environmental datasets, such as levels of metals in the water, presence of aquatic life, and oxygenation levels from current treatment, and use these data, along with local weather predictions and a state-of-the-art reservoir model, to forecast future water quality.

The system is based on a similar technique that forecasts forest growth in light of global change. Assistant Professor Quinn Thomas designed that technique and will implement it in this project as well. The system will transmit data to a cloud-based network available to scientists and water utility managers. "Our goal is to create probabilistic forecasts of water quality, similar to a '20 percent chance of rain' weather forecast," Thomas said.

Associate Professor Michael Sorice, an expert in the study of human dimensions of natural resource management, is tackling another facet of the project: researching the best way to ensure the forecasts will be integrated into management decisions. He will engage with water managers to understand current practices and how the new scientific data and technology could best be implemented into daily tasks. In addition, he will examine public perceptions of this new technology and its effect on public trust in the water authority.



Researchers gather water samples from Falling Creek Reservoir.

Mixing of farmed and wild fish could have adverse impacts on the environment

Through a pilot study in the Volta Lake region of Ghana, doctoral student Gifty Anane-Taabeah is working to protect one of that nation's primary food sources and most important species: tilapia.



Gifty Anane-Taabeah (right) and her advisor, Associate Professor Frimpong, measure water quality and collect fish samples in Ghana's Oti River.

Photo courtesy of Gifty Anane-Taabeah

Experts suspect that some fish farmers in Ghana have started to raise unapproved, controversial strains of tilapia. If such fish escape from holding facilities into nearby rivers and streams, which is a common phenomenon with farm fish, they pose the threat of breeding with wild tilapia. According to Anane-Taabeah, the mixing of farm fish with wild tilapia would be harmful to the species' genetic diversity and their environment. Anane-Taabeah conducted her study in the Volta Lake region, where tilapia cage farming is an established and growing commercial activity. She sought to learn which strains of tilapia are being grown, whether they include the unapproved strains of genetically improved farm tilapia, and whether there is significant mixing between them and wild tilapia.

"Gifty's research will not only fill a void in our understanding of aquaculture impacts and tilapia conservation needs, but her training in modern genetics technology at Virginia Tech is a real boost of expertise for aquaculture and conservation management in Ghana and the sub-Saharan Africa region," said Associate Professor Emmanuel Frimpong, Anane-Taabeah's co-advisor.

Alumni Profile: Kate Fritz

A lifetime of dedication to the Chesapeake Bay

In August 2017, alumna **Kate Fritz** was named executive director of the Alliance for the Chesapeake Bay, an organization dedicated to restoring the bay's rivers and streams through partnerships, collaboration, and individual and community stewardship.

This move represents the next step in an educational journey and professional career that, over the years, has allowed her to live in and help protect five of the seven Chesapeake Bay watershed jurisdictions.

Fritz started her career performing wetland and forest land delineations, then moved to land and water use policy, spending seven years with the Planning Department in Prince George's County, Maryland, where she worked on the county's General Plan.

"I loved working at the local level to improve policy, but I found myself craving more of a leadership role," Fritz recalled. "I was drawn to the Executive Master of Natural Resources program through the college's Center for Leadership in Global Sustainability because it's an executive master's. These are skills that any leader needs to have, and you learn to use them through the lens of sustainability. I use that framework all the time in my current position."

Fritz, who in 2012 was among the first Executive Master of Natural Resources (XMNR) graduates, was also drawn to the program's international aspect. "I thought I wanted to work overseas, so this let me get some international experience on my resume," she said. Fritz completed an international residency in China, where she and the rest of her cohort designed a sustainability strategy for a historic landmark hotel.



Upon completion of the program, however, Fritz decided to continue her work in the Chesapeake Bay watershed that she has called home for much of her life, accepting a position as executive director at the South River Foundation in Edgewater, Maryland.

In her current role as executive director of the Alliance for the Chesapeake Bay, Fritz uses the skills she learned in the XMNR program to impact the Chesapeake Bay on an even larger scale. She oversees the day-to-day operations of the organization, takes part in strategic planning, and works closely with volunteers and the board of directors.

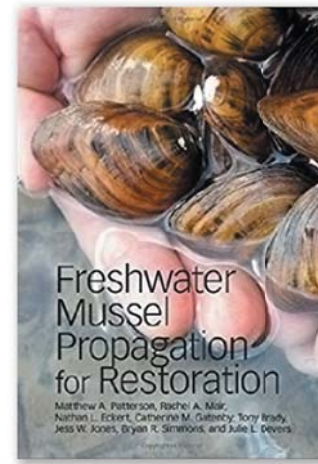
"I love seeing new locations and traveling around the watershed. I get to experience new geographies and have conversations with people about how we do our work and how we can help each other," she said.

Fritz was thrilled to learn that another XMNR graduate, Brian Macnamara, senior vice president and corporate controller of Host Hotels & Resorts, Inc., serves on the alliance's board of directors. "He's been exposed to the same sustainability framework that I was, so we can talk about operations from the same mindset. It gave us an instant sense of camaraderie," Fritz said.

"This organization works tirelessly for cleaner water in the Chesapeake Bay. It's their passion and drive that is contagious to me. I hope mine is to them as well," she added.



Mussel propagation book is a group effort



Several U.S. Fish and Wildlife Service scientists collaborated on the guidebook "Freshwater Mussel Propagation for Restoration," published in April 2018. Many freshwater mussel species are endangered as numbers decline worldwide. Propagation allows scientists to replicate the mussel breeding process and release new juveniles into the wild.

Five of the book's eight authors are Virginia Tech alumni: **Julie Devers** ('04 M.S. fisheries and wildlife sciences), **Catherine Gatenby** ('94 M.S. fisheries and wildlife sciences, '00 Ph.D. biological sciences), **Jess Jones** ('96 B.S., '04 M.S., '09 Ph.D. fisheries and wildlife sciences), **Rachel Mair** ('00 B.S., '13 M.S. fisheries and wildlife sciences), and **Matthew Patterson** ('99 M.S. biological sciences), who spearheaded the project.

"I think the book will help natural resource managers and mussel biologists think carefully about mussel propagation, how to plan for it, and all of the critical elements they will need to consider to be successful," said Jones, a restoration biologist for the U.S. Fish and Wildlife Service stationed at Virginia Tech. He is co-director of the university's Freshwater Mollusk Conservation Center.

The center, one of only a few university programs of its kind, has a long history of cooperation with state and federal agencies in its efforts to restore and recover endangered freshwater mussels in Virginia and adjacent states. It offers students valuable hands-on experience they can apply in their professional careers



Bunin brings GIS to K-12 classrooms

Chris Bunin ('95 B.A. history, '98 M.A.Ed. curriculum and instruction, '01 M.S. geography), a social studies teacher for more than 20 years, emphasizes skills that students need to become critical and responsible problem solvers. By focusing on an authentic problem, students conduct research to acquire and evaluate data and information, conduct analyses, and make decisions based on their findings. Bunin uses Geographic Information System (GIS) and other geospatial technologies in the classroom to bring challenging concepts and skills to life.

His interest and passion led him to co-author the textbook "GIS for Teachers: A Guide to Authentic K-12 Integration and Application," which guides teachers through the use of GIS in K-12 classrooms

in multiple settings and disciplines. "Geospatial technologies represent a leading-edge technology and high-demand skill set," Bunin said. "GIS allows teachers to bring challenging concepts and skills to life using a fun and engaging tool. Introducing GIS to students as early as elementary school provides experiences and opportunities that transform how information is presented, processed, and delivered."

Bunin, who teaches at Albemarle High School in Charlottesville, is also an adjunct associate professor at Piedmont Virginia Community College, teaches courses at Blue Ridge Community College, and is affiliated with the Virginia Geographic Alliance. Among his many awards, he received the National Council for Geographic Education's 2017 Brunn Creativity Award for Outstanding Teaching of Geography and 2014 Geographic Excellence in Media Award. The National Council for the Social Studies granted him the 2016 Outstanding Secondary Social Studies Teacher of the Year and the 2015 Grant for the Enhancement of Geographic Literacy.

Ensign receives career mentor award

Bill Ensign ('95 Ph.D. fisheries and wildlife sciences) received the Council on Undergraduate Research Biology Division Mature Career Mentor Award, reserved for scientists with greater than 19 years of experience mentoring undergraduate researchers. Ensign, a biology professor, has been at Kennesaw State University in Georgia since 1997.

The award acknowledged Ensign's "long-term efforts in supervising undergraduate research students." The council's judges recognized that many of Ensign's students look up to him as an inspiring mentor as well as a teacher who pushes them to work with their strengths.

Many of his students have presented their work at regional or national conferences. Ensign takes care to help each student understand the course material through open-ended lab activities, class time dealing with novel questions, and field experiences.

"Developing the skills necessary to understand the physical world requires practice," Ensign said. "I am constantly trying to create opportunities for students to learn how to observe, generalize, and make inferences about systems and structures with which they are not familiar."

Ensign expressed extreme gratitude at receiving the award and gave thanks to the Virginia Tech faculty members who were his model of dedication to students. "The assistance they provided was tailored to the

students' levels of need and knowledge, and was designed to facilitate progression both as a scientist and as an individual," he said. "It did not matter if the students were first-year undergraduates or final year Ph.D. candidates; the faculty gave their time, effort, knowledge, and compassion to each of them."



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Icebergs ahead! Students study ice, sea birds, and ecotourism in Antarctica



Photo by John Balyozian

Many people like to travel south to escape winter, but seven students in Associate Professor Lynn Resler's Humans and the Environment course took that desire to the extreme. The course, which developed out of a partnership between Virginia Tech's geography department, The Ohio State University, and The College at Brockport-SUNY, took faculty and students from all three schools on a two-week trek to Antarctica in December to learn about the region's physical and ecological systems, sustainable tourism, and the use of south polar resources.



Sea lions relax on rocks in the Beagle Channel in Tierra Del Fuego. Photo by Trish Liller

"Antarctica is such a unique place, and it remains so untouched compared to the rest of the world," said sophomore Maya Johnson. "I'm lucky to have traveled a lot, but sitting in the snow in Antarctica surrounded by penguins and wildlife that other people only imagine seeing was such an incredible experience."

In the fall, the students participated in a lecture-based course delivered online through live video lectures, which allowed students from the three schools to interact before their trip. They also chose a research project based on the lecture topics to work on while onboard the ship to Antarctica. "I was amazed at how students from all three schools bonded flawlessly," said senior John Balyozian. "Regardless of who you were or which school you attended, conversation was greeted with a smile and hello."

The participants began their excursion in Buenos Aires and traveled to Ushuaia, Argentina, where they learned about the town's expansion due to ecotourism and the impact the industry has had on its infrastructure, before boarding a ship bound for Antarctica.

"Our tour company, One Ocean Expeditions, was excellent in terms of their knowledge of the landscape and safety protocols," Resler said. "They had naturalists on their guide staff, so we worked with an ornithologist, wildlife biologists, experts in mountaineering, and professional photographers in the crew."

During the two-day voyage to Antarctica, the students broke into groups for their research projects. "This experience definitely opened my eyes to the dedication and requirements needed to complete accurate research," Johnson said.

Upon arrival, the group took inflatable zodiacs from the ship to the Antarctica Peninsula, where they spent most days hiking, visiting penguin colonies, and touring scientific research stations. They also heard lectures on the region's wildlife, history, and geology.

Senior Trish Liller was particularly amazed by the wildlife she saw. "On the first day in Antarctica, we were sailing back from seeing penguins and I saw a whale breach the

surface. When it surfaced again, it was right next to our zodiac. It was extremely gentle, and seemed so smart and curious about us. Seeing the different personalities in these animals really made me appreciate everything the world has to offer."

On Christmas Day, the group visited Deception Island, a volcanic caldera with ocean water filling its center. While no lava is present, shifting tectonic plates under the surface help classify it as an active volcano and warm the ocean water inside the island. "I can say I jumped into one of the remaining active volcanoes on the planet," Liller declared.

While the group slept on the ship and took the zodiacs to shore each day, the students had an opportunity to spend one night on the ice. "I was nervous about the idea of sleeping on Antarctica for the night, because we weren't allowed to go back to the ship unless absolutely necessary," Johnson recalled. "I didn't love the idea of being stuck out there for six hours, but it ended up being one of the coolest things to wake up on Antarctica in a sleeping bag, covered in fresh snow."

Balyozian added, "It's incredible that our school has a program to send their students to the end of the world to conduct research on everything from tourism and global warming to bird migration patterns."

Resler hopes to offer more study abroad opportunities in the future. "Mentoring students in such a transformative experience is very rewarding for me," she said. "The opportunity to experience a different worldview is invaluable as we become an increasingly globalized society. It fosters an appreciation of other people, cultures, and places. Not only that, it helps people to develop self-confidence and often develop long-term friendships and a broader sense of community."



The Virginia Tech group included (left to right) front row: Maya Johnson and Lilly Petzold; back row: Samantha Stutz, John Balyozian, Kylie Hericks, Trish Liller, Peyton Peay, and Associate Professor Lynn Resler. Photo courtesy of Trish Liller



The students were captivated by Antarctica's stunning landscape. Photo by John Balyozian



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