ENVIRONMENTAL SCIENCES

AT THE UNIVERSITY OF VIRGINIA

Return to the Field

2021–22 ANNUAL REPORT

The Department of Environmental Sciences

ESTABLISHED IN 1969, the University of Virginia's Department of Environmental Sciences was one of the first to look at fundamental environmental processes from a multidisciplinary perspective and the first in the nation to offer undergraduate, master's, and doctoral degrees in environmental sciences. Today, the faculty includes winners of the prestigious Tyler and Hutchinson awards as well as five professors who are among the most highly cited researchers in their fields.

Departmental field stations and facilities include the Anheuser-Busch Coastal Research Center in Oyster, Virginia, home of the National Science Foundation–sponsored Virginia Coast Reserve Long-Term Ecological Research program, the Virginia Forest Research Facility in nearby Fluvanna County, and the Blandy Experimental Farm near Front Royal, Virginia.

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FROM THE CHAIR

Modern science is much like a three-legged stool. It combines sensing and sampling in the field, controlled experimentation in the laboratory, and computational analysis and modeling. These activities are mutually supporting. For instance, fieldwork provides the data for simulation, which can suggest new directions for experimentation and observation.

Missing one or more field seasons, as we did during the pandemic, can consequently slow the pace of discovery. For researchers, losing a year of information gathering can be a serious setback, whether they had been maintaining a decades-long dataset or expanding their research to a new site. It is particularly hard on graduate students, who may have to rethink their dissertation projects. I am happy to say that we have adjusted to these setbacks and that the department has fully returned to the field.

The interruption caused by the pandemic may even have had some benefits. As this report details, it encouraged researchers to adopt a flexible approach to both field work and field courses. It also gave us an opportunity to think about ways we can bolster and focus our field efforts.

For instance, we have exceptional work under way at our three field stations—the Anheuser-Busch Coast Research Center (ABCRC), the Virginia Forest Research Facility, and the Blandy Experimental Farm—but we also have faculty members conducting research across the globe: studying ice shelves in the Antarctic, air pollution in Africa, and giant kelp forests off the coast of California. As department chair, I want to make sure that faculty members whose research takes them far afield have the support they need.

We are also targeting new directions for fieldwork, which will require an infusion of new talent. We would like to increase our capacity to understand climate change at scales that matter to people and inform local action. We are partnering with the School of Architecture to hire an environmental scientist with a focus on land use. At the same time, we hope to increase our capacity to understand the information we gather in the field by making a joint appointment with the School of Data Sciences.

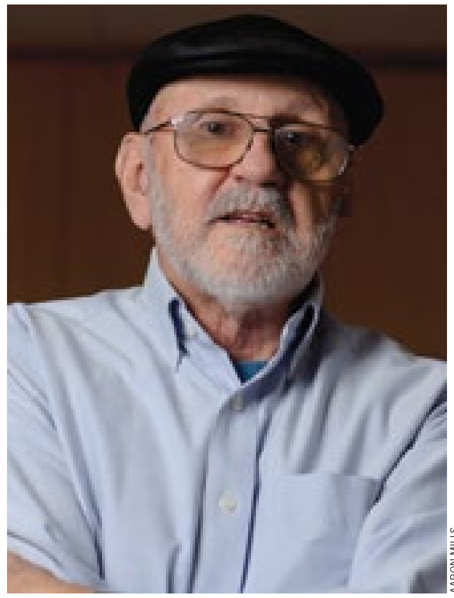
In addition, we plan to bolster the physical sciences of the critical zone, the area between the top of the vegetation canopy and the bedrock, where air, vegetation, and soil interact—recruiting hydrologists and geologists in this realm of research.

In short, we are grateful to be picking up our instruments and returning to the field with a new, expansive vision of the contributions we hope to make.

Howie Epstein, Chair

Retirements

Indivdual talent, luck, character, discipline, and drive–the components of every career–are also what differentiates one career from another. This year, we note the retirement of three individuals who touched the department in their own unique ways.


AARON MILLS

Aaron Mills

Redefining Retirement

Aaron Mills may be officially retired, but his schedule says otherwise. Mills is still a member of the University's Biosafety Committee as well as its Assessment Advisory Committee, helping the University prepare for its decadal reaccreditation. He is also writing papers and launching research projects.

And if that weren't enough, Mills is planning to teach Global Biogeochemical Cycles one last time with Jim Galloway. He will also travel to Guatemala next May as part of the Engineering, Public Health, and Development program. This is a two-week intensive course for UVA and Guatemalan students that provides cross-cultural perspectives on initiatives designed to raise living standards and improve quality of life. As part of the program, Mills works to improve the quality of drinking water in rural homes, reducing the incidence of childhood diarrheal diseases. “I've been taking part in this initiative since 2015,” he says. “It has been immensely satisfying—and I've learned a lot. I'll be going down there as long as I can.”

THE THRILL OF DISCOVERY

Looking back at his research career, Mills is particularly proud of the work he did with former faculty members Janet Herman and George Hornberger. Together, they defined many of the characteristics that control the transport of microbes in groundwater and developed an understanding of the importance of stream sediments in the removal of agricultural chemicals—specifically fertilizer and nitrogen—in areas like Virginia's Eastern Shore. “It was a unique collaboration—George is a modeler, Janet is an aqueous geochemist, and I'm a biologist,” Mills says. “It was exactly the kind of interdisciplinary work that the founders of the department envisioned.”

Mills's research also took him to the outer reaches of microbiology. He served as a visiting scientist at the Kennedy Space Center, working on the microbial degradation of material in space so it could be used to provide nutrients for growing food, and later as chief scientist in the Biological Sciences Office. “In all my projects, the thing that matters to me most is the quality of the science that I am able to do,” he says. “There is nothing like the thrill of knowing something, even for a little while, that no one has ever known.”

At the University, Mills was a strong advocate of graduate education. Although the College and Graduate School of Arts & Science had historically emphasized undergraduate education, as graduate dean, he insisted that the graduate program receive its due. “I think I was successful in promoting the recognition that graduate studies are a critical part of the educational enterprise at this institution,” he says. ■

A Pillar of the Department


W. JOHN ALLEN

Cindy Allen

When **Cindy Allen** started to work at UVA, she never imagined that she would stay for her entire career. Forty-three years later, she is only now recently retired and enjoying the freedom to set her own schedule. Allen joined the department in May 1999 and ended her career as assistant to the chair. She served under six of them—Jim Galloway, Bruce Hayden, Jay Zieman, Pat Wiberg, Mike Pace, and Howie Epstein—and was responsible for supporting the academic mission of the department.

“One satisfying thing for me was helping graduate students document their academic milestones as they made progress toward their degrees,” she says. “I enjoyed doing what I could to help them advance along their career paths.”

A STEADY HAND

Allen's years in the Environmental Sciences office were busy, pivotal not just for the University but also for the department. During that time, she navigated the University's transition to a new student system, the shift of student financial aid administration from the graduate school to the department, the renovation of Clark Hall, and the move to remote work during the pandemic.

Through all these changes, she credits Dave Smith, who served as associate chair during her entire tenure, for providing support and continuity. She also has praise for the department's leadership for finding the private funds for the Clark Hall renovation and the construction of the Anheuser-Busch Coastal Research Center as headquarters for the Virginia Coast Reserve Long-Term Ecological Research program, which she considers milestones in the history of the department.

One of the reasons for Allen's long stay at the department is its culture. “The work the staff does is really appreciated, and we are valued and respected,” she says. “We feel that we are all working together as part of a team, ready to get things accomplished.”

But retirement comes at the perfect time for her. “We just had our first grandchild, our daughter just finished her graduate degree and landed her first professional job, and we are empty nesters,” she says. “So there is no shortage of things to do.” ■

Finding a Path Forward

Whether it is research or teaching, Associate Research Professor **Jennie Moody** has always tried to contribute in ways that move things forward. She completed doctoral work in meteorology when the environmental impacts of acid rain had reached crisis proportions. The challenge that she took on was to connect precipitation chemistry sampled in one location to its source, often a coal-burning powerplant hundreds of miles away. “I was interested in the ways weather influences the chemical composition of precipitation,” she says. “This required understanding dynamic transport over regional scales.”


DAVID STONER

Jennie Moody

Moody found kindred spirits as a UVA postdoc. The Shenandoah Watershed Study (SWAS) investigation of acid deposition on streams in the Shenandoah National Park, had been under way for more than a decade when she arrived. With UVA colleagues Jim Galloway and Bill Keene, she developed the Atmosphere/Ocean Chemistry Experiment (AEROCE) over the North Atlantic. As meteorologist for this large interdisciplinary effort, she tracked the history of airmasses sampled by the chemists.

Her early work in Virginia led her to a career as a meteorologist on international science teams, tracing the ubiquitous fingerprints of human activity in relatively pristine locations—from forested tower sites in North America to islands in the Atlantic, including aircraft campaigns into the arctic and over the Pacific. She also developed novel methods using satellite water vapor observations to identify naturally occurring dry stratospheric ozone intrusions. These realtime images reveal intricate dynamics of high potential vorticity that promote ozone exchange. “It was important to distinguish these events from manmade ozone to model chemistry realistically,” she says.

BUILDING HOPE

Although Moody had long taught classes on satellite remote sensing and weather forecasting, she felt increasingly compelled to do something more. In 2017, she invited Corey Shaman, an associate professor of English, to co-develop a new course, Climate Swerve: Writing on Regional Climate Solutions. “I thought, this is something students need and that I need to do for myself as a way to build hope,” she says.

Using *Drawdown*, a book meant to inspire readers to reimagine the world in response to the climate crisis, as a fundamental text, Moody and Shaman encouraged students to write long-form articles on local organizations pursuing efforts to reduce greenhouse gas emissions. A selection of their work can be found on downforchange.org, a site she created.

Now retired, Moody has volunteered with Charlottesville groups that advocate for local climate policy. “I'm still interested in making a difference and looking for ways to be engaged,” she says. ■

Resuming Discovery in the Arctic

Our planet's polar regions are experiencing warming at a faster rate than other places. That's why it is so important that we were able to resume our Arctic fieldwork in 2022.

Applying a New Tool to Measure Forest Change

Data that some scientists might consider noise can be music to the ears of others. That's the experience of Associate Professor **Xi Yang**.

Researchers using remote satellite sensing to measure greenhouse gases and other atmospheric phenomena found that they were picking up the faint solar-induced fluorescence (SIF) generated by plant chlorophyll, which they had to filter out. But for ecologists and plant physiologists like Yang, this stream of information represented a promising new tool—SIF can be used as a proxy for photosynthesis—for shedding light on fundamental biological issues like plant metabolism as well as carbon sequestration in a time of looming climate change.

For the last decade, Xi Yang has been at the forefront of researchers who are developing ground-based SIF instruments to both validate and complement the data generated by satellites. In 2022, he and his graduate student **Wayne Dawson** took his instrument to the boreal forests of Alaska to better understand the seasonal controls on photosynthesis there. "Because of climate change, the mix of trees in boreal forests is changing, with broad-leafed deciduous trees taking over from needle-based evergreens like spruce," Yang says. "We can infer how much photosynthesis is occurring and translate that into a measurement of how much carbon dioxide is being taken out of the atmosphere and converted to sugar for plants to use."

TOM COGILL

Associate Professor Xi Yang with undergraduate Carmen Petras and graduate student Wayne Dawson.

COMBINING SIF MEASUREMENTS WITH OTHER DATA STREAMS

Typically, satellites that produce SIF measurements track specific locations on a weekly basis. The advantage of Yang's FluoSpec 3, which he has been refining and improving since he was a graduate student, is that it can take measurements every 30 seconds. "We know that photosynthesis changes dramatically over the course of a day," he says. "Now we can track it."

The third generation FluoSpec can monitor multiple objects and do so at angles that more closely correspond to the satellites' viewing geometry, better validating their data while shedding light on the physics of remote sensing. This latest model can also generate hyperspectral signatures, expanding the range of phenomena it can measure including the amount of chlorophyll in their leaves and their water content.

In the Arctic, Yang and Dawson are expanding FluoSpec's applications even farther by coupling it with sensors that measure air and soil temperatures and soil water content to determine the factors that stimulate photosynthesis. In addition, **Carmen Petras**, an environmental sciences major, is using a ground-based LiDAR scanner to characterize tree structure. "In ecology, we say that structure defines function," Yang says. "Combining LiDAR and FluoSpec gives us an opportunity to explore this phenomenon in these changing forests."

Yang is performing similar work at the department's Virginia Forest Research Facility, where he is coupling SIF measurements with thermal camera images. "Our goal is to determine how plants use water to maintain their optimal temperatures, an important consideration as our climate warms," he says.

Yang is enthusiastic about FluoSpec's potential to produce data that other researchers can use to monitor vegetation health, but he is also driven to understand nature's inner workings. "I very much want to contribute to our understanding of climate change," he says, "but answering basic questions in ecology and plant physiology is equally exciting to me. FluoSpec and LiDAR give me the opportunity to do both."■

LEENA CHO

Graduate student Mirella Shaban installing meteorological equipment on the Alaskan tundra.

Helping Arctic Communities Build Resilience to Thawing Permafrost

A recently published paper suggests that the Artic is warming as much as four times faster than the rest of the globe, twice as fast as previously thought. This announcement underscores the urgency of Professor **Howie Epstein**'s research on the impact of thawing permafrost on the culture, economy, and infrastructure of Arctic communities. With funding from the Navigating the New Arctic initiative of the National Science Foundation, Epstein and his collaborators are installing an integrated sensor network in and around Utqiaġvik, the northernmost settlement in Alaska.

"Dramatic climate-induced changes under way in Arctic regions will have a profound effect on people living there," Epstein says. "Our goal is not simply to better understand the natural systems, but also to gain a sense of how these natural systems interact with the built environment." Specifically, Epstein and his colleagues would like to share with people living in Utqiaġvik the data and tools they need to identify those places where the permafrost is vulnerable, develop an accurate idea of the consequences of thawing, and design resilience for the future.

The pandemic caused the team to cancel its first field season in summer 2020, and team members were able to conduct only limited research in 2021. "This year, we hit the ground running," he says. "We're intent on making up for lost time."

A COMPREHENSIVE SUITE OF MEASUREMENTS

The researchers have installed a variety of sensors that will enable them to better understand factors that make permafrost in a variety of sites—around individual buildings and across transects—susceptible to climate change and assess how this permafrost is likely to change in the future. As a regional center, Utqiaġvik has a well-developed utilities infrastructure, community centers, hospital, and airport as well as a growing influx of immigrants in addition to its indigenous population. "The permafrost intersects with the built environment in a range of ways," Epstein says. "And both the permafrost and the built environment are in a state of flux."

As part of the sensor network, Epstein's team is placing micrometeorological equipment at various locations to measure variables like wind speed, wind direction, air temperature, relative humidity, and solar radiation. To connect atmosphere to ground conditions, they are coupling these instruments with 90-centimeter sensors that monitor ground temperature and moisture in the zone in which ground typically thaws and freezes over the course of a year.

Epstein is also collaborating with the Cold Regions Research and Engineering Laboratory (CRREL), part of the Army Corps of Engineers, which will be employing ground-penetrating radar and electrical resistance tomography along transects to measure the percentage of ice in the permafrost. "The more ice in the permafrost, the more dramatic the impact of warming," Epstein says.

In addition, the team is deploying sensors at ponds, lagoons, and lakes surrounding the city to determine the effects of permafrost thaw on water quality. "If there is a serious degree of permafrost thaw, you might see organic matter being transported to water bodies," Epstein says.

A PLATFORM FOR SUSTAINABILITY

The project has been conceived as a joint community-scientific endeavor. The research team has enlisted a number of community collaborators including the local Taġiuġmiullu Nunamiullu Housing Authority, the Barrow Utilities and Electrical Cooperative, Inc, the Samuel Simmonds Memorial Hospital, and TRIBN, a North Slope consulting firm. UVA architects who are part of the project team will be developing a series of infrastructure design principles based on the changes the group observes.

One of the most significant aspects of the project is the creation of a community data management platform, a central repository for the data the group collects with an easily accessible interface and the tools needed to analyze the data. "Our hope is that with this platform, the Utqiaġvik community will have the power to respond directly and proactively to the widespread yet under-addressed vulnerabilities within Arctic communities," Epstein says.■

Field Stations Gradually Return to Capacity

Essential incubators of discovery, our field stations were once again this year welcoming graduate students and investigators.

MAGGIE MCCARTNEY

The summer 2022 class at Blandy.

Blandy Farm Is Back Up to Speed

Summer is usually the busy time of year at Blandy Experimental Farm, the department's field station in the Shenandoah Valley. The growing season is at its height, and faculty members, graduate students, and undergraduates are all in residence. Researchers roam Blandy's forests and fields and work in its greenhouse and laboratories, and visitors tour the State Arboretum of Virginia, which is on its grounds.

In summer 2020, however, Blandy was virtually deserted. Professor **Dave Carr**, Blandy's director, came in four days a week to work with a graduate student whose parents live nearby, but other than that, Blandy was eerily quiet. "For most of us, 2020 was a lost summer," Carr recalls. "Because of the restrictions caused by the pandemic, it took two full years for us to get back to full capacity."

OPENING INCREMENTALLY

Under normal conditions, Blandy has a two-person-per-room policy, accommodating 12 undergraduates, 16 graduate students, and up to 10 senior researchers in a variety of repurposed cottages and buildings. To increase social distancing and minimize the chance of a COVID-19 outbreak, Carr and his colleagues restricted attendance in 2021 to just one person per room.

This enabled them to revive on a limited basis Blandy's Research Experience for Undergraduates (REU), a program sponsored by the National Science Foundation. "The REU, which focuses on general ecological research, is one of our signature programs," Carr says. "We bring in 10 students each year, primarily from four-year liberal arts colleges rather than R-1 universities, for an 11-week program that includes hands-on research and weekly seminars with guest speakers."

Blandy had just accepted its full complement of students for summer 2020 when the pandemic broke out, and the program was cancelled. "We could not imagine a virtual program that would come close to replicating the field experience," Carr says. As an alternative, he offered these students first refusal for the 2021 program, and six were able to attend. Instead of using Blandy's library for class meetings, Carr and his colleagues moved training in such areas as scientific ethics and statistics to a tent. They also moved the entire seminar series online.

In 2022, with Blandy once again at full capacity, Carr welcomed a cohort of 10 new REU students, but retained some of the practices pioneered during the previous year. "Live seminars are a real plus for us because the speakers usually stay overnight and can interact extensively with students," Carr says. "On the other hand, we found that online seminars allow us to draw from a much deeper and more diverse pool of speakers."

This past year, Blandy offered a hybrid program, combining in-person and virtual seminars. Carr asked online speakers to meet informally with students before their formal presentation, giving the students time to find out more about the presenters' path to their current position. "The REU always attracts students from under-represented groups, and these discussions help those students envision a future for themselves in the sciences," Carr says.

Graduate students, too, are making up for lost time. "Summer 2022 turned out to be pretty normal," Carr says. As they have in the past, faculty members and graduate students are taking on new projects and resuming existing ones, whether it is looking at the effects of light pollution on plant growth or modeling the projected range of an endangered species of bumblebee. "We're hoping that in 2023, we'll be solidly back in the groove," Carr says.■

Lessons Learned at the LTER

Amelie Berger was a doctoral student finishing her degree in 2020 when the pandemic forced the department to shut down its Virginia Coast Reserve Long-Term Ecological Research (VCR LTER) Program on Virginia's Eastern Shore. This year, Berger was called back to the VCR LTER to serve as interim site director, putting her in a good position to trace the program's recovery. "The pandemic has definitely taught us a few things of lasting value," she says.

WORKING MORE EFFICIENTLY

Part of the National Science Foundation's network of 28 LTER programs across the United States as well as in Antarctica and the Pacific Ocean, the VCR LTER focuses on developing a predictive understanding of the response of coastal barrier systems to long-term environmental changes in climate, sea level, and land. With continuous funding from the National Science Foundation, the department has led the program since 1987, hosting thousands of graduate and undergraduate students, post-docs, and faculty researchers over its 35-year history.

One of the crown jewels of the VCR LTER program is the unbroken datasets that its scientists have accumulated. At the turn of the last century, VCR LTER scientists collaborated on what is now the largest and most successful seagrass restoration effort on record. Submerged seagrass meadows in the lagoons behind the barrier islands provide habitat for fish and shellfish, stabilize coastal sediment, and sequester carbon. The seagrass meadows at the VCR had been weakened by disease and finally were swept away by a hurricane in 1933. Now thriving seagrass meadows cover 14 square miles of the lagoons. VCR LTER researchers do annual sampling to monitor the success of the ongoing restoration.

DAVID LEE.

Graduate students Emily Rife and Lauren Wood travel to the barrier islands for research during summer 2020.

"Typically, we use teams of seven in four boats, but during 2020, we scaled back to a bare minimum of three people to a boat, who all wore masks and maintained social distancing," Berger says. "Our field staff did a tremendous job modifying our sampling protocols so that we could do the work with fewer people. Now we have integrated those protocols into our regular annual sampling and find we can get the work done most efficiently with five people. The COVID modifications benefited the program in the long run."

DAVID LEE.

Jonah Morreale, Spencer Tassone, Carly LaRoche, Cora Biard, and Kylor Kerns working together to launch a new seagrass resilience experiment in 2020.

TAKING ADVANTAGE OF OPPORTUNITIES

Another indirect benefit of the 2020 closure was that researchers learned—from necessity—to be adaptable. The VCR LTER datasets turned out to be an invaluable resource for graduate students who could not conduct field work in 2020. Instead, they used the time to write dissertation chapters on new methods they were developing, relying on data compiled by other researchers to produce synthesis papers. "By the time these students were able to start their fieldwork, many already had a publication under their belts," Berger says. Adapting to the lab closure meant that student researchers were productive in new and unexpected ways.

"Although the pandemic was definitely a setback, we did learn from it," Berger says. "As we go forward, we will be thinking about how we can make the ABCRC and the VCR LTER program more resilient."■

Graduate Students Maintain Momentum

For graduate students, the clock is always ticking. Our graduate students exhibited exceptional resilience as they worked with their advisors to use their time productively regardless of the impact of the pandemic on their field work.

Seeing the Future in the Past

About 20,000 years ago, the climate began to warm, and glaciers that extended as far south as New York City and the Puget Sound began their retreat. Today, the glaciers in Greenland and most other areas of the world have started to melt, as the heat trapped by rising levels of greenhouse gases in the atmosphere warms the Earth's surface. Being able to predict the path and speed of glacial retreat has become essential. When Greenland's ice sheet disappears, for instance, global sea level will rise 21 feet.

Graduate student **Marion McKenzie** believes that glaciologists can learn much about the future from studying the past. "If we can better understand the factors that shaped the retreat of glaciers after the last ice age, we can more accurately infer what will happen over the next century," she says.

Working with Assistant Professor **Lauren Simkins**, McKenzie combines large-scale data from such sources as surface LiDAR with on-site, fine-scale sampling to understand the relationship between glaciers and the underlying landscape. She focuses on a number of topographic factors that influence the interaction between glacial ice and the subglacial bed. This, in part, includes the topographic high points across deglaciated landscapes, which have the potential to slow, stabilize, or accelerate glacial ice flow, as well as such solid Earth dynamics as the isostatic rebound of land masses formerly depressed by the weight of glaciers. "One thing that I enjoy about my work is that it is very process-focused rather than site-specific," she says. "We are trying to understand processes that have broad applications."

CHANGING STRATEGY ON THE FLY

McKenzie and Simkins put their theories to the test by traveling to the formerly glaciated lowlands south of the Puget Sound, but their trip, postponed by the pandemic to August 2020, required a change of plans. Instead of being part of a larger group, there were just the two of them. They had originally intended to take core samples of glacial sediment from lakebeds at various elevations, an effort that would have enabled them to form a baseline understanding of glacial retreat in the region. Once on site, however, they discovered that there was a pervasive layer that could not be penetrated without heavier equipment and a larger team.

Looking for a way to acquire equivalent data, they turned to the coast, where the action of waves exposed layers of glacial deposits in bluffs that had emerged as the Earth's crust, no longer depressed by the weight of the ice sheet, regained its former elevation. "We are able to look at the sediment record and determine whether each layer was deposited in a marine or terrestrial environment, giving us a sense of glacial interaction with the landscape over time," she said.

FINDING NEW WAYS TO BE PRODUCTIVE

The correlation of topography and the movements of glaciers, as indicated by the morphology of the larger glacial bed, requires laborious mapping. With research in the field postponed by the pandemic and time on her hands, McKenzie decided that rather than sit day after day manually mapping glacial features from LiDAR data, she would develop a software tool that, with minimal guidance, would automate the process.

She modified a program that had originally been created to characterize watersheds across regional landscapes. "I had to relearn how to code in ArcPython," she says, "and there was a lot of trial and error involved in making progress, but it was worth it." Using the tool also accelerated her progress on her first paper, which she published in *Earth Surface Processes and Landforms* in 2022.

"My experience during the pandemic really put a spotlight on the need for resourcefulness as a researcher," McKenzie says. "That's something that I expect will be invaluable as I pursue my career."■

LAUREN SIMKINS

Marion McKenzie examines glacial deposits in Washington.

At the Intersection of Marine Chemistry and Biology

Understanding the various systems that affect the carbon balance on Earth and their intricate interactions is one of the most pressing challenges of our age. The more we know, the more clarity we will have about the fate of the carbon dioxide we are pumping into the atmosphere and the likely course of global warming.

For **Carly LaRoche**, one system that has not received its due is the carbonate system, which controls the acidity of seawater and acts as a governor for the carbon cycle. "We don't know as much as we should about the carbonate system and the variables driving its interactions with inorganic carbon," says LaRoche, a doctoral student in Professor **Scott Doney**'s lab.

SHELLFISH AND SEAGRASS

The ocean absorbs about a quarter of the carbon dioxide we release into the atmosphere every year, enabling it to act as a powerful brake on climate change. But there are downsides. As atmospheric carbon dioxide increases, so does its level in the world's oceans. This carbon sets off a series of chemical reactions that reduce seawater pH, rendering it more acidic and lowering the amount of dissolved calcium carbonate available for organisms like corals and oysters to build their skeletons and shells. Not only does acidification make these creatures more vulnerable to predators, but it also affects their metabolism and creates conditions that can lead to larval die-offs. "The consequences are widespread," LaRoche says. "Acidification has a large impact not only on marine ecosystems but also on the people who depend on them for their livelihood."

But LaRoche has not been content to study the carbonate system in isolation. Taking advantage of the seagrass restoration project underway at the Virginia Coast Reserve Long-Term Ecological Research program, she is investigating how seagrasses affect seasonal and spatial variability in the carbonate system—and by extension, patterns of acidification. "I love studying marine chemistry, but this is a great opportunity to extend the boundaries of my work," LaRoche says.

MARY STACK

Carly LaRoche samples water at the VCR LTER.

SWITCHING GEARS

LaRoche joined the department in 2019 and was ramping up her sampling program when the pandemic struck. "Getting on a boat, collecting water samples from the lagoons, marshes, and inlets and then analyzing the samples is one of the main things I do," she says. "But in summer 2020, which was supposed to be my first season for field work, I didn't get out at all."

After consulting with Doney, LaRoche switched to modeling exercises and analysis. Using previously collected data, she did a comprehensive inorganic carbon inventory of the entire VCR to determine if, overall, it was a carbon sink or source. The inventory has been included in a paper that is under review. She also used the time to take her comprehensive exams and write her proposal.

As 2020 progressed, she looked for opportunities to get back to the water, piggybacking on the VCR LTER's quarterly water quality surveys. In 2021, supply chain issues were the obstacle, as essential instruments needed for her research were put on backorder.

By summer 2022, however, everything was finally in place for her to launch a full-fledged field campaign. "I was able to go to the Eastern Shore for about 10 days a month from May to October," she says. She has found that spatial variability in the carbonate system is more pronounced than seasonal variability, particularly between seagrass and non-seagrass areas. "Other studies have found that seagrass appears to mitigate the effects of ocean acidification locally because it absorbs carbon dioxide," LaRoche says. "My current research on seagrass aims to determine if this pattern is replicated at the VCR."

Thanks to her flexibility, LaRoche is on track to finish her degree on schedule. "I was fortunate in that the pandemic struck relatively early in my graduate career when I had a lot of options," she says. "When all is said and done, I am progressing at a normal rate despite the pandemic."■

Reviving and Reinvigorating Field Classes

In their field classes, students come face to face, often for the first time, with concepts and ideas that they previously experienced only in the classroom. These classes can have an impact that can last a lifetime–which is why we are grateful that our field classes have resumed.

From Field to Screen and Back to Stream

The emergence of COVID-19 in March 2020 marked the moment Professor **Todd Scanlon**'s Hydrological Field Methods and Data Analysis course became a Scanlon Family Production. When his spring semester students, who had just started to learn to set up instruments and collect data, were sent home, Scanlon had to adapt. "The whole idea of a field methods course is to get students out into the natural world and have them collect data under real-world conditions," he says. "My challenge was to convert a hands-on experience to an online one."

Scanlon's response was to enlist his three eldest children to help him replicate that experience on video. Together they traveled to historic Mount Fair Farm, the property in western Albemarle County where the class had been held. Owned by former Board of Visitors member John Macfarlane (MBA '79) and his wife Dudley, it includes 765 undeveloped acres that run along a ridge line and river valley paralleling the Blue Ridge. "I had my kids take videos of me walking through the process of installing the equipment and collecting the data," Scanlon says. "And since you need a lot of hands to collect the data, they were critical in creating the data sets that I gave my students to analyze."

These videos, along with recorded lectures and online discussions, helped Scanlon complete the semester, although he could not reproduce the research project that caps the course. Typically, students chose their own research question, using their collective data set to determine an answer. "Because they hadn't been out in the field, their final exercise was more like a big problem set than an actual research project," Scanlon says.

MARIELLE SCANLON

During the pandemic, Todd Scanlon's three eldest children–Lauren, William, and Elyse–helped him create a video version of his Hydrological Field Methods and Data Analysis course.

LEARNING ABOUT STEWARDSHIP AS WELL AS NATURE

In 2021, the University had still not reinstated field classes, but in 2022, the class returned to Mount Fair. Macfarlane made them welcome. He and his wife have long been thoughtful stewards of the farm, honoring its history and conserving the landscape. In 2018, they commissioned an exhaustive study of the farm, inventorying its plant and animal species as well as characterizing its soil and water. "We thought that offering our farm as a site for environmental research and study would be a useful way to give back to the University," he says. "And we felt that through our example, we could encourage students who came to Mount Fair to give back in turn."

When Scanlon first toured the property, he thought that the virtually pristine watershed would make it an ideal site for the course. Macfarlane supported his efforts by providing a steady source of electricity to power the instruments along the stream and making available a small farm building for onsite preparation and lectures.

In 2022, Scanlon was able to present the full course at Mount Fair the way he had envisioned it, helping students solidify their understanding of concepts covered in their introductory hydrology course. "Each week we cover a different topic that's linked to a new set of instruments that we can add to our experimental watershed," he says. "In the course of the semester, students gain familiarity with the instrumentation and learn that field data is inherently messy, both of which are useful if they go on, as many do, to graduate school or to work with the U.S. Geological Survey or consulting companies."

"It was a real relief to get back to the field," Scanlon says. "Students typically become environmental sciences majors because they want to work outdoors. Now they once again have that opportunity." ■

AJAY LIMAYE

Undergraduates Seth Evans, Olivia Sheldon, and Stephanie DeHart at Taughannock Falls in New York.

A Journey Through Time and Space

Geoscience in the Field," the new short course that Assistant Professors **Ajay Limaye** and **Lauren Simkins** launched in 2022, is a compact odyssey, not simply in space, but also in time. Over five days, 20 graduate and undergraduate students in three vans traveled more than 1,000 miles, ranging as far west as Niagara Falls and as far north as Lake Ontario. As they progressed, they dipped back through geologic history, seeing in the landscape evidence of the Appalachian Mountains' formation hundreds of millions of years ago as well as the glaciers that swept through New York and Pennsylvania over the past 100,000 years.

"During the pandemic, we worked hard to bridge gaps for students, but there are some aspects of geomorphology that you simply can't appreciate unless you spend time with rocks and landscapes," Limaye says. "There is no real substitute for students being able to stand in front of an outcrop of ancient stone and see the science in front of them."

The class had its intended impact. "The trip gave me a better sense of large-scale geologic processes than I could have gotten elsewhere," says **Julianne Kirby**, a second-year environmental sciences major. "It is easier to conceptualize them when you are on the road, thinking about where you were two days ago and how the landscape has changed."

A COLLECTIVE ENDEAVOR

Limaye and Simkins worked hard to ensure students could make the most of their five days in the field. Before they hit the road, they kicked the course off with a series of lectures and discussions about the nature of field work as well as the geology underlying the landscape they would be visiting. But they weren't the only ones involved in preparation. The students helped develop the annotated field guide that the class would be using at the 10 stops along the way.

Simkins and Limaye secured funding for the course through the H. G. Goodall Fund, which had been established to support geoscience teaching and research in the department. The instructors made a priority of using these funds not simply to defray the costs of transportation, food, and lodging but also to meet the equipment needs of all students.

"A longstanding problem in the geosciences is students not being able to afford going into the field," Simkins says. "Thanks to the fund, people from underrepresented groups had the opportunity to participate in an experience that may be lifechanging." In addition, students could confidentially inform the instructors of any health or medical issues they wanted to disclose, enabling them to be accommodated and helping to ensure the course would be open to all.

LAUREN SIMKINS

Graduate student Santiago Munevar leads discussion next to towering glacial sediments on the shore of Lake Ontario.

REBUILDING COMMUNITY

Many of the students participating in the field trip had enrolled at the University during the pandemic, when online courses and social distancing made it difficult for them to get to know each other. The course was a way to compensate for these missing relationships. "Our students connected with each other and their instructors in ways that went beyond even what we could accomplish in a classroom," Limaye says. "They really got to know each other and their instructors in the vans during those packed days."

Having spent her entire first year online, Kirby agrees. "As a major, having the opportunity to connect with the department was particularly important to me," she says. "Spending five days with other students as we came face to face with the geology and morphology of the region was a great way to do that." ■

Awards, Appointments, and Publications

UNDERGRADUATE STUDENTS

The department recognizes fourth-year students who have done outstanding work in specific environmental sciences. This year, the Michael Garstang Atmospheric Sciences Award went to **Rebecca L. Hall** and the Mahlon G. Kelly Prize in ecology to **Margaret E. Dillman**. The department presented its Hydrology Award to **Jacob B. H. Bushey** and the Wilbur A. Nelson Award in geosciences to **Sadey Rodriguez**.

The departmental interdisciplinary award for the undergraduate major who has excelled in interdisciplinary environmental sciences research was presented to **Davis Coffey**.

Henry R. Chin was selected to receive the Hart Family Award for Undergraduate Research in Environmental Sciences. It provides funds to assist full-time environmental sciences majors who are conducting a supervised research project.

Katharine C. Schlachter received the Wallace-Poole Prize, awarded each year to the graduating student majoring in environmental sciences who has at least a 3.8 GPA and who is judged the most outstanding student in the class.

The Bloomer Scholarship, which provides $1,800 toward tuition, is given to an outstanding undergraduate environmental sciences major with a focus on geology. This year's winner was **Julianne D. Kirby**.

Medha Prakash received the Richard Scott Mitchell Scholarship, which provides $1,800 to a rising fourth-year student who is focusing on geoscience and has completed Fundamentals of Geology and two other advanced courses in geoscience, preferably including mineralogy or petrology.

Isabella Dressel was this year's winner of the Joseph K. Roberts Award, given to a student who presents the most meritorious research paper at a national meeting.

To be chosen for the College's Distinguished Majors program, students must achieve an overall GPA of 3.4 or above. This year, the department selected **Jacob B. H. Bushey**, **Davis Coffey**, **Rebecca L. Hall**, **Anna F. Liang**, **Anthony J. Murphy-Neilson**, **Katharine C. Schlachter**, **Camille E. Wilson**, and **Sophie Wong** as distinguished majors.

Jacob B. H. Bushey, **Henry Chin**, **Davis Coffey**, **Isabelle Dressel**, **Iris Kennedy**, **Emily Kruse**, **Medha Prakash**, and **Sophie Wong** participated in the UVA Undergraduate Research Symposium. It includes projects from all disciplines and is an opportunity for students to present what they have learned through their research experiences to a broad audience.

PRESTON THOMPSON

Lindsey Monteith, an REU undergrad from William & Mary, worked with Associate Professor T'ai Roulston modeling the range of the endangered Rusty Patched Bumble Bee (*Bombus affinis*).

GRADUATE STUDENTS

Cal D. Buelo was the winner of the Environmental Sciences Student Excellence Award, the department's premier award. Dr. F. Gordon Tice established the award in 1992 to foster environmental research and scholarship; it recognizes and honors outstanding undergraduate or graduate students for their contributions to environmental sciences, their ability to communicate their findings, and their efforts to promote a better understanding of the environment.

The department offers a series of awards honoring exceptional graduate students in individual environmental sciences. **Kylor Kerns** earned the Graduate Award in Ecology, **Elizabeth R. Bieri** the Graduate Award in Hydrology, and **Jacob W. Smith** the Arthur A. Pegau Award in Geoscience. **Elizabeth M. Dukes** received the Ellison-Edmundson Award in Interdisciplinary Studies.

Spencer J. Tassone was this year's recipient of the Trout Unlimited Award. Established by the Thomas Jefferson Chapter of Trout Unlimited, this award is presented for "significant contributions to research concerning cold-water fisheries or related ecosystems."

Xinhuiyu Liu received the Jay Zieman Research Publication Award, named after the late Jay Zieman, long-time chair of the department.

The Exploratory Research Awards, based on merit, were initiated to help selected students conduct preliminary research leading to the development of a thesis or dissertation proposal. The recipients this year were **Wayne F Dawson III** and **Rong Li**.

This year, **Andrew D. Jablonski**, **Marion McKenzie**, and **Kelsey L. Shoenemann** won Moore Research Awards. Based on merit, this award was initiated to help sponsor the dissertation and thesis work of environmental sciences graduate students.

Clare A. Rodenberg received the Thomas Jefferson Conservation Award, which supports basic research related to the conservation of the Earth's resources. Rodenberg was also one of 14 students from the College and Graduate School of Arts & Sciences selected to present their research at the 2022 Huskey Graduate Research Symposium.

Mary Angelique Demetillo and **Kelsey S. Huelsman** won the Graduate Student Association Award, which recognizes members of the department who have been particularly helpful to the graduate student body.

Jacob Malcomb won the Fred Holmsley Moore Teaching Award, bestowed on graduate teaching assistants distinguished by their ability to instill excitement, wonder, and confidence in students. An endowment established by Fred H. Moore funds this award, along with matching donations from Mobil Oil Company.

STAFF

Elizabeth Jackson won the Department Chair's Award, which recognizes an individual who has performed extraordinary service to the department.

FACULTY

Lawrence Band, Ernest H. Ern Professor, was a member of the Editorial Board of *Hydrological Processes* and is coeditor of a special issue of the *Journal of Hydrology* entitled "Non-Hortonian Processes in Urban Watershed." At the University, he was a member of the Promotion and Tenure Committee in the School of Data Science. Professor Band served on the Faculty Steering Committee for the Environmental Resilience Institute.

Peter Berg reviewed three National Science Foundation proposals and six manuscripts for peer-reviewed journals. In addition, he arranged for two sessions on underwater measurements at the Association for the Sciences of Limnology and Oceanography virtual meeting.

Linda Blum was president of the Coastal and Estuarine Research Federation and was chair of conference art for its 2021 Conference. She was also a board member of the National Oceanic and Atmospheric Administration (NOAA) Chesapeake Bay Sentinel Site Cooperative and a member of its Vertical Land Motion Workshop Planning Committee. She also served as a member of its Surface Elevation Table Working Group for the Mid-Atlantic Region, also sponsored by NOAA.

David Carr was an associate editor of the *American Journal of Botany*, a member of the Board of Directors of the Foundation of the State Arboretum, and a member of the Chairs and Directors Committee of the College and Graduate School of Arts & Sciences.

Max Castorani served on the Editorial Board of *Ecosphere* and as an external advisor for the Plum Island Ecosystems Long Term Ecological Research project (PIE LTER). He served on a review panel for the National Science Foundation Biological Oceanography program, reviewed a grant proposal for the European Research Council and articles for a number of professional journals, and was an invited participant to the workshop on the Future of Synthesis in Ecology and Environmental Science. Professor Castorani was a member of the Ecological Society of America and the Coastal and Estuarine Research Federation.

Robert Davis chaired the Assembly Group of the Processions Committee at the University and was a member of the Fellowship Review Committee of the Raven Society. He reviewed manuscripts for a number of professional journals.

Stephan De Wekker was the editor of the *Journal of Applied Meteorology and Climatology* as well as an associate editor of *Atmosphere*. He was active in a number of scientific initiatives and organizations. He was a member of the Steering Committee for the Transport and Exchange over Mountains–Programme and Experiment (TEAM-X). For the American Meteorological Society (AMS), he served on the Scientific and Technological Activities Commission Committee on Agricultural and Forest Meteorology and represented AMS at the Council for Agricultural Science and Technology. He was also a member of the Observing Facilities Assessment Panel at the National Center for Atmospheric Research. He reviewed grant proposals for the National Science Foundation, the German Science Foundation, and the Austrian Science Foundation. This year, Professor De Wekker was awarded a Sesquicentennial Fellowship from the University. He was a member of the College and Graduate School of Arts & Sciences Promotion and Tenure Committee and chaired the Faculty Senate Nominating Committee. He also represented UVA at the University Corporation for Atmospheric Research.

Scott Doney, the Joe D. and Helen J. Kingston Professor in Environmental Change, is a Web of Science Highly Cited Researcher in Environment and Ecology as well as the Geosciences. This year, he was elected a fellow of the Association for the Sciences of Limnology and Oceanography and served on its Redfield Lifetime Achievement Award Subcommittee. He served as chair of the Committee on a Research Strategy

for Ocean Carbon Dioxide Removal and Sequestration at the National Academy of Sciences and was a member of the Global Ocean Monitoring and Observing Council for NOAA's Climate Program Office and a participant in the Australian Centre for Excellence in Antarctic Science. For the NSF, he was coprincipal investigator and Executive Committee member for the Center for Chemical Currencies of a Microbial Planet and an RCN Steering Committee Member for the Saltwater Intrusion and Sea Level Rise in Rural Landscapes grant. He participated in the Ocean Frontier Institute and the Global Ocean Observation System discussion at the Ocean Carbon Observation virtual workshop.

In addition, Professor Doney was involved in a number of interagency groups. He is a member of the Ocean Carbon Biogeochemistry Scientific Steering Committee (NSF and NOAA), the U.S. Biogeochemical Argo Subcommittee (Ocean Carbon Biochemistry, NASA, NSF, and NOAA), and the Executive Council of the U.S. Global Ocean Ship-based Hydrographic Investigations Program (NSF and NOAA). He reviewed manuscripts for a variety of professional publications, reviewed funding proposals for a number of organizations, and served as an outside reviewer for appointment, promotion, tenure, and awards for several universities and government agencies. At the University, Professor Doney served on the Steering Committee of the Environmental Resilience Institute. This year, the department awarded him its Tice Prize for research excellence.

Howard E. Epstein, chair of the Department of Environmental Sciences, was general editor of a special issue of *Big Earth Data* entitled, "Remote Sensing Thematic Products and Their Application to Environmental Change in the Antarctic, Arctic, and Qinghai-Tibet Plateau." He is cochair of the Vegetation Dynamics Working Group, part of NASA's Arctic Boreal Vulnerability Experiment, as well as of the Environmental Working Group of the Digital Belt and Road Initiative, sponsored by the Chinese Academy of Sciences. He was a session chair at the American Geophysical Union meeting. At the University, Professor Epstein was codirector of the College Science Scholars program, a member of the EXPAND Fellowship Steering Committee, and a lower division advising fellow in the College and Graduate School of Arts & Sciences. He was also a faculty panelist for Days on the Lawn.

James N. Galloway, the Sidman P. Poole Professor of Environmental Sciences, was a member of the Distinguished Traveling Lecture Series of the American Geophysical Union College of Fellows, the Earth Sciences Review Team of the National Academy of Science/National Research Council Research Associateship Programs, and a member of the Planning Committee for the Environmental Health Matters Initiative of the National Academies. He was vice chairman of the Board of Trustees of the Bermuda Institute of Ocean Sciences (formerly the Bermuda Biological Station for Research) and a member of its Education, Science, Compensation, Institutional Partnerships, and Nominating Committees. In addition, Professor Galloway was an associate editor of *Environmental Development*, a trustee of the Marine Biological Laboratory at Woods Hole, Massachusetts, and a member of its Nomination and Governance and its Academic and Campus Strategy Committees. At the University, he was a member of the Committee on Sustainability, a member of its Environmental Stewardship Subcommittee and cochair of its Teaching and Research Subcommittee and Nitrogen Working Group.

Kevin Grise was review editor for *Frontiers in Climate* and a peer reviewer for several other journal articles. This year, he was selected as a new member of the U.S. Climate Variability and Predictability Program Process Study and Model Improvement Panel. He also reviewed a number of funding proposals for NASA, NSF, and the Israel Science Foundation. At the University, he was named an Advance Fellow in the College and Graduate School of Arts & Sciences faculty-led STEM Student Success Initiative and served as an internal reviewer for 12 graduate student research proposals submitted to the Virginia Space Grant Consortium Graduate Fellowship Program competition. He represented UVA at the University Corporation for Atmospheric Research.

Kyle Haynes was on the Editorial Board of *Ecography* and participated in the Future of Synthesis in Ecology Workshop, which was organized by the National Center for Ecological Analysis and Synthesis. He also reviewed manuscripts for a number of professional journals.

Deborah Lawrence directs the Environmental Thought and Practice program, an interdisciplinary major that brings the natural sciences, social sciences, arts, and humanities to bear on understanding and solving environmental challenges such as climate change. She was an invited member of the Climate Strategies Committee of the International Climate Policy Research Group and a member of the Steering Committee for the Community Climate Intervention Strategies group of the National Center for Atmospheric Research. At the University, she served on the College and Graduate School of Arts & Sciences' Expedited Promotion and Tenure Committee and its Cluster Hire Selection Committee. She also served on the National Advisory Board of the *Virginia Environmental Law Journal*, which is edited by students at the School of Law.

Manuel Lerdau was on the Editorial Boards of *Biology Letters, Northeastern Naturalist*, and *Ecology*. He served on the National Science Foundation Graduate Research Fellowship Program panel and the U.S. Department of Agriculture Multicultural Scholars Program, reviewed proposals for the ETH Zürich and the National Science Foundation, and served as external reviewer for promotion and tenure at a number of academic institutions and federal agencies. He also was a member of the Search Committee for the editor-in-chief of *Ecological Monographs* and a Publications Committee member for the Ecological Society of America. In addition, he reviewed manuscripts for several professional journals.

At the University, Professor Lerdau chaired the College and Graduate School of Arts & Sciences Faculty Rules Committee. In addition, he was a member of the University's Nelson Fund Committees, the Provost's Working Group on Faculty Evaluation, the Advisory Board of the Global Infectious Disease Institute, the Southeast Asia Studies Committee, and the Sexual Misconduct Hearings Board. He also mentored students working at the Morven Kitchen Garden and participated in the Grad STAR Faculty Student Mentoring Program.

Ajay Limaye reviewed proposals for the National Science Foundation and manuscripts for a variety of professional journals. In addition, he served on the College and Graduate School of Arts & Sciences Quality Enhancement Plan Advisory Committee.

Stephen A. Macko was a visiting scholar at the Smithsonian Institution. He served as a convener for the Geoscience Information for Teachers and the Science in Tomorrow's Classroom virtual workshops, held in conjunction with the European Geoscience Union General Assembly. He was included in *American Men and Women in Science*, *Who's Who in America*, *Science and Engineering*, *Who's Who in America*, *Science Education*, and *Who's Who in the World, Science and Engineering*. He served as secretary of the Committee on Education of the European Geosciences Union. He was editor-in-chief of *Nitrogen* and served on the Editorial Boards of *Minerals Geosciences (Biogeosciences)*, *Oceanography* (Oxford Research Encyclopedia), and *Minerals*. He was on the Review Committees for the Crafoord Medal Prize in Geosciences, the Franklin Medal, and the Vernadsky Medal. He was on the Major Instrumentation Panel at the National Science Foundation and served as an external reviewer for a promotion and tenure decision. At the University, Professor Macko was a member of the Faculty Senate, the Faculty Senate Policy Committee, the Faculty Advisory Committee to the Honor Committee, the Summer Session Advisory Committee, and the University Libraries Committee. He was a Hereford College Faculty Fellow.

Karen J. McGlathery, the lead principal investigator of the Virginia Coast Reserve Long-Term Ecological Research (LTER) program, sat on the national LTER Science Council and Executive Board as well as the Advisory Committees of the Florida Coastal Everglades LTER and the Moorea Coral Reef LTER. In addition, she was an associate editor of *Ecosystems*. She also was active in a number of organizations in the Commonwealth. She served on former Gov. Ralph Northam's Technical Advisory Committee for Virginia's Coastal Resilience Master Plan, the Governor's Carbon Sequestration Task Force, the Advisory Board for the Chesapeake Bay Trust on Modeling Climate Change Impacts on Submerged Aquatic Vegetation, and on the Research and Education Advisory Council of Virginia Sea Grant. She reviewed manuscripts for professional journals and funding proposals for professional organizations and was on the Design Competition Committee for the Coastal and Estuarine Research Federation. She was the UVA representative to the Association of Public and Land-Grant Universities' Board on Oceans, Atmosphere, and Climate.

Professor McGlathery was a senior fellow of the College and Graduate School of Arts & Sciences Society of Fellows and served as director of the University's Environmental Resilience Institute and as codirector of its Coastal Conservatory Environmental Humanities Consortium. In addition, she was advisor to the provost and vice president of research on Environmental Resilience and Sustainability Grand Challenge Investments, cochair of the Teaching and Research Subcommittee of the UVA Committee for Sustainability, a member of President James Ryan's Morven Farm Working Group, and an advisor to UVA's Yamuna River Project. She chaired the University Scholars Program Dissertation Award Committee and was a reviewer for the Harrison Research Awards.

Michael Pace served as past-president of the Association for the Science of Limnology and Oceanography and was a member of its Executive, Nominations, Publications, and Finance Committees. He was guest editor of a special issue of *Limnology and Oceanography* and reviewed manuscripts for several professional journals. In addition, he served as an external reviewer for a promotion and tenure decision and was on the Evaluation Committee for the Naumann Thienemann Medal, given by the International Society of Limnology. At the University, he served on a Biology Department promotion and tenure review committee and was a member of the Chaired Professors Committee in the College and Graduate School of Arts & Sciences.

John Porter was chair of the Controlled Vocabulary Working Group of the LTER Information Management Committee.

Sally Pusede is a coeditor of *Atmospheric Chemistry and Physics*, chapter coauthor on air quality for the Fifth National Climate Assessment, and a member of the grant selection committee of the Center for Global Inquiry and Innovation.

Matthew Reidenbach was awarded a Friday Harbor Laboratories New Faculty Research Fellowship and served as a reviewer for several National Science Foundation proposals as well as for manuscripts for professional journals. At the University, he was a member of the Physics Chair Search Committee.

Natasha Ribeiro was editor-in-chief of the section on Fire Research at the *Science-Policy-Practitioner Interface of Fire Journal*.

T'ai Roulston was a subject editor of *Ecosphere* and a member of Working Groups on Pollinator Modeling, Rusty Patched Bumble Bee Conservation, North American Nut Tree Conservation, and North American Fruit Tree Conservation. He reviewed grants for the National Science Foundation and manuscripts for professional journals. At the University, he was a reviewer for grants submitted as part of the statewide 4-VA research program and successfully secured certification for UVA as a Bee Campus.

Todd Scanlon reviewed proposals for the National Science Foundation and manuscripts for a number of professional journals. At the University, he chaired the College and Graduate School of Arts & Sciences Committee on Faculty Rules and was a reviewer for the Harrison Undergraduate Research Award program.

Kathleen Schiro was an associate editor of *Monthly Weather Review*, reviewed manuscripts for a number of professional journals, and served on proposal panel reviews for the Department of Energy and NASA. She cochaired the Convection Session at the American Meteorological Association's 34th Conference on Hurricanes and Tropical Meteorology and served as a judge for the Outstanding Student Presenter Awards at the American Geophysical Union fall meeting and the American Meteorological Society annual meeting. She received the department's Environmental Sciences Organization Award, given to a member of the department who has been particularly helpful to undergraduate majors.

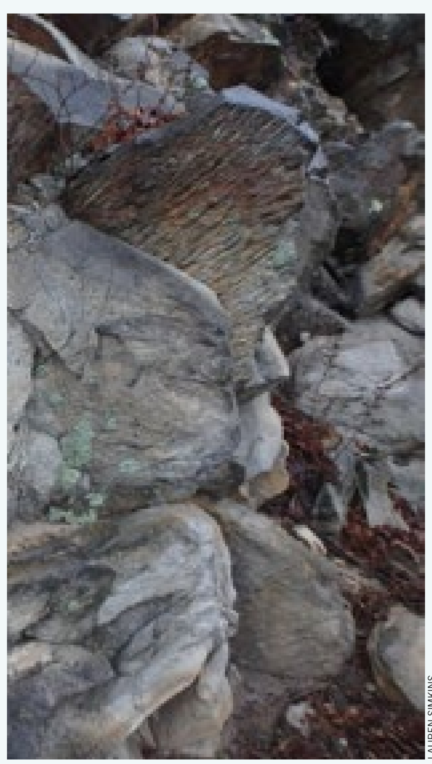
Herman H. Shugart, the W. W. Corcoran Professor of Environmental Sciences, Emeritus, was a member of the Editorial Boards of *Ecological Processes*, *Eurasian Journal of Forest Research*, *Forests*, *Forest Ecosystems*, *International Journal of Ecology*, *International Journal of Environmental Protection*, *PeerJ*, and *The Sejm Review*.

Lauren Simkins was on the Books Editorial Committee of the Geological Society of London, reviewed manuscripts for a number of professional journals, and proposals for funding organizations including the National Science Foundation, National Environmental Research Council, and Programa Polar Português. She was also a member of the Louis Stokes Alliance for Minority Participation (LSAMP) Virginia-North Carolina Alliance Governing Board and served as a mentor for the LSAMP Bridge to Doctorate program. This year, the University named her to its Mead Honored Faculty. In a survey conducted by the UVA Career Center, she was recognized by first- through third-year undergraduate students as "the one individual who helped them the most with their career development." She participated in nonmajor undergraduate advising, served as a faculty mentor at the Mentoring Institute of the Office of Graduate and Postdoctoral Diversity Affairs, and was a member of the Native and Indigenous Relations Community.

David E. Smith directed the Conservation Specialization program for the department. He also served on the University's Facilities Management Advisory Board and the Athletics Advisory Council.

Patricia Wiberg served on the Executive Committee of the American Geophysical Union's Earth and Planetary Surface Processes Focus Group and was a member of the Editorial Committee of the *Annual Review of Marine Science*. In addition, she served on the Steering Committee of the National Science Foundation-sponsored Community Sediment Dynamics Modeling System and on the Advisory Board of the Sediment Workgroup, part of the Regional Monitoring Program for Water Quality in San Francisco Bay. At the University, she was a member of the Steering Committee of the College and Graduate School of Arts & Sciences as well as its Graduate Education Committee.

Xi Yang served on the Foliar Sampling Technical Working Group of the National Science Foundation's National Ecological Observatory Network. He was also on the Steering Committee for FluxCourse, a two-week educational program for graduate students sponsored by the AmeriFlux Network.



LAUREN SIMKINS

PEER-REVIEWED PAPERS, BOOK CHAPTERS, AND BOOKS

For Faculty, Staff, and Graduate Students

(Summer 2021 through Spring 2022)

Allen, T., Behr, J., Bukvic, A., Calder, R. S., Caruson, K., Connor, C., **McGlathery, K. J.**, **Reidenbach, M. A.**, ... & Zinnert, J. C. (2021). Anticipating and Adapting to the Future Impacts of Climate Change on the Health, Security and Welfare of Low Elevation Coastal Zone (LECZ) Communities in Southeastern USA. *Journal of Marine Science and Engineering, 9*(11), 1196. dx.doi.org/10.3390/jmse9111196

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Besterman, A. F., **McGlathery, K. J.**, **Reidenbach, M. A.**, **Wiberg, P. L.**, & **Pace, M. L.** (2021). Predicting benthic macroalgal abundance in shallow coastal lagoons from geomorphology and hydrologic flow patterns. *Limnology and Oceanography, 66*(1), 123–140. doi.org/10.1002/lno.11592

Bhatt, U. S., Walker, D. A., Raynolds, M. K., Walsh, J. E., Bieniek, P. A., Cai, L., **Epstein, H. E.**, ... & Tucker, C. J. (2021). Climate drivers of Arctic tundra variability and change using an indicators framework. *Environmental Research Letters, 16*(5), 055019. doi.org/10.1088/1748-9326/abe676

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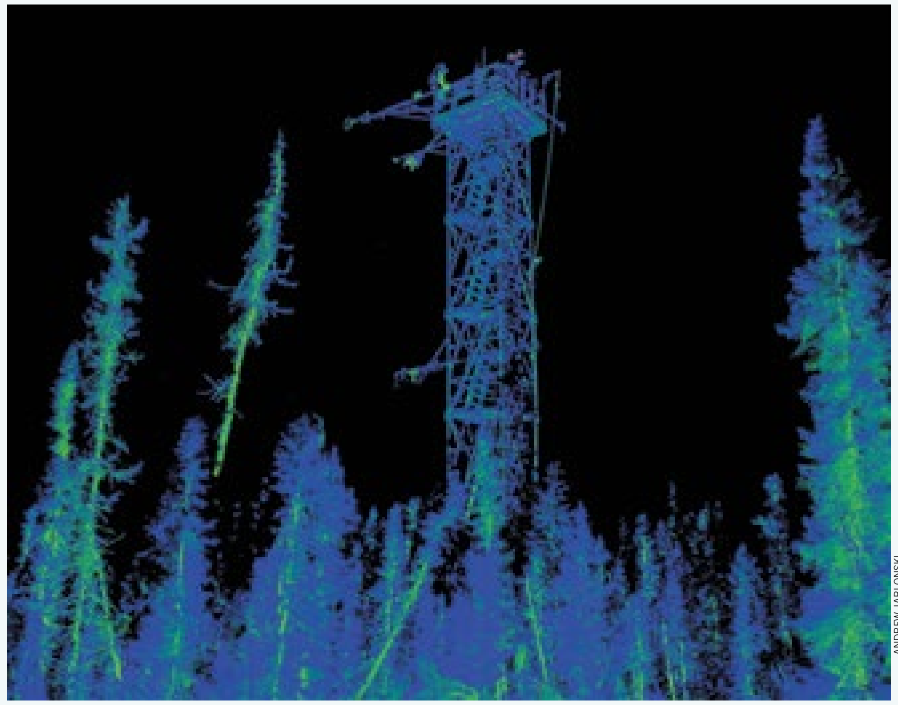

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A LiDAR image of the Caribou-Poker Creek Research Watershed in Alaska.

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