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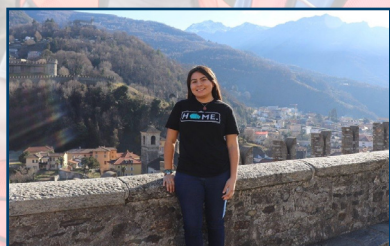
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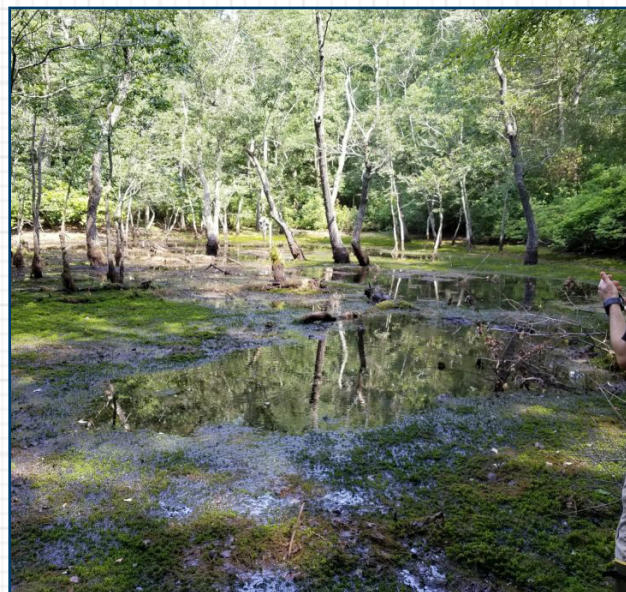
Alumni News

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Scientists using collaborative NSF grant to understand hydrologic controls on carbon processes in wetlands

Wetlands play an important role in the carbon cycle, aiding in the storage and distribution of this crucial energy resource. Now a collaborative grant from the National Science Foundation will allow scientists to research the linkages between hydrological and carbon dynamics taking place in forested wetlands to better understand the role that these ecosystems play in the export, storage, and emission of carbon.

“Wetlands are productive ecosystems, generating large amounts of vegetation biomass; at the same time, they also receive leaf fall and other carbon inputs from adjacent upland areas,” explained **Daniel McLaughlin**, assistant professor and principal investigator for the grant. “They can then store that carbon in organic soil, emit it as carbon dioxide or methane, or export it as dissolved organic carbon to downstream waters, where it will contribute to aquatic food webs,” he continued. “While these wetland carbon processes are well recognized, less is known regarding how they are regulated by water storage and exchange within networks of multiple, interacting wetlands.”



Delmarva bays are a common wetland type across the Delmarva Peninsula and can influence landscape carbon cycles.

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From the department head

What is forestry at Virginia Tech?

I receive a lot of questions around the theme of what forestry education looks like at Virginia Tech today. Given the many curriculum changes driven by the university and through our own attempts to improve our program, that certainly is a fair question. Over the years the most profound university curriculum changes have included a reduction in overall credit hours allowed for any major at Virginia Tech and an increase in the general education requirements for all students, and we ourselves have responded to the growing call for greater “soft” skills.

Through the changes, we have always sought to retain our core strengths while constantly looking for opportunities to expand our offerings into appropriate areas such as urban forestry, water resources, environmental data science, and the study of how humans interact with the environment. In all of our programs, traditional or not, we’ve sought to establish foundational knowledge of the underlying sciences (i.e., biology, chemistry, physics, and social sciences), which we utilize in our courses to build understanding of forests and environmental systems that are near to our hearts. We add to those basic and applied sciences our characteristic emphasis on hands-on field/experiential/professional work. We further pride ourselves in building our students’ problem-solving skills through analysis and design of solutions to real-world situations, examination of case studies, and capstone experiences. Most important, though, is that we continue to maintain a faculty and staff culture of dedication to students and teaching.

If all of that doesn’t sound much different than when you were in school, that might be because it isn’t. Certainly, we’ve had to be creative at times to fit everything in with the additional constraints we face, and we have exceptional advising to help our students navigate the complex curriculum. However, what we valued when you were in school, we still value: preparing our students to be the next generation of practitioners, problem solvers, and leaders in the world that they will face upon graduation and beyond.

A corollary to my original question is one that I also hear frequently: “Did you get rid of spring camp?” In fact, we eliminated our off-campus spring camp program more than 10 years ago due to the constraints placed increasingly upon our students to complete their degree programs in a timely fashion. The off-campus spring camp semester was so rigid that it ultimately became a hardship for students to work it into their complex schedules, especially for our transfer students, and our enrollment had declined substantially. Since that change, our enrollment has increased nearly 2.5 times. Notably, we were able to retain, and even slightly increase, the number of field hours our students experience through an intensive Blacksburg-based field lab experience.

Above all, I want to assure you that forestry education is alive and well at Virginia Tech, and we are confident you will see that when you hire our students, of whom we continue to be so proud!



Jay Sullivan



Highlights - teaching, research, extension

Scientists using collaborative NSF grant to understand hydrologic controls on carbon processes in wetlands

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With wetlands under threat from land use changes, it is crucial for scientists to understand how hydrology influences wetland carbon export and emissions in order to strengthen efforts to conserve and restore wetland ecosystems. To that end, Virginia Tech scientists will be working in collaboration with researchers from the University of Maryland and the University of Alabama to study isolated wetlands in the Delmarva Peninsula area of Maryland.

“We’re focused on a particular type of wetland in the Delmarva Peninsula called Delmarva bays,” said McLaughlin, who is also an affiliate of the Virginia Water Resources Research Center. “These depressional wetlands are small and geographically isolated, dotting the Delmarva landscape. Our work hopes to broadly inform wetland management in Delmarva and in other wetland-rich regions.”

Co-principal investigator Erin Hotchkiss, assistant professor in the Department of Biological Sciences, said that the project will use methods and knowledge from multiple disciplines to provide a comprehensive understanding of wetland dynamics.

The project will use state-of-the-art sensors to collect data, making simultaneous measurements of water storage and water exchange, dissolved organic carbon, and CO₂ and CH₄ emissions. These sensors will allow researchers to gather high-frequency measurements that will capture the relationship between carbon processes and wetland hydrology in real time.

Co-principal investigator Durelle Scott, associate professor in the Department of Biological Systems Engineering, said that this effort has broader ramifications for reducing the amount of carbon in the atmosphere. “When we restore wetlands, we’re often focused on restoring the hydrology and the habitat, but it’s important to also consider wetlands as a place for carbon sequestration,” said Scott.

Grant funding from the National Science Foundation’s Division of Environmental Biology totaling almost \$1 million is split between Virginia Tech and the University of Maryland.



A new grant aims to improve STEM-based field trips



Daniel Pratson ('19 M.S.) and Neil Savage ('17 B.S.) in between field sites at Zion National Park. Pratson and Savage traveled the country for five months, observing environmental education field trips and administering surveys.

Field trips can be transformative experiences for students. Having the chance to get outside the classroom, learn from passionate practitioners and educators, and encounter new places and ideas can broaden educational horizons for young learners. Now, a collaborative grant from the National Science Foundation will help Professor **Marc Stern** research a range of STEM-based environmental education programs to determine how best to promote positive learning outcomes for students.

“We’re looking into environmental education programs that are ubiquitous across the country, and we’re asking what factors are linked with better outcomes for students in the program. It’s a simple goal, but the study itself is very complex,” Stern said.

The study, which is shared among Virginia Tech, Clemson University, and the University of North Carolina–Wilmington, will observe 500 single-day environmental education field trips, identifying which program characteristics are most commonly associated with positive learning outcomes. A second aspect of the project will be to understand these characteristics within a broad range of socio-economic contexts to improve educational outcomes for a diversity of audiences.

Each field trip observed in the new study will be assessed by criteria that Stern developed with Professor Robert Powell of Clemson. The data collected will be

merged with earlier data to create a comprehensive study of some 800 educational programs, measuring outcomes of environmental literacy, positive youth development, and a sense-of-place connection between students and their environment.

Stern and Powell have been collaboratively researching environmental education outcomes for 15 years. The third investigator on the project, Assistant Professor Troy Frensley of the University of North Carolina–Wilmington, completed his doctorate with Stern at Virginia Tech.

Stern said that while some of the specific characteristics, including group size and the passion of the trip leader, are obvious factors related to student outcomes, the research is finding that some less commonly considered factors are also significantly related to student outcomes.

“One thing we’re finding crucial is the power of transitions between activities,” Stern explained. “Say you have a group of students in the forest. The instructor can say something like, ‘We’re going to go over this hill, and as we do so, you’re going to notice that the landscape changes. I want you to pay attention to that, and when we get to the other side, I’m going to ask you how it changed and why that might’ve happened.’ It’s a small detail, how an instructor manages a transition like that, but it turns out to be a crucial component to giving students a richer experience. We’re finding all sorts of lessons like that, all sorts of ways to better learning outcomes.”

Another aspect that Stern cites is the challenge of “novelty,” and how to strike the appropriate balance between something that is well-known to students and something that is completely new. “If you’re not making a connection between novel information and at least something the kids already know, the experience can be lost on them. Exposing kids to new things in a way that relates to their lives is critical.”

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A new grant aims to improve STEM-based field trips

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The \$1.9 million grant, which runs through 2023, is funded through the National Science Foundation's Advancing Informal Science Learning program, which seeks to advance STEM education experiences by building connections among students, researchers, and educators. "All of the empirical research says that if you want to influence young students and instill skills and get them motivated to learn, getting them out in the field and getting them to be active learners instead of passive receivers of information is the way to do it," Stern said. "This is where the whole field of teaching and learning is headed, and we want to make sure we're making the best use of these educational opportunities."



Daniel Pratson ('19 M.S.) administering the survey.

Forest Modeling Research Cooperative holds 41st Annual Meeting



FMRC annual meeting participants.

The 41st Annual Meeting of the Forest Modeling Research Cooperative (FMRC) was hosted by Resource Management Service (RMS) in Georgetown, South Carolina, December 4-5, 2019. Some 30 participants from throughout the southeastern U.S. and a representative from Mondi, an international company headquartered in South Africa, attended the meeting.

RMS personnel led a field trip consisting of multiple stops at forest research installations and operational trials aimed at assessing genetic improvement and silvicultural treatment effects on stand growth and value.

During an indoor session, FREC faculty members **Harold Burkhart, Corey Green, and David Carter**

summarized projects completed during the year and ongoing work toward the incorporation of auxiliary information into forest inventories for resource assessment and projection. A major focus of the meeting was discussion of a proposed study to improve the ability to estimate response to silviculture following mid-rotation thinning.

The mission of the FMRC is to develop tree growth and stand development models that advance the science of forest modeling and provide land managers with decision support capabilities needed to practice economically viable and environmentally sustainable forest management.

Researchers seek to impact New Zealand water quality by understanding forest-water interactions



Kevin McGuire (left) and Brian Strahm are partnering on a project to better understand the dynamics of water and nutrients in forest systems in New Zealand. Photo by David Fleming, Virginia Tech.

Forest systems, a crucial resource for fresh water around the world, are under increasing pressure from global change factors like climate change, population growth, and land management decisions. To meet future demands for clean water, scientists need a clear understanding of the dynamics of water and nutrients in forest systems.

To broaden understanding of those systems, **Brian Strahm** and **Kevin McGuire**, both associate professors, are partnering with the New Zealand government-owned research entity Scion. They are undertaking an ambitious collaborative project that will utilize remote sensing technology, isotopic tracing, and manipulative field studies to develop a comprehensive model of water and nutrient flow through forested watersheds and streams.

“One of the big questions facing New Zealand is how climate change drivers and land use changes are going to affect ecosystem services,” explained Strahm. “There is a lot of uncertainty about what the future will look like. The broad purpose of this grant is to try to reduce some of that uncertainty and give the people of New Zealand confidence in their land use choices going forward.”

The five-year research project, called Forest Flows, will develop forest hydrology models to measure and predict the storage and release of water in forest catchments while simultaneously allowing scientists to collect data on nutrient cycling, with a particular emphasis on the export, utilization, and cycling of nitrogen.

“A major goal is to disentangle the soil and hydrologic processes controlling nutrient cycling and export from forested watersheds,” said McGuire, who is also associate director of the Virginia Water Resources Research Center. “You can’t really look at the cycling of nitrogen at the watershed level without understanding how it’s transported and reacts within soil.” To explore that question, researchers will use isotopic “tracers” in the water and in nitrogen to measure the movement of water and nutrients through a forest system.

“We’ll be using stable isotopes to track the movement of water and nitrogen through these systems,” Strahm said. “It’s a little like putting a flag or a tracker on a molecule of water or an atom of nitrogen and seeing where it goes through the environment.”

This research will build on their recent study published in the journal *Water Resources Research* that modeled hillslope water flow to estimate how natural systems behave in response to land use or climate changes. That research was carried out at the U.S. Forest Service’s Coweeta Hydrological Lab in North Carolina.

“New Zealand wants to understand this challenge at the scale of their nation, so that they can better understand how independent land management decisions will scale up to impact water quality moving ahead,” Strahm said. “They want to be prepared to deal with future climate change drivers and make sure that their land use decisions are compatible with their social and cultural values.” While the project is focused on the unique challenges of New Zealand forest watersheds, both professors noted that this research has both local and global implications.

The project’s total grant amount of approximately \$9 million is funded to Scion by the New Zealand Ministry of Business, Innovation, and Employment. Virginia Tech’s subcontract from Scion will include support for a student researcher to participate in the project.

Kennedy Family's legacy of giving supports research throughout CNRE

For Jan and Kit Kennedy, giving to Virginia Tech is more than a satisfying way to make a difference: It is a chance for the brothers to cultivate new relationships with faculty and students in CNRE while honoring a legacy of generosity that began with their father, Robert J. Kennedy, five decades ago.

The Kennedy patriarch came to Virginia Tech seeking help for the family tree farm, originally a 400-acre property (now 1,500 acres) in central Virginia where generations of the family have gathered to spend time managing the forests and developing good stewardship practices.

"My father came to Virginia Tech for assistance because it was a land-grant college," Jan Kennedy said. "At the time, the College of Natural Resources and Environment was a program in the College of Agriculture. My father met with **John Hosner**, who was in charge of the program, and developed a strong friendship with him. The family has been involved with and supported the school ever since."

From the beginning, the brothers recall, University Distinguished Professor **Harold Burkhart** in FREC has been invaluable in helping their family and their private forester, Bob Warring, a Virginia Tech forestry graduate, manage the planting, thinning, and harvesting of their 29 loblolly plantations. The Kennedys are pleased that data from some of their plantations have been used to verify and calibrate Burkhart's loblolly pine growth model.

The Kennedy family's generosity supports several research projects in FREC. They are helping to fund forest fire ecology research under the direction of Assistant Professor **Adam Coates** as well as a project by Assistant Professor **David Carter** that will utilize lidar remote sensing technology to categorize understory vegetation in intensively managed pine plantations.

Professor Marcella Kelly in the Department of Fish and Wildlife Conservation met the Kennedy family when she joined Virginia Tech in 2001. "We did an inventory of the animals there, and, thanks to their early

investments in our work, we were able to experiment with video monitoring and remote cameras." Kelly is still a presence on the Kennedy land today, and the family's most recent gift to support her research will fund cameras to document how bears behave in the wild. Assistant Professor Michael Cherry, Kelly's colleague, has received funding to explore crucial questions about deer population survival rates.

The family has been a longtime supporter of the Wood Enterprise Institute, a student-run business venture based in the Department of Sustainable Biomaterials in which students develop, manufacture, market, and distribute a wood-based product. The Kennedys have also worked with faculty and students to develop trails on their property to highlight its scenery, wildlife, and a mine that predates the California gold rush.

For the Kennedy family, giving to Virginia Tech is a way to honor Robert J. Kennedy's legacy and to ensure that his passion for protecting and preserving natural spaces — and using those spaces to foster kinship and strengthen the bonds of family through shared work — will endure. According to Jan and Kit Kennedy, their greatest honor was for their father to be selected Virginia's first Outstanding Tree Farmer of the Year in 1975 and for them to earn the same honor in 2016. They emphasize that Virginia Tech deserves a lot of credit for achieving these honors.



International Society of Arboriculture annual meeting

The department hosted the annual meeting of the Mid-Atlantic Chapter of the International Society of Arboriculture (MAC-ISA) in October 2019.

The educational and networking event held at the Inn at Virginia Tech lasted two days and was attended by over 300 arborists and urban foresters from Virginia, West Virginia, Maryland, and Washington, D.C.



Eric Wiseman

Associate Professor **Eric Wiseman** was awarded Volunteer of the Year at the meeting. Wiseman planned the meeting by securing all of the speakers, transportation, and use permits for sites on campus along with coordinating the needs of all field day speakers. He also worked on creating the new MAC-ISA Arborist Certification Course, developing the schedule and helping with the design and layout of the presentation.

The MAC-ISA is a trade association for arborists, urban foresters, and others involved in the caring of trees. Their mission is

“to promote a culture of safety while fostering education and research that supports the care and benefits of trees.”



Attendees of the 2019 annual meeting of the MAC-ISA.

Virginia Big Tree Program recognized



Newly crowned champion honey locust in Botetourt County.

The Virginia Big Tree Program was recognized by American Forests in November for having 96 national champion and co-champion big trees in the state during 2019. Virginia is second only to Florida for the number of champion big trees.

The mission of American Forests is to inspire and advance the conservation of forests, which are essential to life. This is done by protecting and restoring threatened forest ecosystems, promoting and expanding urban forests, and increasing the understanding of the importance of forests.



43rd Annual Forestry and Wildlife Field Tours held

The College of Natural Resources and Environment's Virginia Forest Landowner Education Program (VFLEP) and Virginia Cooperative Extension, in collaboration with Virginia's natural resource agencies, companies, and associations, held the 43rd Annual Fall Forestry and Wildlife Field Tours in October 2019. The three tours visited sites in Floyd County, Charlotte County, and Fredericksburg and Stafford counties.

"The field tour series is the longest running program of its kind in Virginia, and perhaps even the country," said **Jennifer Gagnon**, VFLEP coordinator.



Jennifer Gagnon

The annual tours offer landowners, natural resource professionals, and other interested Virginians the opportunity to spend a day in the field visiting a variety of properties that are actively managed for timber and wildlife. Participants visit private, industry, and public lands that center on multiple-use management opportunities and practices.

The tours promote wise resource management on private forestlands and focus on science-based forestry and wildlife management practices, public and private sources of technical and financial management assistance, and networking among landowners and natural resource professionals. The experience provides a perfect setting for landowners to discuss their forest management issues with professionals in an informal setting, as well as to network with their peers. A limited number of scholarships are offered each year for K-12 teachers.

For more information on upcoming VFLEP programs, visit forestupdate.frec.vt.edu.

Multi-university grant awarded



Eric Wiseman

Associate Professor **Eric Wiseman** and Assistant Professor **Stella Schons** are part of a multi-university team that has been awarded a grant by the U.S. Forest Service to study the economic contribution of the urban forestry industry in 13 southeastern states. The lead university is North Carolina State University. Other universities on the project include the Ohio State University, Mississippi State University, the University of Georgia, and the University of Kentucky.



Stella Schons



Global Change Center partners with Hollins University to promote undergraduate research opportunities



Hollins University students Grishma Bhattarai (left) and Udipta Bohara presented their research findings during the 2019 Summer Research Symposium at Virginia Tech. Photo courtesy of Virginia Tech.

A partnership between Virginia Tech's Global Change Center (GCC) and Hollins University will continue to blossom into its third year, pairing distinguished undergraduate students with Virginia Tech professors for a summer of unique research opportunities.

The GCC is housed under the Fralin Life Sciences Institute and directed by Professor William Hopkins of the Department of Fish and Wildlife Conservation. In summer 2019, the center hosted Hollins University students Udipta Bohara, a junior majoring in biology with minors in mathematics and chemistry, and Grishma Bhattarai, a senior double-majoring in economics and mathematics. Both aspire to complete advanced degrees after graduating. By working at Virginia Tech with faculty members **Kelly Cobourn** of FREC and Dana Hawley and Kendra Sewall

of Biological Sciences, they gained understanding about what it's like to work closely with research faculty on complex projects.

Bhattarai's experiences with Cobourn focused on investigating food insecurity as a function of assistance programs and gender. She wondered if food assistance is more effective for male- or female-headed households and explored exactly how people are being helped (if at all) and whether assistance improves their access to food. Bhattarai's interest in economics and gender combined perfectly with Cobourn's own interests in creating models to predict food insecurity in regions like South Sudan and Ethiopia.

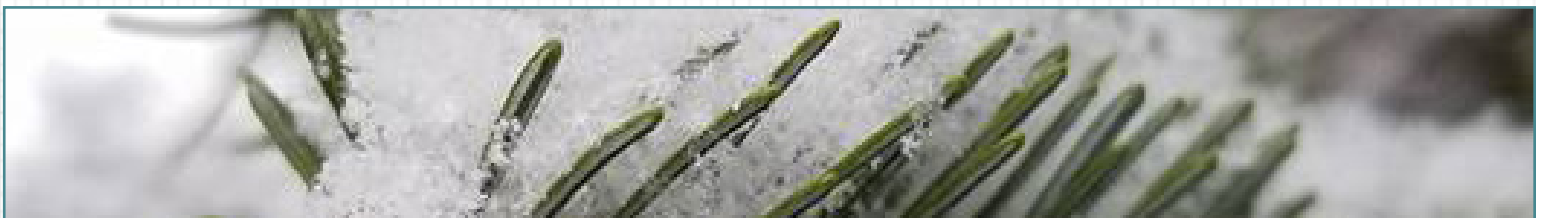
Bhattarai presented her research at an international applied agriculture and economics conference in Atlanta. "It was the experience of a lifetime for me personally, to be surrounded by people in academia driven to solve the world's problems with their research. It was an amazing opportunity."

"Bhattarai has been wonderful to work with," said Cobourn. "She's very intrinsically motivated, energetic, and self-directed. She had a clear idea of what she wanted to do, and all I had to do was steer her toward the right questions. It's important to recognize that being able to do all this research in two months is phenomenal."

In Hawley's biology lab, Bohara worked on a project seeking to understand the differences in how long the bacterial pathogen *Mycoplasma gallisepticum* stays active in different environments. This bacterium can cause severe eye infections in songbirds, and researchers are currently trying to discern just how virulent the disease is and how long it can remain active on a birdfeeder, where it is most commonly spread. Bohara's work involved taking blood samples from birds and swabbing bird feeders as well as setting up and running DNA and RNA-based assays.

Bhattarai and Bohara agree that the opportunity to participate in intensive research at Virginia Tech has helped them better understand what graduate school might look like, laying a solid foundation for these students' future careers in research. Collaborative work, positive mentorship, and exciting research made for a rewarding summer for both students.

The GCC's mission is to advance interdisciplinary scholarship and education to address critical global changes impacting the environment and society. For more information about the Hollins-GCC partnership, visit globalchange.vt.edu.



The United Nations Framework Convention on Climate Change holds 25th Conference of the Parties



(Left to right): Carol Franco (FREC), Luis Marcelo Tavares (University of Lavras, Brazil), Stella Schons (FREC), and Solhanlle Bonilla-Duarte (INTEC).

Franco and Schons had the opportunity to organize and lead, together with the Technological Institute of Santo Domingo, a side event for the Capacity Building Hub. This event showcased the ongoing research-based collaboration between FREC and research institutions located across the Americas. These collaboration efforts aim to generate and share knowledge, lessons learned, data management and analysis, and recommendations to streamline the design and implementation of national climate change mitigation and adaptation policies.

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The United Nations Framework Convention on Climate Change held its 25th Conference of the Parties (COP25) in Madrid, Spain, December 3-15, 2019. In spite of the fact that the venue had to be changed from Chile to Madrid in November 2019, around 27,000 participants from government, NGOs, the private sector, academia, and the media attended the conference.

Two important outcomes from COP25 were the approval of a new Gender Action Plan and the highly anticipated Work Plan of the Local Communities and Indigenous Peoples Platform. Although no agreement was reached on some key topics (carbon markets, loss and damage) and discussions will continue in 2020, COP25 helped pave the way for increasing ambition in emission reductions through the new and/or updated National Determined Contributions commitments, and the entering into force of the Paris Agreement, which will take place at COP26 in Glasgow, Scotland, in November 2020.

Research Associate **Carol Franco** led the Virginia Tech delegation and took students **Ryan Mahoney** from FREC and **Owen Callahan** from Psychology to COP25 so they could experience firsthand high-level global climate policy development through the study abroad course Climate Change and the International Policy Framework. Three other faculty members from CNRE attended the COP for the first time: **Stella Schons** and **John McGee** from FREC, and **Lynn Resler** from Geography.



(Left to right): John McGee (FREC), Owen Callahan (Psychology student), Carol Franco (FREC), and Ryan Mahoney (FREC student).



Virginia Tech faculty delegation (left to right): Stella Schons, Carol Franco, John McGee, and Lynn Resler (Geography).

The United Nations Framework Convention on Climate Change holds 25th Conference of the Parties

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Virginia Tech student delegation: Owen Callahan (Psychology student) and Ryan Mahoney (FREC student) with Eduardo Calvo, IPCC co-chair.

“Attending the COP was a life-changing experience as it made the importance of climate change a reality in my

life,” said Mahoney. “I was unaware of just how urgent and extreme the situation was until I witnessed international climate change negotiations firsthand. I was able to meet many other students from around the country and the world. What I learned was that Virginia Tech’s CNRE program and FREC program and professors absolutely blow every other university out of the water. The education I’ve been awarded stands alone in terms of mentally preparing myself for life after college.”

McGee added, “I returned from the COP with a more comprehensive understanding of the challenges and opportunities associated with local, regional, and global climate change mitigation and adaption efforts. This opportunity has personally spurred a renewed sense of urgency and purpose that I will continue to share with my students and through other programs and initiatives.”

Using data to protect the lakes we love

If you visited a lake this past summer for a day at the beach or on a boat, you know how relaxing and refreshing time on and around the water can be.

A team of researchers led by FREC Associate Professor **Kelly Cobourn** has been exploring the ecological impact of humans on lakes, as well as how these bodies of water can impact

people, with a goal of producing a new model for use in protecting and maintaining lakes.

At the heart of their effort is data.

The team collected data for pristine and polluted lakes across the north

central and northeastern U.S. on land use and management decisions, and the organizations formed by people to protect their lakes. The team uses the data to study how humans affect, and are affected by, changes in water quality.

“People derive a lot of value from connecting with lakes,” said Cobourn, who is also a Global Change Center affiliate. “We also understand that humans degrade the quality of lakes with some of the choices they make. We provide a road map for understanding and approaching these problems that hasn’t been used before.”



Associate Professor Kelly Cobourn (left) explores the ecological impact of humans on lakes with a goal of producing a new model for use in protecting and maintaining lakes.

DRIVEN BY DATA

Through its Data + Decisions Destination Area, Virginia Tech inventively interweaves data science into its curriculum. Meet a faculty member using data in novel and world-changing ways.

Mapping With Drones Workshops offered across Virginia

Small Unmanned Aircraft Systems (sUAS), also known as drones, are permeating many sectors of industry. They are increasingly being employed as data collection platforms to support an array of applications that span disciplines and industries, including planning, natural resource management, marketing, inspection of structures, agricultural production, permitting, STEM education, and public safety.

The Virginia Geospatial Extension Program, including FREC faculty member John McGee, is hosting a series of two introductory-level Mapping With Drones workshops at three locations around the state during February and March. No prior drone experience is necessary.

The curriculum has been divided into two back-to-back workshop sessions. Individuals can elect to attend one or both sessions.

- Workshop #1: Preparing for the FAA's Pilot Certificate Exam (aka Part 107)
- Workshop #2: Flight Operation, Data Collection, and Image Processing Basics

The workshops are targeted to natural resource professionals, planners, public safety professionals, agricultural operators, and educators.

The workshop schedule is as follows:

- Feb. 18-20 in Blacksburg
- March 3-5 in Culpeper
- March 31-April 2 in Petersburg

The workshop is sponsored by the Virginia Geospatial Extension Program in partnership with Virginia Cooperative Extension, Virginia Tech's Conservation Management Institute, VirginiaView, and the Geospatial Technician Education–Unmanned Aircraft System (GeoTEd-UAS) project team.

Visit frec.vt.edu/announcements/drones1.html for details on times, locations, fees, and a link to register for the remaining programs.



Weather permitting, the workshops will include flight demonstrations and opportunities for participants to operate unmanned aircraft. Photo by Stacey Kuhar.



Spotlight - faculty, staff, students

Seiler chosen to deliver commencement keynote speech

John Seiler, the Honorable and Mrs. Shelton H. Short Jr. Professor of Forestry, was chosen to deliver the keynote address at Virginia Tech's 2019 fall undergraduate commencement ceremony in Cassell Coliseum on December 20.

Seiler has been a faculty member in FREC since 1985. During his career at Virginia Tech, he has garnered a host of teaching and service awards at the university, state, national, and international levels, including the university's William E. Wine Award for Teaching Excellence, the Society of American Foresters' Carl Alvin Schenck Award for outstanding performance in forestry education, and the State Council of Higher Education for Virginia Outstanding Faculty Award. In 2010, he was named an Alumni Distinguished Professor.



John Seiler

Seiler specializes in environmental stress effects on woody plant physiology, including water and pollutant stresses. He has been studying trees for nearly 40 years and, along with his students and colleagues, has produced more than 110 refereed articles. Seiler is known for his work with departmental colleagues in developing an array of multimedia teaching tools that assist students learning about North American tree identification and forest biology, including the most widely used and downloaded tree identification app (vTree). He is also quoted regularly in broadcast and print publications, especially in the fall as media and the public seek out his annual predictions for autumn color.

To his students, Seiler is "Dr. Dendro," and passing his Forest Biology and Dendrology course is akin to a badge of honor. Over his years at Virginia Tech, he has taught a wide variety of both undergraduate and graduate courses and has worked with students ranging from kindergartners to retirees. If a group wants to learn about trees, Dr. Dendro will be there to teach them. Seiler personally answers thousands of tree-related questions submitted by the public online through the vTree app and website each year.

"I have always considered myself a 'blue-collar' teaching professor, so getting to speak to all fall undergraduates as one last class for the semester is a great honor and possibly the highlight of my teaching career," Seiler said.

Seiler holds bachelor's and master's degrees from The Pennsylvania State University and earned his doctorate at Virginia Tech in 1984.



John Seiler (center, wearing hat) gave the keynote speech at the university commencement ceremony on December 20.

Students' summer research experience focuses on forest ecological assessment

Two FREC students spent last summer surveying a section of forest located on the southwestern corner of Virginia Tech's campus, west of Route 460. Seth Ramsay and Erika Wright, both environmental resources management majors, conducted an ecological assessment of the 39-acre forest. Their first step was to install permanent plot posts in the forest: metal stakes surrounded by PVC that can be relocated using GPS and a metal detector. From each of these points, the students measured a circular plot and inventoried and measured trees and shrubs within the resulting area.

"For each plot, we measured the height and diameter of every tree and identified the species," said Wright, a junior. "This allowed us to get an idea of the average sizes of trees in the forest while identifying the common species."

Ramsay, a May 2019 graduate who joined the Peace Corps as an agricultural forestry volunteer last fall, said that another important aspect of the survey was tagging and inventorying every tree in the forest that exceeded a specific trunk diameter. "We selected a diameter class that we wanted to tag and collected data and characteristics for all of the prominent tree groups," he explained. "Everything over 22 inches in diameter was tagged and recorded — a total of 496 trees. We used that information to determine the age and structure of the forest, and to understand the distribution of tree species."

To make an accurate determination of the ages of individual trees, the students took coring samples from some of the larger trees. The process, which involves using a tool called an increment borer to take a pencil-thick sample of the tree, is minimally invasive: A tree will generally close the hole in one or two seasons.

"It's really cool because when you core a tree you find out a lot that you couldn't know just by looking at it," Wright said. "It helps us understand how different species grow and compete, and the results are often surprising. We cored a 26-inch diameter pignut hickory and a 46-inch northern red oak and discovered that the red oak was only about 60 years old, while the hickory was at least 125 years old."

The students' research in the area sometimes referred to as Hoot Owl Woods has surprised campus tree experts. Professor John Seiler, who initiated the survey project and supervised Ramsay and Wright, notes that the results reveal that the forest has a significantly different composition and history than the forested area on campus known as Stadium Woods that borders Lane Stadium.

"One of the exciting things we're finding is that these woods are nothing like the Stadium Woods forest on the east side of campus," said Seiler. "Just about everyone expected that this forest would have the same cohort of trees as Stadium Woods, which has white oaks that date back to before the American Revolution. What we're finding is that the trees in this other forest are much younger, and the composition is mostly hickory and red oaks."

Seiler said that this discovery opens up new research questions, not just in terms of forest structures but in better understanding the history of humans on the land now occupied by Virginia Tech. "The story we're imagining is that the area was harvested up until a hundred years ago," Seiler said. "If that's so, you could dig deeper into the regeneration that's there and work backwards to figure out how the northern red oaks got there."

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Erika Wright (right) carefully pulls a core out of a large white oak; Seth Ramsay waits with a special tube designed to protect it during transport. After examination in the lab, they determined that the tree was at least 270 years old.

Students' summer research experience focuses on forest ecological assessment

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Seth Ramsay (left) uses a tool called a clinometer to measure the height of a tree while Erika Wright records the measurements.

"Why is hickory so prevalent in these woods but absent in Stadium Woods?" Seiler continued. "This survey gives us some insights into what people might have been using the land for, but at some point, it'd be exciting to blend that information with whatever archival history can be pieced together."

For Wright and Ramsay, the opportunity to put into practice techniques that they've learned about in the classroom has been an invaluable experience. "This was my first experience doing field work of this nature, and I really enjoyed being out in the woods," Wright said. "One of the most incredible feelings is spending a day in the thick forest and then stepping out and feeling the temperature difference at the end of the day."

A report of their findings was submitted to college leadership on August 1.

FREC student is first Hokie to receive Udall Scholarship in tribal policy

Nizhoni Tallas, a junior natural resources conservation major in FREC, is the first Virginia Tech student to receive a Udall Undergraduate Scholarship in the tribal policy category. These national scholarships are awarded annually by the Morris K. Udall and Stewart L. Udall Foundation to students who demonstrate exceptional leadership, a dedication to public service, and a commitment to environmental issues, particularly as they relate to Native American communities.

Tallas, who grew up in northeastern Arizona on the Navajo Reservation, says her passion for the environment started at a young age. "Growing up, I lived in a very rural area," Tallas said. "There was a mesa right by my house and a canyon in my backyard, so just having the outdoors at my fingertips made it more accessible. I didn't have internet or anything, and there wasn't much to do except to go outside and explore. My love for the environment started there, just hiking around and picking up plants and seeing the animals that lived in the desert."

"There are a broad range of environmental issues that I've seen growing up on the Navajo Nation," Tallas said. "One aspect I'm particularly interested in is learning more about environmental policy and planning and how that influences tribal governments and what occurs in those communities."

Tallas drew on both her interests and her education during a five-day conference with fellow scholarship recipients in Tucson, Arizona. She worked on case studies while learning new ways to collaborate on environmental and social justice challenges, and cultivated connections with professionals working on land management and tribal issues.

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Nizhoni Tallas

Student channels life-threatening diagnosis into a passion for wildland fire management

John Kese, a senior in FREC, spent the better part of last summer hiking through Great Smoky Mountains National Park, leading a team of fellow students researching how much fuel mass exists in the forest understory and estimating wildfire risks for the area.

For any student aspiring to work in the outdoors, this would be a challenging adventure and an opportunity to gain new skills in the field. For Kese, the experience was something more: “When a doctor tells you that he’s not sure you’ll ever walk again, and you find yourself running up and down the mountains in the Smokies, that’s reward enough right there.”

A difficult diagnosis

John Kese was supposed to be a baseball player. “All along, my goal was to play college baseball,” he said. But a high school injury led to an MRI, which revealed that he had something called Arnold-Chiari malformation. Kese’s condition was severe: the base of his brain was blocking the flow of spinal cord fluid. During the next year, Kese endured 11 brain and spine surgeries and had shunts placed in his spine and brain. “I had to learn how to walk and how to write and everything in between,” he explained. “It was a rough time, but it built me into a better, stronger person.”

Igniting a new passion at Virginia Tech

With a career in baseball no longer an option, Kese found a new path forward through his childhood interests in forestry and the outdoors. While growing up in Bedford County, he helped his parents manage 600 acres of family land. The work included conducting prescribed burns with his father as part of their land management plan.

“We’d been doing prescribed burns on our land since I was a kid,” he explained. “When I turned 16, I started to really focus on getting my certification to work on wildfires. I was in my senior year of high school when I finally got it, and I remember getting my first detail on a fire out in Goshen. That experience was when I knew I wanted a career in this field. Walking off a mountain when it’s pitch dark and all you can see are the glowing embers throughout the woods was a life-changing experience for me.”



John Kese, far right, and fellow students, left to right, Amy Denny (sitting), Cora Every, Brandon Hughes, Nick Boley, and Leah Wood sampled forest fuel loads in Virginia Tech’s Fishburn Forest in June.

A presentation at Kese’s high school by CNRE Director of Recruitment John Gray Williams helped him find his way to Virginia Tech. He was invited to campus for a private interview and tour, and says, “I fell in love with the place.”

Measuring fire risk

To FREC Assistant Professor **Adam Coates**, Kese stood out almost immediately. “I first met John in my role as faculty advisor for the Wildland Fire Crew at Virginia Tech,” Coates explained. “He really impressed me with his work ethic: He’s prompt and professional and self-directed.” When Coates needed someone to lead a group of students to research wildfire hazards and risks in Great Smoky Mountains National Park in the summer of 2019, he knew just whom to ask.

“We have photos and data documenting how much material was located at specific sites within the park 15 years ago,” Coates said, outlining the project. “Since that research was conducted, a lot of different diseases and pests have potentially affected the forest significantly, most notably the hemlock woolly adelgid. Our task was to revisit these plots and measure fuels as they exist today to determine how fuels and potential wildfire risk might have changed over time.”

To conduct this research, Kese and two other Virginia Tech forestry students, Nick Foley and Brandon Hughes, spent

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Student channels life-threatening diagnosis into a passion for wildland fire management

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days hiking through the forest, using a GPS unit to locate the various plots scattered throughout the park. “Normally we’d start our day at sunrise and be out there for 12 to 14 hours,” Kese said. “It was hard work — the Smokies are *real* mountains, so it was a struggle for us to acclimate to the terrain. But it was a great experience, and we met some great people out there.”

Kese’s work on wildland fire research last summer extended beyond the Smokies. He helped FREC doctoral student George Hahn complete fuel tallies in the George Washington and Jefferson National Forest. Then he traveled to Athens, Georgia, to work with the U.S. Forest Service’s Southern Research Station and gained experience in new terrain and a different fire regime.

Coates says that these kinds of summer field experiences are a valuable test for aspiring wildland fire technicians.

“With anything related to working with fire, so much of it is about flexibility,” he said. “Being able to adjust when conditions change and having the right attitude that you’re going to learn something no matter what happens, even if things don’t happen quite as you expect them to, is crucial to having success in the field. John has that flexibility and the capacity to get the work done. He’s a hard worker, and I appreciate everything he’s done this summer.”

For Kese, the life-changing path from aspiring baseball player to aspiring forester has been a trial by diagnosis that has led to a future in fire. “They say that good things come out of bad situations, and I think that’s definitely the case for me,” Kese reflected. “I try to look at those things and where I am now, where I’m doing something that I love every day, and I wouldn’t change it. I think there’s a reason why something like this happens, and I’m very grateful for the path I’m on now.”

FREC student is first Hokie to receive Udall Scholarship in tribal policy

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Though Tallas admits that she felt somewhat isolated when she first arrived in Blacksburg, she soon found a community with Native at Virginia Tech, a student group that aims to increase awareness and visibility for American Indians and other indigenous people on campus. “Coming to Virginia Tech was different,” Tallas explained. “At home I was always surrounded by people who spoke my language and understood when I talked about my culture and various tribal issues. Getting involved with Native at VT was awesome because I got to meet other Native students at Tech and form a community that I was able to have these conversations with.”

“Nizhoni stands out as one of our leaders on campus,” said Melissa Faircloth, director of Virginia Tech’s American Indian and Indigenous Community Center. “We’re lucky to have her and we’re proud of everything she’s doing. I know that Nizhoni is a student who will take her science background and apply it to some of the challenges faced within indigenous communities.”

Indeed, Tallas is already tackling some of those challenges. In high school, she created a prototype to heat water for the people in her community who still live in traditional houses. With Faircloth, Tallas presented her project at the American Indian Women of Proud Nations conference in 2018.

Tallas was one of four Hokies this past year to receive a Benjamin A. Gilman International Scholarship, which she used to study at Virginia Tech’s Steger Center for International Scholarship in Riva San Vitale, Switzerland, during the spring 2019 semester. She also received a Beyond Boundaries scholarship, which supports students from underserved communities among others, and has served as an ambassador for the program, speaking about her experiences as a Native student studying in a STEM field.

Looking forward, Tallas hopes that she will be able to utilize her experiences and knowledge to better serve the Navajo community. “I’d love to be serving the Navajo community five to 10 years from now, building my career around the needs of the community and figuring out what the priorities are and how to work with them,” Tallas explained. “I’d like to contribute to the conservation of our natural resources and help motivate indigenous students to pursue higher education.”

Class of 2019: Jonathan Reynolds is ready for a career in water management



Jonathan Reynolds

As he prepared for graduation in December, FREC senior **Jonathan Reynolds** said that his internship experiences had laid an important foundation for a career in water management.

“The internships I’ve had while at Virginia Tech have helped me broaden my view of what’s going on in the environmental side of water science,” said Reynolds, who is from Fredericksburg. “I’ve learned a lot of skills I wouldn’t have gotten just by being in the classroom.”

Reynolds, who graduated with degrees in environmental resources management and in water: resources, policy, and management, has worked as a GIS intern for the Stafford County Department of Public Works, a crew leader guiding high school students in conservation projects in Virginia State Parks, and a stormwater policy intern for the Virginia Water Resources Research

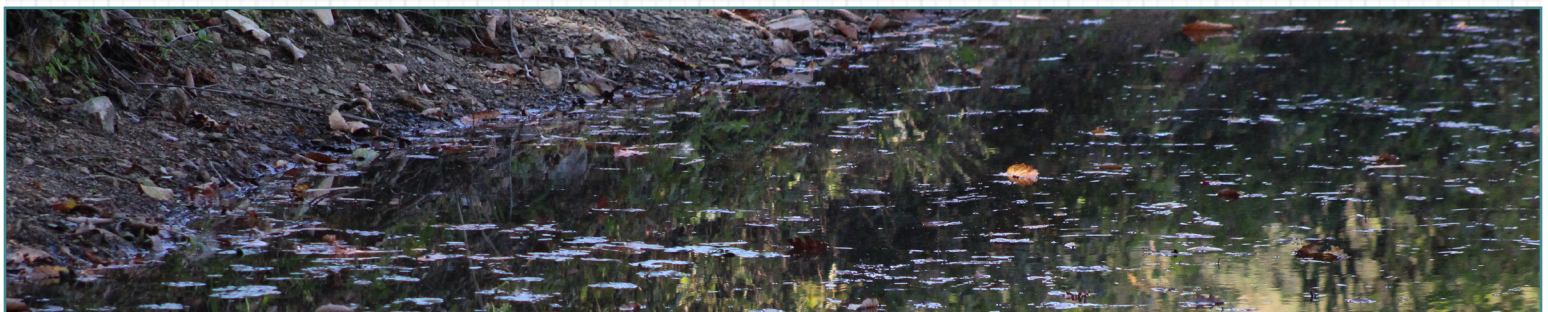
Center. In the summer of 2019, he was a field conservation intern at James Madison’s Montpelier, where he researched how to control invasive species in the old-growth forest surrounding that historic Virginia landmark. Reynolds presented this work at the Mid-Atlantic Chapter of the International Society of Arboriculture Annual Meeting in October.

“What has impressed me about Jonathan over the last couple of years is his commitment to academic achievement and his understanding of the value of education in creating future opportunities for himself,” said Associate Professor **Eric Wiseman**, who attended the conference with Reynolds and two other Virginia Tech students. “He’s taken full advantage of the courses, programs, and services offered here.”

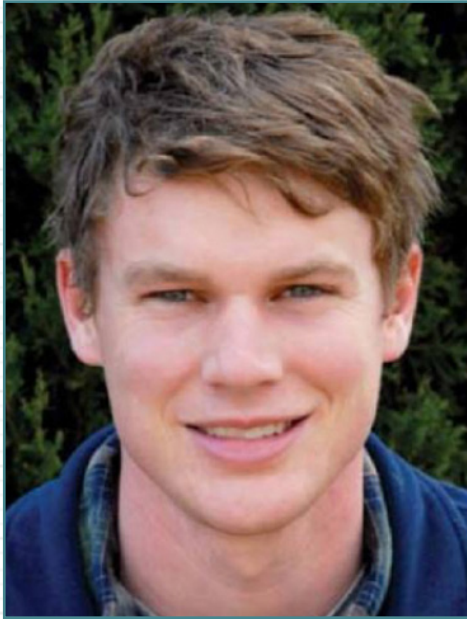
In addition to internships, Reynolds completed a wintermester course in Panama, another experience that he says expanded his understanding of water’s role in broader global contexts. “I worked at a rain forest preserve there, where I got to do water quality data analysis in addition to learning about the overall biodiversity of the rain forests.”

As Reynolds prepares to embark on his career, he is grateful for the ways that his time at Virginia Tech has prepared him for the future. “It’s been a family environment in the College of Natural Resources and Environment,” he said. “All of the professors are there to support students throughout the process. They’ve helped me with all of their knowledge and experience, and I feel ready for anything the world throws at me down the road.”

Reynolds’ positive experience at Virginia Tech has already led him to make his own contribution. When asked why he chose to make a senior gift, Reynolds said that he viewed it as a chance to give something back to a place that had given him so much. “I chose to make my senior gift because it’s not just going to the general university; I could choose a department it could go to,” he said. “The Department of Forest Resources and Environmental Conservation has meant so much to me, and making a gift is the least I can do to start giving something back.”



Student and faculty awards



As a Ph.D. candidate in forest biometrics, **Corey Green** received the Best Oral Presentation by a Graduate Student Award at the Southern Mensurationists Conference held in Asheville, NC, September 15-17.

Green graduated in December 2019 and is currently a research assistant within the department.



Stephen Schoenholtz was a faculty recipient of CNRE Instructional Support Funds for courses taught in spring and summer 2020.

Schoenholtz was awarded \$1,000 to support travel expenses associated with inviting guests to share diverse perspectives associated with water issues and water law in two different courses.



Amanda Pennino (Ph.D. candidate, left) and **Stephanie Duston** (M.S. candidate, right), both advised by Associate Professor Brian Strahm, were awarded “Best Paper” awards for their presentations at the 2019 Soil Science Society of America annual meeting in San Antonio, Texas, in November.

In addition, Duston was awarded the Soil Science Society of America’s Robert J. Luxmore Graduate Student Travel Award (\$1,500) and selected to participate in the society’s 5th Annual Graduate Student Leadership Conference.

Alumni News

The college community mourns the loss of alumnus **John Farmer** ('53 B.S. forestry), who passed away on Aug. 30 at the age of 87. Farmer enjoyed a 38-year career with Dominion Energy, managing thousands of acres of timber and designing innovative programs to manage growth in the company's rights-of-way. His most notable contributions, though, came through his charitable work with organizations ranging from his local church and the Lions Club to the Boy Scouts and the Appalachian Trail Conference.

Of particular note, Farmer served almost three decades as president of the Virginia Forestry Educational Foundation, which supports natural resources education programs for students of all ages. The foundation's largest funding initiative is the scholarships it awards to Virginia Tech students studying forestry and related fields, totaling over \$1.3 million since 1993. "Funding forestry's future is the reason we award scholarships to students in the various disciplines," Farmer said in 2014. "They go on to ensure that forests are sustainably managed, which provides the base for a strong forest products industry and ensures the continuation of the many ecosystem services forests provide."

Professor Harold Burkhart, who serves on the foundation's board, said, "The assets of the foundation grew steadily, and funding for educational programs increased by over 1,800% during John's tenure as president, thanks to his influence in bringing more individuals and businesses into the donor circle and his savvy investment instincts and management skills. His life exemplifies the Virginia Tech motto, *Ut Prosim*."



John Farmer



2019 M.F., M.S., and Ph.D. graduates!

M.F. Students

- Robert Howell

M.S. Students

- Chris Dukes
- Wyatt McCurdy
- Paige Williams

Ph.D. Students

- Corey Green
- Katie Trozzo

Welcome new graduate students!

M.S. Students

- Muhammed Furkan Can
- Malia Pownall
- Emily Thorpe

Ph.D. Students

- Rachel Corrigan
- Fletcher Meadema
- Jennifer Weber
- Paige Williams

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