

# FORESTRY

Summer 2018

leader in excellence.....

## *The Department of Forest Resources and Environmental Conservation*

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## Computational Modeling May Soon Help Researchers Predict, and Prevent, Food Insecurity

Kelly Cobourn is working on a project that may bring us a step closer to the reality of scientists using computers to predict the impact of climate change and other stressors on international food security, migration, and civil conflict. They would then use those predictions to increase the availability of vital resources.

Cobourn is part of a team of researchers that brings together experts in artificial intelligence, model coupling, hydrology, agronomy, and economics. Her work will contribute to an understanding of food security via the integration of socioeconomic and biophysical models, as well as the streamlining of data tools used in assessing food security issues.

In considering the complex interplay between humans and environmental issues such as climate change, the researchers are working to develop models that illustrate how farmers make decisions about food production. They will then create models to help explain how those decisions affect, or are affected by, strains on the environment and social systems.

The four-year project, called MINT for Model INTeграtion, is led by Yolanda Gil, professor of computer science at the University of Southern California's Information Sciences Institute. It is funded with a \$13 million

grant from the Defense Advanced Research Projects Agency (DARPA) as part of DARPA's World Modelers program.



*Project researchers are working to develop models that illustrate how farmers make decisions about food production and to help explain how those decisions affect, or are affected by, strains on the environment and social systems.*

By automating data collection and modeling, the team will be able to greatly reduce the amount of time needed to connect models across disciplines,

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# From the Department Head



*Jay Sullivan*

I spent some time this spring in discussion with industry and agency leaders at our FREC Advisory Board meeting, and while on the road with Dr. Paul Winistorfer (Dean, CNRE) and the other department heads. These discussions centered on student preparation for today's job market, and all of the discussions shared amazingly common themes. First, we heard that employers want our graduates to possess the traditional hands-on skills for which we in FREC have long been proud of providing, and are committed to maintaining and even building as appropriate. Second, we heard strong sentiment expressed that our graduates will need to be prepared for working effectively in our increasingly digital world. They must be prepared to work with a wide-ranging variety of data sources, and be ready to manipulate, analyze, understand and make decisions using the incredible volume of information that will be at their fingertips. Third, of course they want our graduates to possess the so-called "soft skills" that we've heard

much about recently; that is, the ability to work with people and the ability to partner with others to tackle often multi-faceted challenges they undoubtedly will face. Fourth, much will change over the span of the careers of our current and future students (just as in the past), so our students must be flexible, adaptable, and resourceful problem solvers who can take the tools they've developed and apply them in new and innovative ways. Finally, and most importantly, is that our graduates must have the utmost integrity in all that they do.

Certainly, there is much to be done to prepare our students for rewarding and impactful careers in forest and environmental resources, and our remarkable faculty spend a great deal of time not only instilling these skills, and hopefully the requisite character, but also developing and refining curricula to meet the anticipated needs of our students. In fact, we're quite well known across the campus for our often aggressive efforts in curriculum innovation! Of course, we can't possibly accomplish all of these things on our own, and many (probably all) of these skills will not be developed fully until our graduates have years of experience behind them. I can't tell you how much we value your partnership in this endeavor, and want you to feel free to contact me personally with your thoughts about how we can best prepare our students for their future opportunities.

## Forestry Program at Virginia Tech is Best in the U.S. for 2018

College Factual has released information stating that Virginia Tech's forestry program was ranked 1 out of 30 nationwide, making the program the best in the U.S. for 2018! FREC has achieved this ranking 2 years in a row and was also ranked 1 out of 1 in the state of Virginia, making it the best in the state.

College Factual, located in Troy, New York, is a leading source of college data analytics and insights, with a strong focus on student outcomes. Their mission is to help all types of students discover their best-fit college and major so they can enjoy their college experience and graduate with less debt. College Factual provides coverage for over 2,500 colleges and universities, 350 college majors, for students in over 160 countries.



*Virginia Tech's forestry program starts in the classrooms of Cheatham Hall*



# Welcome New Faculty and Staff



*David Carter*

**David Carter** joined the Department of Forest Resources and Environmental Conservation in August 2018 as an assistant professor of silviculture.

Carter's research interests broadly focus on studying the efficacy of different silvicultural techniques in accomplishing a diversity of objectives, from biological conservation to maximizing fiber production. His research has focused on oak woodland restoration in the Midwest, ecological forestry in the Northeast, and vegetation management in high-yield plantations in the Pacific Northwest. He also conducted urban forestry research in different parts of the US. His teaching responsibilities include silviculture and environmental silviculture and he is a co-director of the Forest Productivity Cooperative.

Carter received his Ph.D. in 2018 from the University of Minnesota-Twin Cities in forest resources; M.S. from the University of Maine, 2015 in forest resources; and B.S. from the University of Wisconsin-Madison, 2010 in forest science.

## Highlights: Teaching - Research - Extension

### Computational modeling may soon help researchers predict, and prevent, Food insecurity *continued from front page*

which will lead to a fuller understanding of the intersection between human activity and the environment.

Over the next four years, the researchers will develop models of human activity and impacts on natural resources to create predictions for certain parts of the world based on such factors as climate change and crop yields.

"I'll primarily be developing models and creating human behavior and policy scenarios," Cobourn said. "The computational experts know how to automate the data collection and modeling process, but they may not have background in the disciplines that are working on these problems. The other disciplinary experts and I will help them bring together things like agronomic and economic models in a way that makes sense."



*Kelly Cobourn*



# Highlights: Teaching - Research - Extension

## Study Forecasts Growth Rates of Loblolly Pine Trees through First Half of 21st Century

Researchers using ecological forecasting to predict how changes in temperature, water, and concentrations of carbon in the atmosphere in the Southeastern United States may affect future growth rates of trees was published in a study in *Ecological Applications*. The published study brings together efforts from two projects funded by the U.S. Department of Agriculture: the first known as PINEMAP, which had hundreds of researchers collect forest growth data from the past 35 years and develop mathematical models to quantify how pine forests may respond to climate change.



*The researchers used historical observations on tree growth and weather in loblolly pine plantations to develop a model to forecast forest productivity.*

Led by Assistant Professor **Quinn Thomas**, the second project focused on quantifying uncertainties in how climate models predict how forest and agricultural ecosystems, along with decisions like the timing of crop or forest harvest rotations, influence climate temperature and precipitation patterns. Thomas noticed the way weather data can help meteorologists predict future weather patterns, leading him to develop a new research project to forecast productivity through the middle of the 21st century.

Thomas and team members from FREC — master's student **Annika Jersild**, postdoctoral associate **Evan Brooks**, Associate Professor **Valerie Thomas**, and Professor **Randolph Wynne** — built on data and concepts from the two projects to develop a common analytical framework that can be combined with predictions from climate models to produce an outlook for the future.

Data on the diameter of trees, the number of leaves produced in a given year, and how much water is evaporated from the forest are all fed into a model representing the process of forest growth. Then, using statistical methods similar to those used in weather forecasting, the model is adjusted based on those data to account for uncertainties.

Researchers looked specifically at conditions in the Southeastern United States, often referred to as the “wood basket of the United States” for its productive forests. They focused their attention on planted loblolly pine plantations, an important source of timber for the region.

“We found that in this region, there will be about a 30 percent increase in productivity between now and the middle of the century,” Thomas said.

He cautioned, however, that there is uncertainty around those predictions, depending on specific parts of the region. Despite these uncertainties, however, the future of ecological forecasting looks bright.

The study, “A mid-century ecological forecast with partitioned uncertainty predicts increases in loblolly pine forest productivity,” is available online in Early View format in advance of publication in an upcoming issue of *Ecological Applications*.



# Highlights: Teaching - Research - Extension

## Virginia Master Naturalist Chapter Publishes Guide to the State's Poisonous Plants



*Pokeweed (Phytolacca americana) is one of the poisonous plants highlighted in the new guidebook. Photo by Brenda Clements Jones, Old Rag Chapter, Virginia Master Naturalists.*

There is a new reference guide to some of Virginia's poisonous plants.

The Socrates Project: Poisonous Plants in Virginia is a collaborative effort between the Virginia Master Naturalist Program and Virginia Cooperative Extension.

"This project is the first of its kind in a couple of ways. It's the first publication of its kind focused on poisonous plants in Virginia, and it was a totally volunteer-driven effort," said **Michelle Prysby**,

statewide coordinator of the Virginia Master Naturalist Program and Extension associate. The core group of volunteers who produced the guide was led by Alfred Goossens of the Old Rag Master Naturalists chapter, which serves Culpeper, Fauquier, Greene, Madison, Orange, and Rappahannock counties. He saw the need for the project owing to the high incidence of contacts with poisonous plants, many of which land people in emergency rooms, a fact he confirmed with the director of the Blue Ridge Poison Center.

In addition to Prysby's support, Senior Extension Agent **Adam Downing** wrote one of the data sheets and leveraged his connections to help with the publication.

In order to ensure that people remain aware of which plants to watch for, Goossens is also working with Master Naturalist chapters across the state on a second edition of the guide that will include additional poisonous species.

"The Socrates Project: Poisonous Plants in Virginia," publication number CNRE-13NP, is available as a downloadable pdf file at the Virginia Cooperative Extension website ([ext.vt.edu](http://ext.vt.edu)). For more information on the project, contact the team at [socratesormn@gmail.com](mailto:socratesormn@gmail.com).

## Study Explores Connections Between Land Management, Water Quality, and Human Response in Lake Catchments

Scientists have long studied the ecological impact of humans on lakes, but a new study led by researchers at Virginia Tech explores how those ecological impacts can cycle back to affect humans. The study, published in the journal *Ecosphere*, offers a new model for those invested in protecting and maintaining lakes.

The study, which is in its third year, brings together researchers from Virginia Tech, The Pennsylvania State University, University of Wisconsin, Cornell University, Michigan State University, and Cary Institute of Ecosystem Studies. The team uses coupled natural and human systems modeling to understand how humans and the environment affect one another.

The researchers examined three lake catchments, or areas of land where water runs into a freshwater lake — Lake Mendota in Wisconsin, Oneida Lake in New York, and Lake Sunapee in New Hampshire.

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# Highlights: Teaching - Research - Extension

## Study Explores Connections Between Land Management, Water Quality, and Human Response in Lake Catchments

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The team collected data on land-use and management decisions, how water and sediment are transported to the lake, and how those things affect water quality by changing levels of chemicals that may affect the color or clarity of the lake.

“Lakes provide so much in terms of drinking water, recreation, aesthetic value, and more,” said **Kelly Cobourn**, assistant professor of water resource policy and project lead. “People derive a lot of value from connecting with lakes. 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.”



*The researchers examined lake catchments — areas of land where water runs into a freshwater lake — at Lake Mendota in Wisconsin, Oneida Lake in New York, and Lake Sunapee (pictured) in New Hampshire.*

“Similar research in the past has looked at the effects humans have on lakes, but rarely has anyone completed the loop of looking at how lakes affect humans,” said Cayelan Carey, assistant professor in the Department of Biological Sciences in Virginia Tech’s College of Science. “This paper focuses on completing the feedback loop that captures human actions, the consequences of those actions for water quality in lake ecosystems, and the effect of ecosystem change on human behavior.”

Researchers focused on how changes in water quality affect shore front property values and whether those changes motivate civic action by lake associations and other concerned groups. Kevin Boyle, professor in the Department of Agricultural and Applied Economics in Virginia Tech’s College of Agriculture and Life Sciences, studied the factors that affect the value of properties surrounding lakes.

A critical relationship between lakes and people arises when citizens participate in civic action to protect ecosystems. According to **Michael Sorice**, volunteer organizations like lake associations are common in areas surrounding lake catchments because of the nonmonetary value people associate with lakes.

“Lakes are magnetic to people,” he said. “They are important for outdoor recreation, aesthetic value, historical significance, and more. We are trying to understand how lake associations encapsulate all of those values and use them to influence lake water quality.”

Cobourn, Carey, and Sorice are also affiliated with the Global Change Center housed in Virginia Tech’s Fralin Life Science Institute.



# Highlights: Teaching - Research - Extension

## Owner's Connection to the Land Plays a Major Role in Conservation Efforts



Clearing shrubs from grasslands is one of several conservation practices landowners can employ on their property.

A recent study on land conservation and management led by **Michael Sorice** and master's student **Kiandra Rajala** was published in *Rangeland Ecology and Management*. The study found that when it comes to land conservation and management, it's a landowner's involvement and interest in working the land that matter more than residing on the property.

The research is part of a larger effort funded by the U.S. Department of Agriculture to understand how private landowners in Texas employ conservation management practices on their land. The focus was on involvement with the land as a way to clarify the absentee landowner concept.

To understand which landowners are actively involved with managing their land, mail surveys were sent to approximately 800 private landowners. The surveys included questions about whether the landowners resided full time on their land and how much time

they spent managing their property and employing conservation practices.

A specific line of questioning also included the landowner's involvement in brush management on their property. According to Rajala, "Woody plants encroaching on grasslands has become a big problem in the southern Great Plains, so in addition to asking how involved landowners are on their property, we selected woody plant reduction as the focus of our study."

The results revealed that high percentages of both full-time and absentee landowners had noticed woody plant encroachment on their property, and both groups reported engaging in brush management efforts. Ultimately, there was little difference between full-time and absentee landowners on the level of brush management effort reported. Instead, the differences appeared between landowners who reported being actively engaged with their land and those who did not. Ultimately, the study suggests that to understand issues like woody plant encroachment and other invasive species, natural resource managers should look beyond landowner traits and focus on how they think about their land.

"It's not the characteristic of living on one's land that matters," Rajala concluded. "Instead, it's the way they think about land ownership that influences if and how they interact with it. That, in turn, influences how they will manage their property."

This research was funded by a grant from the USDA National Institute of Food and Agriculture's Conservation Effects Assessment Project and supported by the National Science Foundation's Dynamics of Coupled Natural and Human Systems program.



# Highlights: Teaching - Research - Extension

## Community College Faculty get Training in Unmanned Aircraft Systems (UAS) to bring back to the Classroom

Geospatial Technician Education-Unmanned Aircraft Systems (GeoTED-UAS) is a statewide partnership to develop the unmanned aircraft systems (UAS) workforce through new community college career pathways and building faculty capacity at Virginia's community colleges. Partners include Mountain Empire Community College, Thomas Nelson Community College, the Virginia Community College System, the Virginia Space Grant Consortium, and Virginia Tech. The goal of the project is to train faculty who can prepare students for success as UAS operations technicians who will plan and fly UAS missions to collect and analyze data to solve problems and answer questions.



*Maury Wrightson of Germanna Community College practices with a UAS during the 2017 GeoTED-UAS Faculty Institute at Virginia Tech. Photo by Stacy Kuhar.*

The GeoTED-UAS faculty cohort returned for its second training session, hosted by FREC May 20 through 25. Attendees in the GeoTED-UAS Faculty Institute gained hands-on experience in flying and operating small UAS to conduct a variety of missions. They planned and conducted manually flown missions and autonomous UAS missions to collect data to make actionable decisions. Other institute topics included UAS federal and state laws and regulations, repairing and maintaining UAS vehicles, and integrating student service-learning projects into the college pathways.

The GeoTed-UAS is funded by the National Science Foundation and administered by the Virginia Space Grant Consortium.

## Urban Forestry Field Experience



This past April, students in FREC 2414, Field Experiences in Forest Resources, spent an afternoon learning about a variety of topics including pruning, climbing, risk management, and urban forest planning. Several certified arborists affiliated with the Mid-Atlantic Chapter of the International Society of Arboriculture traveled to campus to provide guest instruction along with departmental faculty members **Eric Wiseman** and **Susan Day**.



Also assisting were Eric Day of the Department of Entomology and Roger Harris of the Department of Horticulture at Virginia Tech. The purpose of this event is to show students a different facet of forest management and expose them to professional opportunities in urban forestry and arboriculture.



# Highlights: Teaching - Research - Extension

## Human-centered Design is key to Forming Partnerships for Large-scale Conservation Success

A study that modeled the preferences of fishers in Chile in creating and monitoring marine protected areas inside their fishing management zones concluded that to recruit more fishers to help with marine conservation, cast a wider net.

Lead author **Michael Sorice** and his colleagues, Josh Donlan, founder and director of Advanced Conservation Strategies and co-author on the study, Kevin Boyle, co-author and a professor of agricultural and applied economics in the College of Agriculture and Life Sciences at Virginia Tech, and Stefan Gelcich, a co-author on the study and professor of natural resource management at the Center of Applied Ecology and Sustainability at Pontificia Universidad Católica de Chile, found that more fishers voted in favor of adopting the program when it was designed to incorporate their preferences and when they had a reasonable expectation of good outcomes for the fishery.

“We call this approach where participants’ needs are given the same weight as the resource’s needs during the design phase of the program, ‘human-centered design,’” said Sorice, who is also affiliated with the university’s Global Change Center, an arm of the Fralin Life Science Institute. “It can help minimize costs by building programs that are seen as desirable at the outset.”

The human-centered design approach works by attracting fishers who may be otherwise uncertain or unenthusiastic about the payment program. Their study found that desirable programs were better able to attract fishers who thought the program was a good idea, but who might have low trust that the conditions exist to make it happen. They also found that fishers who were not sure it is a great idea were more willing to participate based on program adjustments like shorter enrollment periods.

The team surveyed a total of 168 fishers across 12 fishing associations in central Chile, all of which have functioning territorial user rights (TURFS) assigned by the Chilean government. The TURF-reserve program was described to respondents as a marine biodiversity conservation program in which businesses, organizations, and agencies interested in protecting marine biodiversity, either for philanthropic purposes or to offset environmental impacts elsewhere, would provide the fishing association with an annual cash payment to set aside 15 hectares of their fishing territory as a no-take protected area.

Fishers were informed that an independent nonprofit organization would be created to administer the program, and that, while the fishing association would actually receive the cash payment, each member would receive a portion.

The findings, published in PLOS ONE on March 9, question previous assumptions in the field that the payments themselves are the most effective motivator of participation.



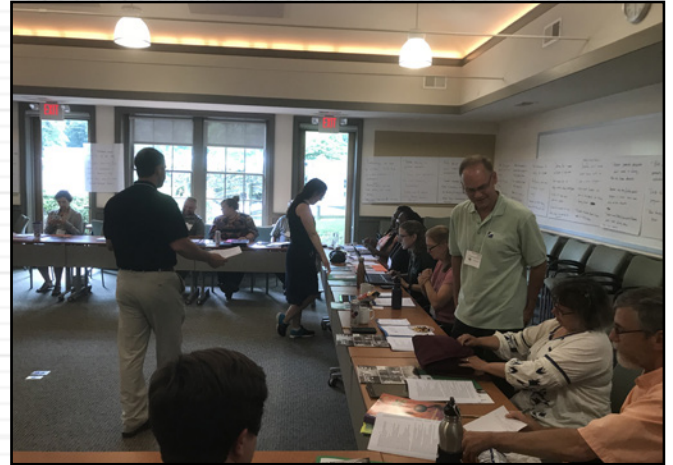
*Small-scale fishers mainly use diving gear and these deckless boats to harvest inshore finfish, benthic invertebrates, and algae. Photo courtesy **Mike Sorice**.*



# Highlights: Teaching - Research - Extension

## Copenheaver and Downing Host Information Sharing Sessions

**Carolyn Copenheaver** (FREC) and **Adam Downing** (Virginia Cooperative Extension) teamed up with faculty from the University of Georgia to host information sharing sessions in Virginia and Georgia for high school teachers and natural resource professionals. The goal was to discuss the challenges and opportunities of improving instruction about forests and forestry at the secondary level. The Virginia session included two graduates from our program: William (Derek) Mays, a forestry graduate who teaches agriculture at Amherst County High School; and Kara (Smalley) Owen, an environmental resource management graduate employed as an environmental scientist with Wetland Studies and Solutions in Maryland. These sessions were funded by a grant from the United States Department of Agriculture and the results will be shared with that federal agency in developing future educational initiatives.



## FREC Hosts 41st Annual Council on Forest Engineering Meeting



FREC hosted the 41st Annual Council on Forest Engineering (COFE) Meeting at the Williamsburg Lodge in Colonial Williamsburg July 15-18. The meeting was co-chaired by **Chad Bolding** and **Scott Barrett** with the theme Revolutionary Traditions, Innovative Industries. Meeting attendance was approximately 70 from 7 countries (Brazil, Canada, Italy, New Zealand, South Africa, Sweden, and U.S.) and 21 U.S. states.

The meeting began with a Sunday night icebreaker reception followed by Monday general sessions, a Tuesday field trip, and Wednesday concurrent technical sessions. General session topics included Innovations in Machine Design, Efficiency, and Safety; and Global Forest Engineering Innovations. Invited industrial speakers included Chris

Harwood of John Deere; Mike Duncan of Caterpillar; and Steve Jones of Peterson Pacific. Invited global innovations speakers included Dr. Kris Brown, New Zealand; Dr. Luc Lebel, Canada; Dr. Lars Eliasson, Sweden; Dr. Raffaele Spinelli, Italy; and Mr. Angelo Moura, Brazil. Sixteen students were also in attendance representing Laval University-Canada, Auburn University, Virginia Tech, University of Georgia, Northern Arizona University, University of Montana, West Virginia University, and the University of Stellenbosch-South Africa. Concurrent technical session topics included The Role of Forest Operations; Supply Chain Efficiency; Operational Efficiency; Forest Roads and Site Impacts; The Logging Workforce; Biomass; Harvesting Productivity and Costs; and Trucking and Transportation. Of the 53 presentations, 16 papers will be peer-reviewed and edited into a special issue of the *International Journal of Forest Engineering* entitled "Forest Engineering Innovations and Advancements," which will be published in 2019.

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# Highlights: Teaching - Research - Extension

## FREC Hosts 41st Annual Council on Forest Engineering Meeting *(continued from page10)*

A full-day field trip on Tuesday included stops at the Enviva Biomass Northampton pellet mill in Garysburg, NC, a BBQ lunch and awards ceremony at the Franklin Business Center in Franklin, VA, and visits to both Southeast Fiber Supply and Jerry D. Rose Logging to observe high production in-woods chipping of both hardwood and softwood species.

COFE presented the 2018 Student Communication Award to Patrick Grove for his paper entitled “Timber Theft: Financial Impacts and Prevention in the U.S. South.” The Operator Award was presented to Davis Rose of Southeast Fiber Supply, who is a core supplier of microchips to the local Enviva Biomass pellet facilities.

Special thanks are extended to our sponsors: Enviva Biomass, Fibria Cellulose, Huber Engineered Woods, Council on Forest Engineering, John Deere, Virginia Tech Department of Forest Resources and Environmental Conservation, and International Union of Forest Research Organizations (IUFRO) for their support of the meeting.



## Research Explains Larger-than-Life Perceptions of American Chestnut



*Since the introduction of chestnut blight to North America in the early 1900s, American chestnuts very rarely reach maturity. They sprout but are killed by the blight once they reach a certain size. Photo by Rachel Collins.*

The American chestnut was often remembered as a giant towering over forests along the East Coast over a hundred years ago and found in forests from Ontario to Alabama. This changed with the introduction of chestnut blight. First identified in the early 1900s, the blight spread quickly and soon killed most all adult American chestnuts in the region.

“You won’t see many mature American chestnuts today. They sprout, because the roots aren’t impacted by the blight, but once the stems reach a certain diameter, the blight latches on and they die,” explained **Carolyn Copenheaver**.

Wondering what preblight American chestnuts looked like, Copenheaver searched records and photographs of exceptionally large species and determined that the Eastern United States does not have trees like this and

wanted to know where they were coming from. She teamed up with several colleagues and they researched many resources to find what they could about the preblight era, gathering publications and personal accounts from landowners and examining each source for quantitative descriptions, including height, diameter, and growth rate.

The team soon realized a significant increase in reported size of American chestnuts in sources published after the blight decimated the majority of the adult trees. Many sources recorded both the average size of a tree and the maximum size. In some sources, the maximum size was recorded as the average, making the species appear to be much larger than normal. Also noted by Copenheaver was that landowners who remembered the trees preblight may have exaggerated owing to nostalgia. Also in the 1800s when writing about trees, people measured circumference, but in the late 1800s to early 1900s, diameter became the more common measurement. The chestnut trees were very large, but similar in size to white oaks and yellow poplars seen in forests today, and there was nothing that made them grow bigger than other area trees.

The study’s results also have important implications for restoration efforts, and the public could have unrealistic expectations.



# Highlights: Teaching - Research - Extension

## Leave No Trace this Summer as You Explore the Outdoors



USGS scientist **Jeffrey Marion** and Virginia Tech student **Holly Eagleston** measuring conditions at the Appalachian Trail in Virginia to evaluate trail impacts and sustainability guidance. Credit: **Matthew Browning**, Virginia Tech Graduate Student, College of Natural Resources and the Environment

Some of the impacts of the millions of people visiting national parks, state parks, wildlife refuges, and federally designated wilderness areas that are protected natural areas include trampling of native vegetation, causing erosion of soils, contaminating water, attracting wildlife with food, and displacing wildlife from preferred habitats.

“We’re doing research on the impacts people are having while they are out having fun in our nation’s wilderness,” said **Jeffrey Marion**, a USGS research ecologist. “The information we gather helps land managers make the best decisions on how to accommodate more visitors while limiting their overall impact, helping preserve protected natural areas for all generations to enjoy.” Some of the possible impacts include:

**Camping** - Major issues with camping can include the cutting of trees for firewood and the expansion of campsite size and creation of new and unnecessary campsites. Campsites expanded can cause more water runoff with soil and pollutants into lakes and creeks. USGS has a study on the Pacific Crest Trail to identify the most sustainable campsites and develop online maps for easy navigation to those locations. Visitors will be

able to print and bring the maps or download them to a smartphone app or GPS device.

**Low-Impact Outdoor Practices** - USGS science is used to develop and communicate low-impact outdoor practices by many organizations. Some low-impact outdoor practices include visitors collecting only dead and fallen wood that can be broken by hand and used for firewood, choosing sloped areas that are more than 200 feet from water when choosing a campsite, and concentrating activity on durable surfaces like rock or areas with no plant cover.

**Hiking Trails** - Hiking trails with hardened treads designed to sustain traffic are where most visitors hike. After heavy hiking traffic, use by mountain bikers, motorized vehicles, and horseback riders all affect the condition of the trails. With the parks becoming more crowded, hikers venture off the trails on their own and can trample and remove protective vegetation and organic materials, which can compact soils and increase water runoff and erosion, making soil loss the most significant and long-lasting environmental impact. Scientists are investigating ways to deter off-trail hiking such as “don’t walk here” signs, placement of organic materials to hide and discourage the use of informal trails, educational signs, low fence borders, and extending and widening main trails with short side trails. *(continued page 13)*



USGS research documented these informal trails created by off-trail visitor traffic in areas with large numbers of rare and endangered plants in Potomac Gorge near Washington, DC. Credit: **Jeffrey Marion**, USGS



# Highlights: Teaching - Research - Extension

## Leave No Trace this Summer as You Explore the Outdoors

(continued from page 12)



USGS research revealed that this educational trailhead sign was highly effective in deterring off-trail hiking that was threatening rare plants in Potomac Gorge near Washington, DC. Credit: **Jeffrey Marion, USGS**

**Feeding Wildlife** - Common in many national parks and protected areas is feeding wildlife. This can lead to animals starting to associate food with people, which can put dangerous or diseased animals in close proximity to humans. This could also be harmful to wildlife, making them dependent on unreliable food sources and suffering nutritionally. USGS science has helped by providing educational messages through signs or personal engagement with uniformed park staff.

**Education** - Working with the Leave No Trace Center for Outdoor Ethics to provide best practices, along with educational courses and materials, have been widely adopted by federal, state and local managers of protected areas and outdoor organizations.

**Start with Science** - “With so many people visiting and enjoying the great outdoors and exploring the wonders of nature off the beaten path, leaving no trace can be a real challenge,” said Marion. “But our science can inform decisions being made across the landscape to help prevent, minimize, or mitigate the effects some recreational activities are having on our wildernesses.”



USGS research revealed that these educational symbolic signs were highly effective in deterring off-trail hiking that was threatening rare plants in Potomac Gorge near Washington, DC. Credit: **Jeffrey Marion, USGS**



Trees cut down for firewood in the Boundary Waters Canoe Area Wilderness in northern Minnesota. Credit: **Jeffrey Marion, USGS**



# Spotlight: Faculty - Staff - Students

## Stern Provides Workshop at Annual “Climb the Hill” Event



*Marc Stern with Lynn Hill, who is famous for making the first free ascent of “The Nose” of El Capitan in Yosemite Valley.*

**Marc J. Stern** traveled to Washington, D C, to provide a short workshop for a gathering of outdoor recreation advocacy groups and world famous American climbers. As part of the annual “Climb the Hill” event (<https://www.climbthehill.org/>), Stern provided insights on communication across the partisan divide prior to the group’s meetings with senators and congressmen the next day to advocate for national monuments and other outdoor recreation issues. Attendees included the Access Fund, the American Alpine Club, the Outdoor Alliance, the Outdoor Industry Association, and Patagonia, among other leading outdoor



*Marc Stern with Tommy Caldwell, who made the first free ascent of the famous “Dawn Wall” of El Capitan in Yosemite National Park.*

associations. Representatives of these groups paired with athletes, including Lynn Hill, Tommy Caldwell, Alex Honnold, and others, to advocate on behalf of responsible access to natural areas throughout the country following the training.

## Franco Nominated to Panel as Review Editor

Thanks to her nomination by the Ministry of Environment and Natural Resources of the Dominican Republic, **Carol Franco** was invited to serve as a Review Editor for the IPCC Sixth Assessment Report (AR6). Franco will be contributing to Working Group II: Impacts, Adaptation and Vulnerability; Chapter 2: Terrestrial and Freshwater Ecosystems and their services. She will be representing Virginia Tech and her home country, the Dominican Republic.



*Carol Franco*

The IPCC main objective is to “assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation.”

The role of Franco as a review editor will involve the identification of expert reviewers for the expert review process, ensure the appropriate consideration of all comments made by experts and governments, advise lead authors on how to manage any controversial issues that could arise, and make sure that genuine concerns are reflected in the final report. The first meeting will be in January 2019 and the report will be ready by the end of 2021.

## Stern Promoted to Professor

**Marc Stern** was promoted to professor as approved by the Virginia Tech Board of Visitors following its June 4 meeting. Stern’s background includes a B.S., Cornell University (natural resources), 1998; M.S., Yale School of Forestry and Environmental Studies (social ecology), 2002; Ph.D., Yale University (social ecology), 2006. Congratulations!

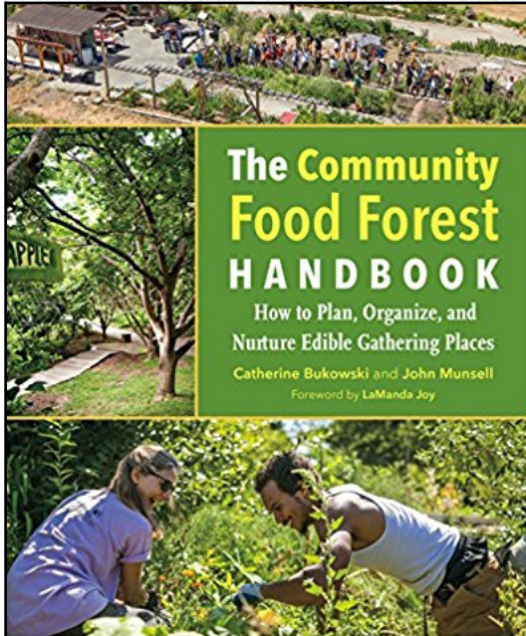


*Marc Stern*



# Spotlight: Faculty - Staff - Students

## The Community Food Forest Handbook: How to Plan, Organize, and Nurture Edible Gathering Places



“The Community Food Forest Handbook: How to Plan, Organize, and Nurture Edible Gathering Places” is a new book offering authored by FREC graduate student **Catherine Bukowski** and Associate Professor **John Munsell**.

Community food forests are springing up across the United States to create greater access to nutritious food and enhance environmental stability. In this book, Bukowski and Munsell provide a guide to implementing and sustaining community food forests, including building engagement, working with diverse peoples, navigating public policy, and managing site evolution. By diving into the civic aspects of establishing community food forests, Bukowski and Munsell provide the road map for people to come together, create change, and provide a site that can feed all people.

The book can be purchased through Amazon or the publisher, Chelsea Green Publishing.

## W. Michael Aust receives William E. Wine Award for Teaching Excellence

**W. Michael Aust** received the university’s 2018 Wine Award for Teaching Excellence.

Inside the classroom, Aust is described as a dedicated and demanding professor who provides a positive and active learning environment where students are challenged academically and given hands-on experiences. Outside the classroom, Aust is easily approachable and students seek him out for mentoring, advising, and learning opportunities.

Aust has served on various committees, including the FREC Undergraduate Affairs Committee for 20 years. He was involved in numerous major course, option curriculum, major, and degree revisions. Additionally, he continues to serve on the Undergraduate Curriculum Committee, Promotion and Tenure Committee, and Facilities Committee.



*Mike Aust*

In 2011, he received the College of Natural Resources and Environment Curriculum Club Award in Teaching Excellence.

The William E. Wine Award was established in 1957 by the Virginia Tech Alumni Association in memory of William E. Wine, Class of 1904, who was a former rector of the Board of Visitors and Alumni Association president. Following a college-level selection process of candidates nominated by students, faculty, and alumni, each college may put forth one nominee. From this group, three faculty members are selected annually. Each Wine Award winner receives \$2,000 and automatic induction into the Academy of Teaching Excellence.



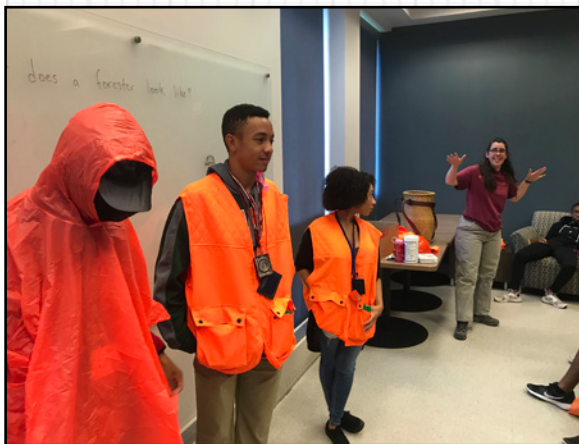
# Spotlight: Faculty - Staff - Students

## Social Science Theory for Environmental Sustainability: A Practical Guide.

**Marc Stern** has published a new book with Oxford University Press: "Social Science Theory for Environmental Sustainability: A Practical Guide." The book provides an accessible guide to using social science theories for addressing many of our most challenging environmental problems. It is based on the premise that environmental problems are, first and foremost, people problems. Without better understandings of the people involved, solutions are often hard to come by, regardless of expertise in biology, ecology, or other traditional conservation sciences. Written for engaged citizens, environmental practitioners, and students alike, the book provides practical and easy-to-read summaries, advice, and examples of how to use decades worth of social science knowledge to influence better environmental and social outcomes.



## Students Gain Knowledge of Careers Focused on Forestry



The College of Natural Resources and Environment hosted 150 high-achieving African American high school seniors as part of Virginia Tech's Black College Institute. **Eric Wiseman** and **Carolyn Copenheaver** met with students to discuss educational opportunities and career pathways in the Department of Forest Resources and Environmental Conservation. Copenheaver reported that prior to meeting with FREC faculty, most of the high school seniors had never considered majoring in forestry because they were unaware of this potential career pathway. After meeting with Wiseman and Copenheaver, the students gained a better understanding of forestry, urban forestry, and other careers focused on forests.

## FGSA Club Participates in the Big Event 2018

In the spirit of a day dedicated to volunteerism, on the day of the Big Event, a student-run community service event, the Forestry Graduate Student Association (FGSA) partnered with the Outdoor Club at Virginia Tech and the Appalachian Trail Conservancy to tackle an invasive species removal project on the Appalachian Trail. Twenty-five volunteers bravely faced the impending freezing rain work conditions and showed up to work on an area of the AT near the historic Pearis Cemetery that is under attack from multiflora rose and other invasives. Cumulatively they completed around 125 work hours and made a serious dent in the fight for an enjoyable and open trail corridor. Maintenance of the Appalachian Trail is almost 100% volunteer-based, and work trips such as these are essential to sustaining good trail conditions. Two volunteer trail clubs in the area care for the trails that Virginia Tech students love to hike on so much - the Outdoor Club at Virginia Tech and the Roanoke Appalachian Trail Club.





# Spotlight: Faculty - Staff - Students



Ph.D. students **Joshua Rady** and **Mike Graham** spent the summer visiting the National Center for Atmospheric Research in Boulder, CO, working on their research. Joshua is improving how the Community Earth System Model (a major international climate model) represents forest management in climate simulations. Mike is improving how the same model represents agricultural management through the simulation of no-till management activities. Both projects are associated with our faculty member **Quinn Thomas's** USDA research grant focused on improving land management in climate models.



*The Forestry Club earned second place (out of 14 schools) in the annual Southern Forestry Conclave held at Abraham Baldwin Agricultural College in Tifton, Georgia in March. Congratulations!*

*Planting of the customary tree in honor of the 2018 graduating class. A white oak was planted on the grounds of the Moss Center. **John Seiler** and **Eric Wiseman** handled all of the tree planting logistics.*



## FREC Spring 2018 Graduates!

Johanna Arredondo  
Neila Cole  
Chandler Dangle  
Damion Drover  
Troy Frensley  
Xinde Ji  
David Lee  
Raymond Ludwig  
Alexandra Steinmetz

## Welcome New Graduate Students!

Kelly Anderson  
Adam Beck  
Sarah Coffey  
Christopher Dukes  
Stephanie Duston  
Austin Garren  
Madeline Grupper  
George Hahn

Wyatt McCurdy  
Amanda Pennino  
La'Portia Perkins  
Cassidy Quistorff  
Nilesh Shinde  
Brooke Thompson  
Paige Williams  
Clay Word



# Teaching and Research Faculty and Interests



**Dr. Jay Sullivan**

*Professor & Department Head*

Interest Areas:

- forest economics & management



**Dr. Greg Amacher**

*Professor*

Interest Areas:

- forest economics & management
- environmental economics

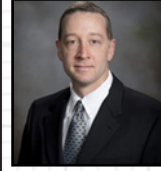


**Dr. Mike Aust**

*Professor*

Interest Areas:

- forest operations
- forestry BMPs
- water quality



**Dr. Scott Barrett**

*Assistant Professor*

Interest Areas:

- forest operations
- logging businesses
- BMPs for water quality

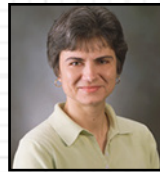


**Dr. Chad Bolding**

*Associate Professor*

Interest Areas:

- forest operations & harvesting
- best management practices
- environmental impacts



**Dr. Amy Brunner**

*Associate Professor*

Interest Areas:

- tree environmental physiology
- functional genomics
- tree phenology & growth



**Dr. Harold Burkhart**

*Professor*

Interest Areas:

- forest biometrics
- growth and yield modeling



**Dr. David Carter**

*Assistant Professor*

Interest Areas:

- precision forestry
- multiaged silviculture
- forest rehabilitation and restoration

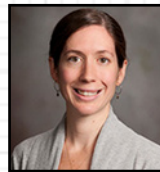


**Adam Coates**

*Assistant Professor*

Interest Areas:

- fire ecology & effects
- silviculture
- restoration ecology



**Kelly Cobourn**

*Assistant Professor*

Interest Areas:

- natural resource economics
- bioeconomic modeling
- water policy



**Carolyn Copenheaver**

*Associate Professor*

Interest Areas:

- forest ecology
- dendrochronology
- land-use history



**Susan Day**

*Associate Professor*

Interest Areas:

- urban forest ecology
- urban soils
- stormwater management



**Stella Schons DoValle**

*Assistant Professor*

Interest Areas:

- natural resource economics
- development & conservation
- international forest business



**Jason Holliday**

*Associate Professor*

Interest Areas:

- evolutionary genomics
- climatic adaptation
- genome-enabled breeding



**Bruce Hull**

*Professor*

Interest Areas:

- leadership & collaboration
- sustainable development
- society & values



**Jeff Marion**

*Adjunct Professor*

Interest Areas:

- recreation ecology
- visitor impact management
- sustainable recreation



# Teaching and Research Faculty and Interests



**John McGee**

*Professor*

Interest Areas:

- geospatial extension



**Kevin McGuire**

*Associate Professor*

Interest Areas:

- hydrology & water resources
- forest watershed management
- catchment biogeochemistry



**Daniel McLaughlin**

*Assistant Professor*

Interest Areas:

- ecohydrology
- watershed science
- ecosystem ecology



**John Munsell**

*Associate Professor*

Interest Areas:

- private land stewardship
- landowner behavior
- agroforestry adoption



**Phil Radtke**

*Associate Professor*

Interest Areas:

- digital forest modeling
- terrestrial laser scanning
- forest inventory & analytics

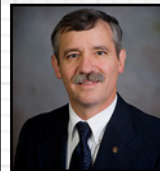


**Stephen Schoenholtz**

*Professor*

Interest Areas:

- forest hydrology
- forest soils
- watershed management



**John Seiler**

*Professor*

Interest Areas:

- tree ecophysiology
- dendrology
- carbon cycling



**Michael Sorice**

*Associate Professor*

Interest Areas:

- human dimensions
- private lands conservation
- natural resources recreation



**Marc Stern**

*Professor*

Interest Areas:

- social science
- natural resource management
- environmental education

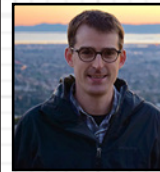


**Brian Strahm**

*Associate Professor*

Interest Areas:

- soil biogeochemistry
- ecosystem ecology
- carbon & nutrient cycling



**Quinn Thomas**

*Assistant Professor*

Interest Areas:

- ecosystem ecology & modeling
- climate change science
- environmental data science



**Valerie Thomas**

*Associate Professor*

Interest Areas:

- remote sensing
- ecosystem condition & dynamics
- big data



**Eric Wiseman**

*Associate Professor*

Interest Areas:

- urban forest management
- urban forest assessment
- trees in the built environment



**Randy Wynne**

*Professor*

Interest Areas:

- forest remote sensing
- environmental analytics
- measure, monitor, model

## Graduate Studies

- Master of Forestry (M.F.)
- Master of Science (M.S.)
- Doctor of Philosophy (Ph.D.)

## Undergraduate Programs

- Forestry
- Natural Resource Conservation
- Environmental Information
- Environmental Resources Management
- Water: Resources, Policy, & Management
- Minors in Forestry, Urban and Community Forestry, Recreation, and Watershed



## Alumni Corner

**Pete Hancock** (B.S. forestry, 2001) was named Roanoke Timberlands Manager for Roseburg Forest Products, effective May 7. Hancock will be in charge of overseeing day-to-day harvest and land management activities on the company's 158,000-acre fee land base in North Carolina and Virginia.

Hancock joins Roseburg from GFR Forestry Consultants, where he has provided clients in northeastern North Carolina and southeastern Virginia with high-level timber sale, forest management, strategic harvest, and land use planning services for the past 12 years. Hancock will be based in North Carolina.



*Pete Hancock*

Roseburg Forest Products is a privately owned company headquartered in Springfield, OR that produces particleboard, medium density fiberboard and thermally fused laminates, softwood and hardwood plywood, lumber, and other products.

Gifts from our clients and friends have a direct impact on the quality of learning, discovery, and engagement programs that the Department of Forest Resources and Environmental Conservation offers. We invite you to become part of our team! To make a tax-deductible contribution, send your check, payable to the Virginia Tech Foundation, Inc., to: Department of Forest Resources and Environmental Conservation, 313 Cheatham Hall (0324), Virginia Tech, Blacksburg, VA 24061

For further information on memorial giving, endowed professorships, gifts of securities, planned or deferred giving opportunities or other contributions, please contact **Emily Hutchins**, Chief Advancement Officer, CNRE, 540-231-8859, or send an e-mail to [ehutch@vt.edu](mailto:ehutch@vt.edu).

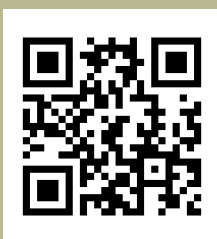
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