

# UMaineToday

SPRING | SUMMER 2020

CREATIVITY AND ACHIEVEMENT AT THE UNIVERSITY OF MAINE



**CONIFER CLASSROOM** What are the roles of Maine's University Forests?





The University of Maine formed an innovation team to help evaluate and develop solutions to the shortages of supplies and challenges faced by Maine's health care centers since the beginning of the COVID-19 pandemic. The group includes UMaine faculty, staff and students, representatives from the Maine Department of Economic and Community Development, the Maine Manufacturing Extension Partnership, MaineHealth, St. Joseph Hospital and Northern Light Health. Other collaborating partners include the Manufacturers Association of Maine and Maine Procurement Technical Assistance Center. The first UMaine-led initiative in support of health care workers focuses on production of hospital-grade hand sanitizer. A team led by UMaine's Process Development Center (PDC) and faculty in chemical and biomedical engineering set up production of hospital-grade alcohol-based sanitizer in accordance with FDA Temporary Guidance. PDC is working with the Maine Distillers Guild, which is coordinating the ethanol supply from area distillers. UMaine's production has focused on 55-gallon and 5-gallon containers for use by hospitals. As production increases, the team is supplying other health-related facilities and first responders to meet demand. The three-member on-site production team is Nick Hill, Nayereh Dadoo and Donna Johnson.



These are extraordinary times. I hope you and those you love are healthy and safe. Our hearts go out to those who have lost their lives and those whose well-being has been impacted by the coronavirus. COVID-19 has touched all of us and has forever changed us. Despite the uncertainty, there are many simple truths and underlying principles that make us strong. Most important: We are in this together.

In spite of this virus that is transforming our lives in unprecedented ways, we at the University of Maine continue to plan, perform and persevere every day. We are making important decisions in as timely a manner as possible, and supporting our students and employees in all the ways possible. And we enact our values of fostering learner success, discovering and innovating, and growing and advancing partnerships, every day, everywhere — from online instruction, to research on coronavirus immunity, to partnerships with the Maine Center for Disease Control and Maine Emergency Management Agency.

The very best of Black Bear Nation is coming through at this very difficult time. Despite their own professional and personal challenges, faculty and staff continue to focus on helping ensure student success and service to the state. In the UMaine community, the examples of innovation, vision and goodwill are endless, firm in the commitment that we must come together and work in partnership to come through the significant challenges and to continue to define tomorrow.

As the state's only public research university, we have formed an innovation team to help evaluate and develop solutions to the shortages of supplies faced by Maine's health care centers since the beginning of the COVID-19 pandemic. As many of our researchers as possible have turned their efforts to supporting the coronavirus fight in partnership with businesses, agencies and organizations statewide. And it is making a difference.

*UMaine Today* magazine will share stories of that leadership and collaboration in subsequent issues. In this issue, we wanted to offer some UMaine stories that provide familiar context in these uncertain times. These stories get to the breadth and depth of the state's land grant university, and reaffirm that the University of Maine is here for you and all we serve as members of Black Bear Nation.

Take care of yourselves. Be well.



Joan Ferrini-Mundy  
*President*



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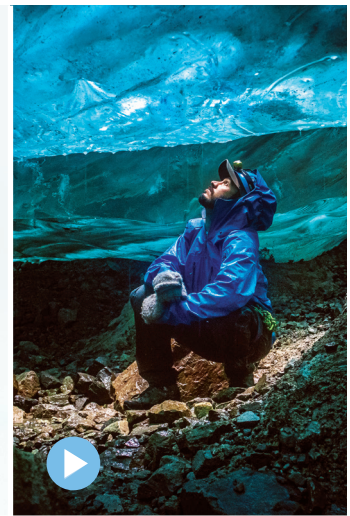
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Haley Harlow, a first-year student from Boxford, Massachusetts, is one of about 70 University of Maine students who were enrolled in a vegetation course led by Bill Livingston, associate director for undergraduate education and associate professor of forest resources. For the first eight weeks of the fall semester, the students were in the Dwight B. Demeritt Forest adjacent to the UMaine campus. A photo essay about the more than 1,860-acre living laboratory, used year-round for education, research and recreation, begins on page 22.

Photo by Adam Kuykendall





## UMaineToday online

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*UMaine Today* magazine online provides web-exclusive features, including videos, photo galleries, full-length versions of articles and a comprehensive editorial archive.



Video magazine

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## Museum of Art naming gift

**A \$1.3 MILLION NAMING GIFT** from education leaders and arts supporters Donald and Linda Zillman will expand and enhance the University of Maine Museum of Art.

The museum is now the Linda G. and Donald N. Zillman Art Museum – University of Maine.

The Zillmans, longtime Maine residents who now live in Santa Fe, pledged the gift to the University of Maine Foundation for the construction and operation of five new galleries to showcase the museum's collection of more than 4,000 works of modern and contemporary art.

A long-term lease agreement will increase the square footage of the museum's public gallery space by 40%. Construction of five new galleries will bring the total number to 12, with more than 4,700 square feet for exhibitions.

Donald Zillman has been a leader in the University of Maine System for 30 years. Linda Zillman is an art historian who has written two catalogues and curated two exhibitions on Andy Warhol at the University of Maine at Presque Isle.

The Zillmans were instrumental in moving the University of Maine Museum of Art from the Orono campus to its current location in downtown Bangor. Linda Zillman has served on the UMMA support board of directors for more than 10 years. They are members of the University of Maine Foundation Stillwater Society, and have funded several key museum projects through the years, including a vibrant sculptural welcome sign erected in fall 2019.

The UMaine Museum of Art advances the university's land grant mission of service to citizens through its cultural engagement activities that include exhibitions, a permanent collection and educational programming. ♦



# New molecular tools

**DEVELOPMENT OF NEW MOLECULAR TOOLS** to advance understanding of calcium release activated calcium (CRAC) channels in the plasma membrane is the focus of a nearly \$800,000 grant from the National Science Foundation (NSF) to a University of Maine-led research team.

The molecular tools — novel compounds called light-operated CRAC channel inhibitors (LOCIs) — will allow researchers to control the function of CRAC channels to better understand their role in cell biology.

CRAC channels are key proteins that affect calcium entry and signaling in cells. The channels control such cellular activities as cell migration and proliferation, and gene expression. However, little is known about the molecular, biophysical and biochemical mechanisms that regulate the highly selective release of calcium. Calcium is one of the most important signaling molecules in living cells.

The grant, funded by NSF and the U.S.-Israel Binational Science Foundation, enables an international collaboration between Michael Kienzler, UMaine assistant professor of chemistry, and assistant professor Raz Palty at the Technion in Haifa, Israel.

Kienzler's research focuses on the synthesis and evaluation of new light-activated molecules for biological applications. His lab is developing a series of LOCIs photoswitches designed to modulate CRAC channel activity. By incorporating photoswitches into the LOCI compounds, their activity can be turned on and off by shining different colors of light on them, providing a high degree of precision and control in experiments.

The UMaine Chemistry Department recently upgraded its facilities with a state-of-the-art, 500 MHz nuclear magnetic resonance spectrometer, made possible by a more than \$535,000 grant from NSF's Major Research Instrumentation and Chemistry Research Instrumentation programs. This new instrument is an essential tool for characterizing the LOCI compounds.

The goal of the research is to determine if LOCIs can be used to control calcium-dependent cellular responses and, ultimately, manipulate such functions as gene expression and cellular migration. The research team's novel opto-genetic and opto-pharmacological approaches could provide rapid and reversible remote control of CRAC channel signals — an important component in a wide range of cellular processes and particularly immune system function. ♦





## Personalities studying personalities

**SMALL MAMMALS HAVE DIFFERENT PERSONALITIES**, just like people do — and this can influence their decisions, leading to wide-ranging impacts on the environment.

Alessio Mortelliti, associate professor of wildlife habitat conservation, has been awarded an \$875,000 National Science Foundation (NSF) CAREER Award to study how small animal personalities — whether shy, outgoing or in between — affect the ecosystem.

He plans to focus on the specific traits of individuals to find out how those traits and their expressions influence population trends and ecosystem processes like forest regeneration. This individual variation also could impact the response of populations and communities to land use and climate change.

A team of graduate and undergraduate students, collaborators and citizen scientists will assess how changes in land-use practices affect the distribution of different animal personality types, and assess whether diversity in personalities can influence population dynamics, such as whether a high proportion of bold individuals in the population leads to a different dynamic than a population of mainly shy individuals.

The project also will encompass a new teaching model called “personalities studying personalities,” in which Mortelliti will encourage undergraduate students to analyze, improve and capitalize on their own personality traits and communication methods. Students will then utilize those skills and knowledge to engage high school students in citizen science projects that are part of Mortelliti’s research.

“The insights and models generated by this project will illuminate the link between individual variation and population, community and ecosystem dynamics,” says Mortelliti. ♦

“

The insights and models generated by this project will **illuminate the link between individual variation and population, community and ecosystem dynamics.**”

Alessio Mortelliti

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# The latest tool to help Mainers fight opioid overdoses

**MAINE'S OFFICE OF BEHAVIORAL HEALTH**, in collaboration with the University of Maine, has released a free mobile app that provides key information to help reduce deaths from opioid overdoses.

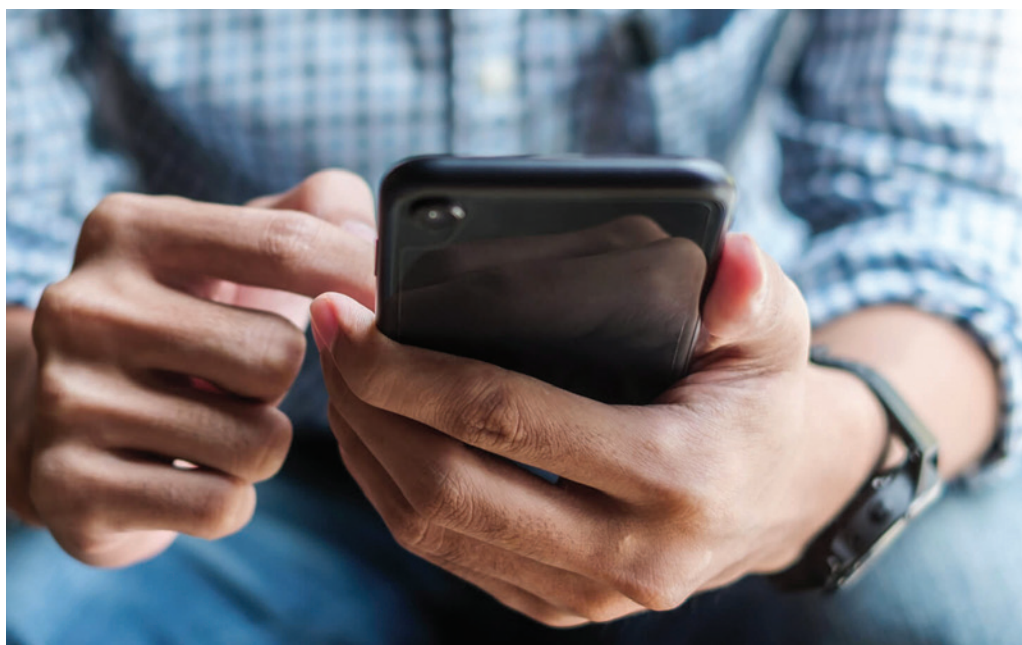
The app, OD-ME, contains naloxone administration instructions for both intranasal Narcan and intramuscular naloxone, and step-by-step audio and visual guidance on how to perform rescue breathing. The app, available through the Apple App Store and Google Play, also allows a user to dial 911 for emergency assistance and 211 for additional resources.

The app was developed by the Margaret Chase Smith Policy Center, and the Virtual Environment and Multimodal Interaction (VEMI) Laboratory at the University of Maine, and is published by the University of Maine System. The goal of the app is to provide a free and easily accessible emergency response tool primarily aimed at educating active bystanders. Bystanders following instructions on the app could intercede on behalf of a person experiencing an opioid overdose.

"The app is not meant to be a stand-in for formal naloxone use training," says Alexander Rezk, a research assistant at the Margaret Chase Smith Policy Center who was involved in the development. "Rather, it is a low-barrier, easy-to-use emergency response and educational tool for those who want to be prepared."

The app complements the state's public outreach campaign, [haveitonhand.com](http://haveitonhand.com), regarding naloxone distribution and use. Most opioid overdoses are accidental, and a bystander friend or family member could use the mobile application to recognize and confirm the signs of an overdose. If they have naloxone on hand, the app can walk them through the process of administering the life-saving medication.

"An important part of the Governor's Executive Order on Opioid Response is providing education and training to friends and family of those who are at risk of overdose," says Marcella Sorg, research professor at the Margaret Chase Smith Policy Center who led the app development. "This app makes naloxone administration instructions easier to get into the hands of Mainers than ever before." ♦





## Headed into space as part of NASA initiative

**NASA SELECTED 18 SMALL RESEARCH SATELLITES** to fly as auxiliary payloads aboard rockets launching between 2021 and 2023.

And the University of Maine, University of Southern Maine, Saco Middle School, Fryeburg Academy and Falmouth High School are on board, so to speak.

NASA's CubeSat Launch Initiative provides opportunities for nanosatellite science and technology payloads built by universities and schools to ride share on space launches. CubeSats — a small spacecraft — can measure 4 inches on each side and weigh less than 3 pounds.

Maine's CubeSat is MESAT1. UMaine professor of electrical and computer engineering Ali Abedi leads the project with USM professor of physics Jeremy Qualls and Wells National Estuarine Research Reserve director Jason Goldstein.

Saco Middle School's payload will compare temperature and albedo (fraction of solar irradiation reflected back into space) across urban and rural areas to determine whether urban heat islands can be mitigated through architectural designs that maximize albedo.

Fryeburg Academy will modify a digital camera to image shallow, coastal waters to distinguish water quality properties, including turbidity and phytoplankton concentration. The goal is to develop a low-cost remote sensing tool for coastal estuaries.

And Falmouth High School will examine whether harmful algal blooms increase atmospheric temperature and water vapor levels in the air above them. If a correlation is established, it will be easier to detect when an algal bloom is growing.

MESAT1 received \$300,000 from NASA, \$150,000 from the NASA Maine Space Grant Consortium for graduate student research, and \$72,000 from UMaine and USM. ♦



# Life histories of fish

**THE GOALS OF A RESEARCH CONSORTIUM** funded by a \$1.6 million award from NOAA Sea Grant are improving stock assessment, management and sustainability of highly migratory species such as tuna, swordfish and sharks. The consortium is led by Walt Golet, assistant professor in the School of Marine Sciences.

Funding to support the Pelagic Ecosystem Research Consortium was one of three competitive awards totaling \$2 million in the 2019 Sea Grant Highly Migratory Species Research Initiative.

The Pelagic Ecosystem Research Consortium will conduct several projects focused on bycatch reduction, increased understanding of life history, post-release mortality and other objectives for multiple species of highly migratory fish in the Northwest Atlantic and Gulf of Mexico.

Co-principal investigators are David Kerstetter of Nova Southeastern University, Robert Hueter of Mote Marine Laboratory and Stephen Bullard of Auburn University.

Comprehensive information on the life history of highly migratory species is lacking, including data on age, growth, indices of abundance, reproduction, post-release and natural mortality, infectious disease, anthropogenic disturbance, habitat utilization/migratory behavior and stock structure.

Research by the consortium is expected to reduce uncertainty in stock assessment models and population status, and inform appropriate quotas to promote sustainability. ♦

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**Highly migratory species are some of the most sought-after fish in the world, both commercially and recreationally,** and yet there is so much to learn about their life history in order to improve the stock assessments that determine their population status, the allocation of fishing quotas and, ultimately, their sustainability.”

Walt Golet



Photo by Walt Golet



Don Holder



# Seeing the light

**Tony Award-winner Don Holder plugged into the arts at UMaine**

By Elyse Catalina | Photographs by Adam K  ykendall

**I**n the late 1970s, Don Holder was pursuing a forestry degree at the University of Maine. He also was engaged in a “self-designed” liberal arts education.

That foundation is what the now Tony Award-winning lighting designer points to as his springboard for success on Broadway.

“I have an extraordinary informal training and experiences in the arts, as well as the sciences,” he says of his time at UMaine, where he was involved with Maine Masque, a student-led theater group open to all majors, and played the bass and tuba with several ensembles. “I don’t know if I would have gotten that anywhere else. It was sort of a perfect place for me.”

Holder, a native of Rockville Centre, New York, says he can vividly remember “Cat on a Hot Tin Roof,” the first show he worked on as a lighting operator at UMaine.

UMaine also was the only place where he acted.

“I think the greatest thing that came out of my experience with Maine Masque was understanding that making theater was about being part of a community, and it’s the community aspect of theater making that’s always been what has attracted me more than anything else,” he says.

Holder's lighting mentor was the late UMaine theatre professor Edgar Allan "Al" Cyrus. Holder says Cyrus was invested in nurturing his interest in lighting, which had been a passion since childhood. The pair shared a love of forestry, which also was Cyrus' major as an undergrad at West Virginia University.

"I don't know why I was fascinated with light, I just always was," Holder says. "I was always drawn to it."

Holder recalls the first play his parents took him to, "Fiddler on the Roof," when he was 5 or 6 years old, and how he could "feel" the light change.

"Throughout my childhood, I seemed to be the person who was the manipulator of light. Even in Boy Scouts, I was the kid who built the campfires and bonfires, and lit the ceremonial trails," he says. "I just kind of fell into lighting in every aspect of my life."

Holder graduated from UMaine in 1980 with a degree in forestry, then went on to earn a master's degree in technical design and production from the Yale School of Drama. Having a formal education in forestry separated Holder from the crowd when it came to finding work.

"People were intrigued by the fact that I was a forestry major," he says. "I was sort of the one person in a pile of resumes who had a very different background."

Holder has designed 58 Broadway productions, earning two Tony Awards for "The Lion King" and "South Pacific," as well as 13 Tony nominations.

"'The Lion King' is special in my heart," says Holder of the first Broadway musical he worked on. "At that point in my life I was starting to think I'd never get to design a musical on Broadway, which was my big dream. And it really changed my life."

Lighting designers reveal the world of the play, according to Holder.

"We're responsible for what you see and how you feel about what you're seeing," he says. "We sort of provide the lens through which a theatrical event is experienced by an audience. It's a very important role."

A lack of proper lighting can lead to unintended audience reactions, he says.

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We as human beings  
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**A lighting designer  
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medium so you can  
manipulate it to  
achieve certain  
creative objectives.”**

Don Holder



"Above everything else, lighting has a powerful influence on perception," Holder says. "We as human beings respond chemically to the quality of light, the intensity of light, the color of light. A lighting designer needs to understand this about the medium so you can manipulate it to achieve certain creative objectives."

In addition to Broadway, Holder has worked on operas, television shows and films. His recent credits include several productions at the New York Metropolitan Opera, seasons one and two of the NBC drama "Smash," and Warner Bros. Pictures' "Ocean's Eight."

He currently is head of lighting design at Rutgers University.

For high school and college students who are interested in lighting design, Holder suggests becoming exposed to a range of topics through school, theater, films and news.

"Study art history, study history and politics, and philosophy, and psychology — anything that could feed your brain and make you understand the human condition in a more profound way.

Because what designers do, we essentially crystallize work into something very, very precise that speaks profoundly to the human condition," he says. "In order to be an articulate designer, you have to have a lot to draw from. Either it's life experience or it's experience in intellectual pursuits and intellectual curiosity."

Being involved in the technical side of theater requires a passion for the art and understanding that it is a collaborative act.

"Your role is to be an artisan, but also to support the artistic process," he says of lighting electricians, costume makers and technical directors.

Holder says he has done what he has always wanted to do — work at the Metropolitan Opera, travel the world and light a Broadway musical. He plans to continue to seek out collaborative, challenging projects that take him out of his comfort zone and force him to think outside the box.

"I wanted to be a lighting designer when I was 13 years old," he says. "I sensed that was what I wanted to do, and it took a while to get there, but I feel like every day, I'm living the dream." ♦



# LEADERS

## in the making

By Beth Staples

**Courses tap into each person's potential to contribute**

Students interested in developing leadership skills have an excellent role model in Rich Powell.

The political science professor who directs the interdisciplinary leadership studies minor is the 2020 Distinguished Maine Professor — the University of Maine's most prestigious faculty award.

When the fledgling leadership studies minor launched in 2014, 17 students enrolled in courses. Now, more than 400 students clamor for classes. And last fall, 63 students had declared a minor in leadership studies. →



“A

number of us felt we could do more to teach leadership across campus and that would be positive in business, education, engineering and more,” says Powell. “We thought about ways to work together campuswide and the leadership studies minor grew out of that.”

To earn a minor, students complete 18 credits. Twelve are core credits in Foundations of Leadership, which focuses on developing practical skills and behaviors; Leadership Ethics, which examines moral and ethical theory and challenges that leaders face; Advanced Leadership Theory and Practice, which covers challenging leadership case studies from a range of fields, such as politics, business, education, athletics and the military; and Applied Leadership, which includes participating in the Washington, D.C. Leadership Institute Travel Course, a Congressional internship or another practicum.

Students also choose from more than 60 electives in multiple disciplines, including business, nursing, psychology, women’s studies, political science, theater and military science.

“I think leadership studies translates across different domains. Our goal is to turbocharge their world,” says Powell, who also is the founding director of the William S. Cohen Institute for Leadership and Public Service. “Leaders listen, are perceptive, and communicate effectively. Leaders are honest and ethical. Leaders have to walk the walk. If they’re inauthentic, people see through.”

During the annual Washington, D.C. Leadership Institute Travel Course offered by the Cohen Institute, students, including many taking leadership studies classes, interact with leaders in government, military, business, nonprofits, athletics, education and the arts.

The goal is for participants to develop hands-on, advanced leadership skills for the 21st century — a time of dramatic, unpredictable change.

The travel course is “truly a life-changing experience for students,” says Powell. Participants, including first-generation college students, become more poised and confident, and develop new perspectives and skills.

Some alter their career aspirations as a result.

“They’re optimistic about contributions they can make in the world,” he says. “It taps into each person’s potential to contribute.”

Students immersed in leadership studies also frequently take part in Congressional and state legislative internships.



Rich Powell

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**“I think leadership studies translates across different domains. Our goal is to turbocharge their world. Leaders listen, are perceptive and communicate effectively. Leaders are honest and ethical. Leaders have to walk the walk. If they’re inauthentic, people see through.”**

— Rich Powell





## Peter Madigan

“Life-changing” is how Peter Madigan ’81, chair of the Cohen Institute board of advisors and leadership studies faculty member, describes his congressional internship in Washington, D.C.

Money was tight 40 years ago for the then-junior political science and broadcasting/film major at UMaine. To make it work, he slept on the couch of his brother, who was in medical school at Georgetown University.

“The opportunities, I found, were limitless,” says Madigan.

He made friends and connections, which led to amazing jobs, including in the Bush Administration and on the Bush/Cheney Transition Team. Madigan also has consulted and strategized for Fortune 100 companies, nonprofits, small businesses and foreign heads of state.

Madigan resigned from the UMaine Board of Visitors so he could chair the Cohen Institute board of advisors, and help shape and inspire the next generation of leaders graduating from UMaine.

Madigan also encourages students in the leadership courses that he teaches to hone their empathy, self-awareness, honesty, decisiveness and optimism.

And, he helps promising students secure internships and jobs, including on Capitol Hill.

Leaders are needed in all fields, he says, because “the changes ahead will be huge and rapid.”



Peter Madigan



**“The opportunities, I found, were limitless.”**

— Peter Madigan

## Hali Bowden

Hali Bowden was in elementary school in 2008 when she became enamored with John McCain and cast a vote for him in a mock election.

Lessons she learned from the now-deceased Arizona Republican have stuck with her: Admit when you’re wrong and fix it. Be empathetic. Be willing to change.

Bowden, a fourth-year political science major, with minors in leadership studies, legal studies and history, strives to incorporate those lessons into her daily life.

She’s had considerable practice doing so. Growing up, she was a leader for Maine National History Day and participated in a slew of sports, including field hockey, lacrosse, wrestling and indoor track.

At Noble High School, Bowden occasionally wondered if big-time college opportunities would be available in the small town of Orono, Maine.



Hali Bowden

The Lebanon, Maine native soon learned they were. She participated in the Washington, D.C. Travel Course through the Cohen Institute for Leadership and Public Service. She met movers, shakers and political insiders, including Sen. Tim Kaine of Virginia, the 2016 Democratic nominee for vice president.

“It opened my eyes to opportunities I never would have thought,” she says. “You find yourself in this program and through other people.”

Bowden now works in the Bangor office of U.S. Sen. Susan Collins.

Through leadership courses, Bowden says she’s discovered that being an avid learner is her biggest strength. When she doesn’t know something, she immerses herself in the topic.

Which should suit her well in her planned career in advocacy and public policy outreach.

## Declan Downey

“UMaine changed my life,” says Declan Downey.

The Dedham, Massachusetts native had a 2.8 grade-point average in high school and wasn’t planning to attend college.

But his mom persuaded him to fill out the Common App. And Downey decided to apply to be a Black Bear because he loved Maine. Growing up, he and his family vacationed each summer on Medomak Pond in Waldoboro.

UMaine, he says, was the first to accept him.

Now the political science major, with minors in leadership studies and sociology, is a multi-time Dean’s List student.

“I’ve become part of the community here,” says the vice president of the UMaine College Democrats.

Downey has wanted to be a police officer since he was 12 or 13. That’s when he witnessed the Boston Marathon bombing, and the ensuing heroic actions of law enforcement personnel, on TV.

After high school, Downey successfully completed the 10-week basic training at Fort Benning, Georgia. At UMaine, he takes Army ROTC courses and when he graduates in spring 2021, he’ll be commissioned as a second lieutenant.

The huge Red Sox fan says he’s hopeful that young, energetic, idealistic people with leadership skills will help make the world a better place.

“I think the No. 1 quality of a leader is empathy,” he says. “It’s not about being best, it’s about representing people and building a coalition of voices — not just one or two — and creating a better community.”



Declan Downey

**“Leadership is found in the balance between listening and taking action.”**

— Genevieve McDonald

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## Brody Haverly-Johndro

Growing up in Newport, Maine, Brody Haverly-Johndro’s parents taught him that character is revealed in how you treat others. They also taught him the importance of being a leader, especially when it matters most.

These days, the J.D. candidate at the University of Maine School of Law seeks to lead by example. He says working with Portland High School (PHS) students through the Portland Mentoring Alliance has been extraordinary and rewarding.

The alliance matches volunteer leaders from business and education with PHS students — often first-generation immigrants or refugees. “They are some of the truly brightest, most thoughtful students I have ever met,” says Haverly-Johndro. “It’s an incredibly rewarding experience.”

Much of the rest of the time, he’s either in first-year law classes or prepping for those classes. Haverly-Johndro’s well prepared. He graduated magna cum laude with a bachelor’s in political science and a minor in leadership studies from UMaine in 2019.

At UMaine, he also served as president of his class for four years.



Brody Haverly-Johndro



He's volunteered on a number of political campaigns, was president of the Maine College Democrats and, in the spring of his senior year, he was selected as a UMaine Congressional Intern, working with U.S. Rep. Chellie Pingree in D.C.

Haverly-Johndro says the Washington, D.C. Leadership Institute Travel Course, which had as its theme "Leadership in Chaotic Times," was instrumental in his development.

Meeting with U.S. Sen. Angus King and others at the national level opened his eyes to the ways people can be at the forefront. "Leaders aren't always necessarily the loudest people in the room," he says. "It also taught me to approach every discussion open-minded, and to listen and to be heard."

The experience also fortified his desire to pursue a career in public policy. Haverly-Johndro's also not ruling out a run for office. He believes in the adage: If you don't like what's going on, be the change you want to see.

"We need leaders in every segment of society."

## Genevieve McDonald

In the Foundations of Leadership course, Genevieve McDonald better defined what type of leader she wanted to be.

"Leadership is found in the balance between listening and taking action," she says. "I believe the key to successful leadership is in communication, collaboration and information."

McDonald had already been asked if she would consider running for state legislative office when she was in the nation's capital for the 2017 Washington, D.C. Leadership Institute Travel Course.

"Washington is very different than serving in the Maine Legislature, but I thought experiencing an inside view of politics would help inform my decision of whether or not to run," says McDonald.

"I realized I wanted the opportunity to work on policy and issues impacting the people of Maine and that as a commercial fishing boat captain, I was uniquely qualified to represent the interests of the people in my district. The rest, as they say, is history."

That history includes 67% of House District 134 voters electing in 2018 to send her to Augusta.

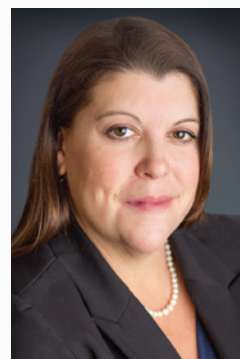
McDonald also completed classes in December 2018, graduating summa cum laude with a Bachelor of University Studies and a Maine studies minor. She planned to march with the class of 2018, but went into labor with her twins and marched in 2019 instead.

McDonald incorporates lessons she learned in D.C. into action in Augusta.

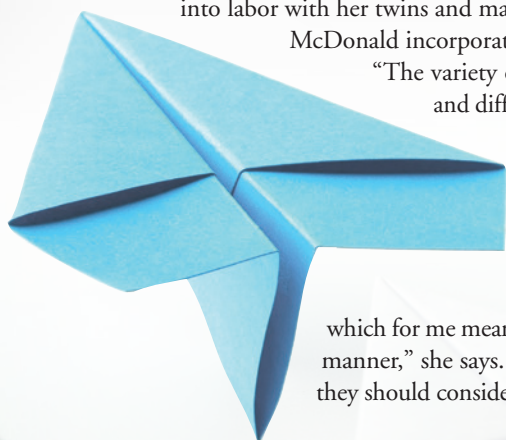
"The variety of speakers (in D.C.) from different aspects of government and different political ideologies challenged my preconceived notions about who I could find common ground with," she says.

McDonald often recalls advice of various people she met in D.C., especially former U.S. Sen. Bill Cohen, a Republican who served as Secretary of Defense under Democratic President Bill Clinton.

"I also reflect on the topic, which was civility in discourse, which for me means presenting fact-based information in a direct but respectful manner," she says. "I rarely tell people they are wrong. Instead, I explain why they should consider my position." ♦



Genevieve McDonald



# Schoolwork

Education policy institute celebrates 25 years  
of service to the state

by Casey Kelly



**SCHOOL LEADERSHIP IS SECOND ONLY TO CLASSROOM INSTRUCTION** in shaping the quality of preK–12 education. Principals and other administrators are key to hiring and retaining quality educators, and they help establish and maintain the culture and conditions conducive to excellence in teaching and student learning.

That's why in 2015 the Maine Legislature created a task force on school leadership.



Maine faces numerous challenges when it comes to developing leaders in public schools, including difficulties identifying, nurturing, recruiting and retaining people in leadership positions. Other states have similar problems, but Maine's largely rural, economically and socially diverse population creates unique issues for educational leaders, says Janet Fairman, associate professor in the University of Maine College of Education and Human Development.

"We'll go into a school one year, and when we come back the next year, they have a new principal, a new superintendent, a new special education director. It's hard to generate any kind of positive momentum when you have turnover like that at the top," Fairman says.

The legislative task force's final report, released in 2016, identified many of these challenges, and proposed solutions, including streamlining programs to prepare and license principals, and creating mentorship opportunities to encourage teachers to ease into leadership positions.

The task force's work grew out of a multiyear project examining high-performing schools in the state. It was conducted by the Maine Education Policy Research Institute (MEPRI), a collaborative effort of the University of Maine System and the Legislature. But the report was not the end of lawmakers' interest in the issue. Over the next few years, legislators tasked MEPRI with examining strategies and initiatives that could promote educational leadership development.

MEPRI co-director Fairman co-authored two recent reports with Ian Mette, a UMaine faculty member in educational leadership. They explored different aspects of school leadership in Maine.

The first report, based on a statewide survey of principals and central office personnel, found that while schools employed a variety of strategies to encourage teachers to take on leadership responsibilities, the focus was mostly on curriculum and instruction.

In addition, the survey indicated a disconnect between the perceptions of district administrators and principals about support for leadership. While administrators thought there were adequate measures in place for leaders, principals said there should be more.

The follow-up report consisted of two case studies examining innovative models in Maine. The first looked at the Bangor School District, where a leadership pipeline provides interested teachers pathways to explore leadership positions, encouraging aspiring principals and creating new opportunities for teachers to lead within schools. The other case examined two schools in two Maine districts — one urban and one rural — that implemented a model where teachers serve as head administrators, rather than the traditional principal-led school.

"Legislators have indicated that they want MEPRI to continue exploring programs and strategies to support leadership development in the coming years," says Fairman.

The nonpartisan research institute turns 25 this year. The Legislature established MEPRI in 1995 "to collect and analyze education information, and perform targeted education research for the Legislature." Over the years, MEPRI has produced hundreds of reports on topics ranging from Maine's statewide middle school laptop program to public preschool to teacher turnover and shortages.

As politicians and university officials increasingly talk about collaboration as not just a goal, but a necessity for the University of Maine System, MEPRI stands as a model of what is possible.

David Silvernail and Walter McIntire at the University of Southern Maine and UMaine, respectively, are MEPRI's founding co-directors.

"It hasn't strayed from the original goal of providing impartial, fact-based research and analysis," says Silvernail, former director of USM's Center for Education Policy, Applied Research, and Evaluation (CEPARE).

As politicians and university officials increasingly talk about collaboration as not just a goal, but a necessity for the University of Maine System, **MEPRI stands as a model of what is possible.**

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“That’s so important, because lawmakers will often hear from interest groups or from political appointees who may have an agenda when it comes to particular policy. MEPRI doesn’t have an agenda, other than providing good information and data,” says Silvernail, who also was a USM professor of educational research and evaluation.

Since 2015, the institute has been led by Fairman and Amy Johnson, who took over at CEPARE when Silvernail retired. In addition to McIntire, UMaine faculty members Walter Harris and Craig Mason have directed MEPRI.

“Our model is built on sharing resources and taking advantage of the expertise at both institutions,” Johnson says.

In 2019, the Legislature appropriated \$250,000 for MEPRI. The University of Maine System also contributed \$125,000 by funding a portion of the salaries and benefits of the respective co-directors on each campus, and providing in-kind support.

The institute also has a contract with the Maine Department of Education to perform ongoing research related to school funding.

Each year, faculty, staff and graduate students at both institutions with specific knowledge in different areas of education contribute to MEPRI’s work.

“Janet and I try to check in on a weekly basis to stay up-to-date, on our shared projects. If there’s a project that we are working on at USM or that they are working on at UMaine, we use each other as a sounding board for how things are going on those projects, as well,” Johnson says.

Another aspect of the institute’s governing structure that promotes collaboration is a steering committee, which serves in an advisory role as MEPRI develops its work plan each year. Representatives from the Legislature, Maine Department of Education (MDOE) and the state Board of Education, as well as from professional organizations such as the Maine School Management Association, the Maine Education Association and the Maine Municipal Association, serve on the committee.

These stakeholders help MEPRI brainstorm topics to study. MDOE and the Legislature’s Joint Committee on Education and Cultural Affairs select the final list of projects based their priorities. The steering committee also assists MEPRI in accessing individuals with specific knowledge related to a particular study, and with disseminating surveys statewide to its members.

Since Fairman and Johnson became co-directors, MEPRI has produced seven to nine studies or reports per year. All of its publications since 2011 are available online, with select publications from 2010 and earlier on the MEPRI website.

Various faculty, staff and graduate students at UMaine and USM with specific knowledge in different areas of education **are called upon each year to contribute to MEPRI’s work.**

**MEPRI reports include:**

“Challenges with Teacher Retention and Staffing Shortages in Maine School Districts”

“Exploring Innovative Models for School Leadership in Maine”

“Study of a Regional Approach for Delivering Special Education Programs and Services in Maine”

“Factors Influencing Parents’ Decision to Use Public Pre-K Programs in Maine: Results of a Parent Survey”



Lawmakers speak glowingly of MEPRI's role in shaping education policy in Maine.

"MEPRI is essential to our work," says Rep. Tori Kornfield of Bangor, who has served eight years in the Maine House of Representatives, six of them as House chair of the Education Committee.

"Every bill has a public hearing and a work session, and in the public hearing we get a lot of anecdotal testimony, which is wonderful," Kornfield says. "But you can't base policy on it. We need facts and data, and that's what MEPRI gives us."

Brian Langley of Ellsworth served 10 years in the Legislature — one term in the House and four terms in the Senate. He was on the Education Committee most of that time, including six years as Senate chair.

"By the end of my tenure, Dr. Johnson, Dr. Fairman and MEPRI had become very valued and trusted sources of information," says Langley, now the executive director of Bridge Academy Maine.

"It's the link to the University of Maine (System) that gives it its credibility," he adds.

Both Langley and Kornfield say they've spoken to lawmakers from other states who are fascinated by MEPRI, some of whom have tried to implement a similar research institute in their legislatures.

## MEPRI Impact:

### Standardized testing

### School leadership

### School district reorganization

### School funding

### Proficiency-based standards

Fairman and Johnson say the trust policymakers have in MEPRI is a direct result of its longevity. This has allowed the institute to study perennial issues, including the state's school funding formula, teacher shortages in STEM and special education, and long-term ramifications of policy choices, such as school district consolidation.

"MEPRI's had an impact on education policy in Maine, not to mention nationally and internationally," Fairman says, adding that she receives a handful of calls and emails every year from people in other states and abroad who have come across MEPRI reports online and want to discuss how the findings might apply to their circumstances or jurisdictions.

In many cases, MEPRI's research has shown there aren't one-size-fits-all solutions to thorny issues facing Maine's schools. One recent example was a 2012 state law that required public schools to implement proficiency-based standards for high school graduation. MEPRI documented implementation problems in multiple studies that started as soon as the law went into effect. In 2018, lawmakers repealed the requirement.

"That's an example of an issue where there was no silver bullet," Johnson says.

In fact, a 2019 MEPRI survey of Maine superintendents found that while 38% of respondents said they would probably return to a system in which students are only required to take a certain number of credit hours to graduate, about a quarter said they planned to keep the proficiency-based standards in their districts. Another 25% said they were considering a "hybrid" system, and 11% were taking a wait-and-see approach.

"Sometimes you have policies where the intentions are good, but the requirements can be burdensome. What our research showed was that it was better to give districts a choice," Fairman says.

As MEPRI marks 25 years of service to the state, Fairman and Johnson say the institute's best years are ahead. They're committed to continuing the productive partnership between the two university campuses, as well as the service to the state.

"We're maybe not the biggest initiative," says Johnson, "but I'd argue we have a pretty big impact." ♦





# *conifer* CLASSROOM



By Elyse Catalina | Photographs by Adam Küykendall





*UMaine's mission —  
teaching, research  
and public engagement*  
— FLOURISHES in University  
Forests like the Dwight B. Demeritt

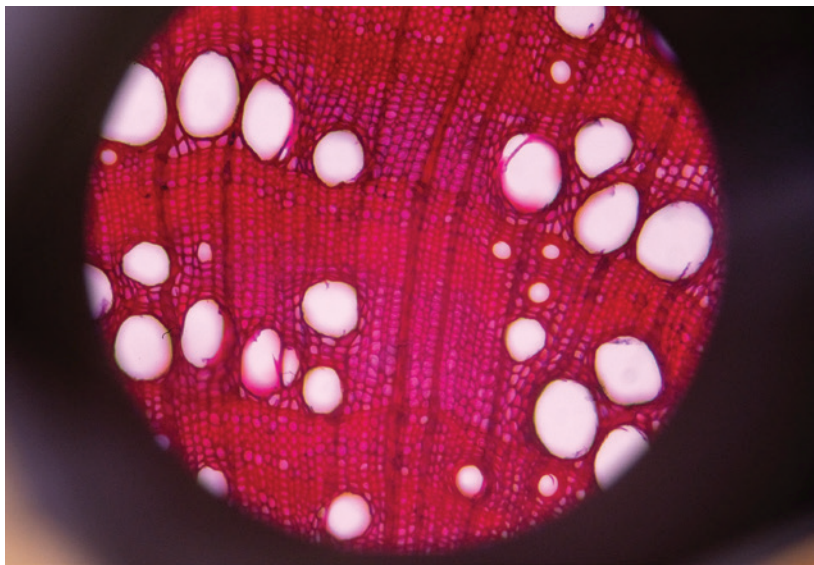
Approximately 14,000 acres of forestland owned by the University of Maine System and University of Maine Foundation can be found statewide — from Chapman in the north near Presque Isle, to Bethel in the west, the midcoast near Damariscotta and Down East in Whitneyville.

However, the heart of the University Forests is located adjacent to or near the UMaine campus. The 1,865-acre Dwight B. Demeritt Forest in Old Town and Orono features mixed forest stands, fields and waterways. Its mission, as it is with all the University Forests: research, demonstration and education. All in keeping with the stewardship role and sustainability emphasis of the state's public research and land grant university.



Keith Kanoti, University Forests manager with the University of Maine School of Forest Resources, surveys an Eastern white pine in the Demeritt Forest. In Demeritt, approximately 6,451 trees are greater than 24 inches in diameter and 73% of those are white pine. The more than 1,860-acre Demeritt Forest includes 91 acres of forest reserve with no timber harvesting, 81 acres of formal research areas, 118 acres of forested wetlands, 129 acres of riparian forest and 1,444 acres of managed timberland, according to Kanoti. Tree species include Eastern white pine, Eastern hemlock, red maple, red spruce, Northern white cedar, balsam fir and aspen.





# *UMaine has* MANAGED DEMERITT FOREST *for 80 years.* The federal government purchased land in 1939 during the Great Depression that later became the forest.

It was leased to the university to be managed by the forestry department before being deeded to UMaine in the 1950s, according to Keith Kanoti, University Forests manager with the School of Forest Resources.

“It’s the primary teaching forest for the university,” says Kanoti, adding the land is where students from a variety of disciplines, including forestry and wildlife, have labs and outdoor classes. “Not every university forest is located right on campus like ours is, which is a great benefit. Their laboratory space — the outdoors, the woods — is right close by.”

Research is made convenient by the forest’s proximity to campus, and owning land around the state allows researchers, including undergraduate and graduate students, access to varied forest types, according to Kanoti.

“From a research perspective, we can have lands that may have different issues down on the coast as opposed to up in Aroostook County because the climate is different,” he says. “It’s also nice just to have the diverse land base because with insects and diseases and threats like that, it’s always good to have your portfolio spread out a little bit.”

The Demeritt supports research on forest resources, according to manager Keith Kanoti. Faculty and students from a variety of disciplines take advantage of the living laboratory year-round. Kelly French (**right**), a graduate student pursuing a master’s degree in forest resources, collaborates with Jay Wason, assistant professor of forest ecosystem physiology, on research looking at relationships between tree structures and how trees function physiologically. The researchers collect tree cores (**above**), branches and leaves to study the cells (**left**) to better understand wood’s ability to store, transport and release water during a drought.











*While the research, education and demonstration*

MISSION IS  
CLEAR IN THE  
DEMERRITT, some of the  
outlying lands have additional  
management objectives depending  
on how the acreage was acquired.

Gifts of additional forestland are encouraged through the Green Endowment of forestland held at the University of Maine Foundation. The land can be managed with the donor's specific priority in mind, such as wildlife management.

Over a dozen UMaine forestry and wildlife classes use the Demeritt for multiple labs each year. Classes that convene in the woods focus on a range of topics, including forest management, silviculture, forest vegetation, remote sensing, coordinate geometry, wildlife ecology, outdoor leadership, forestland navigation and GPS, and outdoor preparedness. In addition, high school students from throughout the state visit for events such as the Maine Envirothon, a natural resource problem-solving competition. Old Town High School students also are using the land for watershed research.



Jay Wason (**right**), assistant professor of forest ecosystem physiology, and Ruth van Kampen, a master's student in forest resources, simulate an extreme drought to study the effects in four tree species in the forest. Preliminary results show red maple is able to store more water in its wood, and that water can easily be released to the leaves during dry conditions, according to Wason. "This may be one of the reasons why red maple is able to be so competitive in the forest and could lead to its continued dominance with future climate change," he says. Other recent projects include tick prevalence (**above**) and studying personalities and nut-caching decisions of small mammals (**below**).















Bill Livingston, associate director for undergraduate education and associate professor of forest resources, has been studying white pine in the Demeritt for more than two decades. White pine, the fastest-growing conifer in the Northeast, is used in several of the state's mills. He is researching improved tree growth through active management and thinning, and the common diseases found in white pine (**below**). "With pine forests like these, you can put in a study and you know it's going to be maintained for the long term," Livingston says of research in the Demeritt. "And when you're dealing with trees, long term means you're looking at decades for it to have any meaning. Having a resource like this for studies on trees is essential." Beyond research and education, students can enjoy the forest year-round, from snowshoeing in the winter to swimming in the summer (**left**).





# *Members of the* *UMaine community* FREQUENTLY

## VISIT THE FOREST

to walk, run, mountain bike,  
snowshoe, cross-country ski  
and even swim in the river.

Sports teams, clubs and student groups, including Army ROTC, conduct physical and tactical training, as well as navigation, in the forest.

“The forest is in everybody’s backyard in Orono and Old Town,” Kanoti says. “It’s a big chunk of undeveloped land that people can use and recreate on.”



Photo by Ben Tero





UMaine Campus Recreation maintains the more than 15 miles of groomed ski trails on campus **(right)**, and a local mountain bike group keeps up 10 miles of single-track trails. Additional running and walking paths, managed by the University Forests office, are located throughout the forest **(left)**. Facilities Maintenance and UMaine Athletics, whose cross-country teams use the forest for practice and races, also help improve and clean up the on-campus trails after storms, says Jeff Hunt, director of Campus Recreation. A Challenge Course, which includes a zip line **(far left)**, offers team-building programs for groups. “(The forest) gives students an outdoor recreation opportunity within walking distance from their dorm,” Hunt says. Here, recreation coexists with active forest management.







UMaine classes that convene in the woods focus on a range of topics, including outdoor leadership. Lauren Jacobs ([this page](#)), a lecturer in kinesiology and physical education, leads the outdoor and adventure activities course, which focuses on helping students become confident and competent in environmental conditions and outdoor activities, such as safely using camp stoves and building shelters ([right](#)). "In order to be a leader in outdoor settings, you need to be able to take care of yourself so that you can then take care of others," Jacobs says.











*The Demeritt has been managed for timber* SINCE ITS INCEPTION and continues to be a working forest.

Kanoti oversees the forest management plan, which includes harvesting trees and selling wood to local mills. Revenue from harvesting goes back into operating the forest.

“There’s a real rhythm to the management of the forest,” Kanoti says. “It varies with the seasons. What the seasons are dictate what we’re doing because our jobs are very weather dependent.”

The majority of harvesting takes place in the winter when the ground is frozen, to cause less damage, according to Kanoti. During that time, classes and labs also use the forest.







Tony Guay, a remote sensing technical specialist, teaches a course on forestland navigation and outdoor preparedness for students majoring in natural resources. In fall 2019, Guay had more than 50 students in the course that focused on mapping a forest boundary traverse using a tablet app (far left). "The close proximity of the Demeritt Forest to campus is essential to providing students with easy access to this 'forest laboratory,' which allows ample time to learn and practice forestland navigation during the semester," he says. "We're extremely lucky and grateful to have such an amazing resource for teaching and research so close to campus." Being a working forest with timber harvesting allows for the demonstration of practices. In the Demeritt, the public can see forestry in action. The School of Forest Resources follows a forest management plan based on an inventory every 10 years. Eastern white pine is the primary species managed in the forest. Using a shelterwood system, the harvest is timed to abundant seed years to achieve natural regeneration, Kanoti says. "We don't plant trees, we don't need to," he says. "They come back on their own, if we do it properly." The Demeritt also has a forestry best management demonstration practice area, and is a setting for professional foresters and loggers in the region to complete required training (above and left).







*With spring comes  
collecting and  
boiling sap* FOR  
MAPLE SYRUP.

“After sugaring, we tend to fix everything we broke in the winter because winter is our busiest season,” says Kanoti, referring to equipment and building maintenance.

Students are hired over the summer to assist with harvest planning, inventories and maintaining boundary lines on acreage throughout the state.







Thomas J. Corcoran Sugar House attracts more than 250 schoolchildren a year. Each spring, students and University Forests staff, including forest technician Charlie Koch (from left) and manager Keith Kanoti, tap and collect sap from more than 400 maple trees in the university's sugarbush, and boil it into maple syrup at the sugar house. "We're open on Maine Maple Sunday," Kanoti says. "People just stop by and discover us, and get to see the sugar house. Everyone likes it, that's a fun part of the season. A lot of work, but it's fun." Research involving the maple sugar operation includes geographic information system projects to map tubing systems, physiology studies on trees and food safety studies on sap. The original sugar house was built in the 1980s and was replaced with a larger, more modern structure in spring 2020.







## *In the fall, staff and students* **PREPARE FOR HARVESTING**

**SEASON**, with tasks including pre-commercial thinning, timber harvest layout and marking timber for harvest.

The most challenging aspect of Kanoti's job is juggling the many uses of the forest and interacting with all the people who have an interest in the land, he says.

"That's why we're here, to assist with the research, assist with the education and manage recreation," Kanoti says. "It's way more about managing people than managing trees, which forestry is in general. That's what we tell the students all the time. The sooner they figure out it's more about people than trees, the better off they're going to be." ♦





"We're very fortunate. There aren't that many (forestry) programs in the country where you have miles and miles of forest adjacent to campus," says Bill Livingston (**right**), associate director for undergraduate education and associate professor of forest resources. "Teaching forestry here in Maine is not an abstract effort trying to let students imagine what it's like to be out in the woods. We bring them out here and they have their hands-on education." Livingston conducts labs in the woods for courses including forest vegetation, forest measurement, and tree pests and diseases. For the first eight weeks of the fall semester, Livingston estimates that about 70 students have come to the forest for his vegetation course (**left**).







"I can tell you from firsthand experience that the Demeritt Forest served as a building block of my budding career in forestry," says Patty Cormier, director of the Maine Forest Service and a 1988 UMaine alumna. "I can think of many classes and labs in that particular forest of which I still use the knowledge gained there. It gives me much pleasure to congratulate Keith and the university for the outstanding stewardship of the University Forests, and the learning that happens in them. May they continue as outdoor classrooms for many years to come."









# Learning through discovery



Interdisciplinary research initiative gives undergraduates experience  
in real-world problem-solving

By Cleo Barker



**I**n the Interdisciplinary Undergraduate Research Collaborative (IURC) at the University of Maine, students and faculty contribute their unique perspectives and diverse expertise to address pressing questions related to muscular dystrophy, fall prevention in elders, zoonotic diseases, farming practices, hunger and food waste, and more.

IURC is a particularly enriching opportunity for undergraduates, some of whom may be conducting research for the first time. And the program connects seemingly disparate disciplines — for example, agriculture and computer science — that come together today to solve issues of tomorrow.

The UMaine initiative launched in 2018 with nine interdisciplinary research teams comprising 26 faculty members and 47 students. Two of those teams returned in 2019, along with two new cohorts and their respective projects. Last year, 27 students participated in research pursued by four IURC teams.

“We are delighted to provide this type of high-impact experiential learning programs to our undergraduate students,” says Kody Varahramyan, vice president for research and dean of the Graduate School. “Being at Maine’s research university, (they) have the advantage and the unique opportunity to acquire a highly effective, quality education through interdisciplinary cutting-edge research experiential learning.”

IURC research, which aligns with the University of Maine System “Research and Development Plan,” is funded by the Office of the Vice President for Research and Dean of the Graduate School, and the University of Maine System Research Reinvestment Fund. The teams’ investigations typically build on work that has received university, state and federal funding.

The breadth, depth and potential of IURC are evident in the profiles of the 11 projects in the past two years.

## What’s in the water

NISHAD JAYASUNDARA, assistant professor of marine physiology, and Zheng Wei, assistant professor of statistics, led research combining biology and data science to analyze biological responses to environmental stressors.

“Drinking water sources are increasingly contaminated with various chemicals, and developing rapid screening tools to assess biological effects of exposure is critical for determining adverse health outcomes,” says Jayasundara.

The goal was to develop a new method to evaluate biological effects of chemical contaminants in drinking water and better understand how chemicals can affect fundamental cellular processes.

The researchers placed developing zebrafish eggs in a very small amount of water and used a high-throughput system to measure changes in oxygen levels of the water. With the use of various inhibitors, they applied this method to determine changes in the egg’s mitochondrial function. This serves as a proxy for how well the egg can meet its energy demand under different chemical contaminant exposure scenarios, says Jayasundara.

The research team developed statistical tools to analyze this data and predict potential outcomes, including forecasting potential health effects of chemical exposure.

“Maine waters are especially of concern, given the high levels of arsenic found in well water, and we are using this method now in a citizen science study in collaboration with MDI Biological Laboratory. The goal is to measure how well water collected from Maine may affect cellular energy-producing processes,” Jayasundara says.

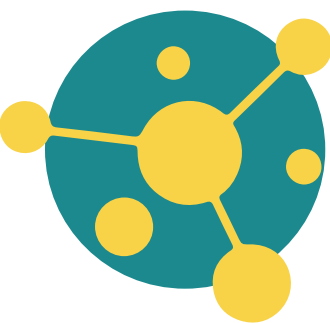
“This project would not have been successful without the dedication from the students,” he says. “They brought several fresh perspectives and critical insights to the project. The students never hesitated to take initiative and were always a step ahead in the process, which created a highly productive research environment.”

“It was extremely rewarding to be so involved in a research project. The professors working on the project made sure students felt involved and properly understood the different aspects of the project, not just those related to our respective fields. As a result, I got a lot of valuable hands-on research experience.”

Maddy Dorr, then a mathematics major, minors in psychology and neuroscience (Hometown: McLean, Virginia)







## Molecular mechanisms of muscular dystrophy

MUSCULAR DYSTROPHIES, a large group of debilitating diseases that result in weakened skeletal muscle, affects approximately 250,000 individuals in the U.S., according to the Muscular Dystrophy Association. The long-term goal of UMaine research is to understand the molecular mechanisms of the disorders that will help to inform development of new therapies.

“Some of these mechanisms may be involved with other neuromuscular diseases. Learning how to promote muscle health is not only important in these diseases, but also in muscle wasting after traumatic injury, cancer and aging,” says Benjamin King, an assistant professor of bioinformatics.

King and Clarissa Henry, a professor of biological sciences, are examining one form of the disease that causes mutations in the GMPPB gene. To discover the impaired molecular mechanisms, the research team is applying developmental biology, genomics and computational methods to a novel zebrafish model of the disease.

A team of five undergraduate research assistants from the Honors College, and recent Ph.D. graduate Erin Carter, collected zebrafish embryos, characterized their phenotypes, extracted RNA for sequencing, and analyzed data to characterize the expression of genes. The study resulted in the identification of several promising candidate genes, King says.

The interdisciplinary approach combined expertise in developmental biology, genomics and computational biology. Genomic and computational analysis informed new hypotheses. The IURC work led to a research proposal for the UMaine Medicine initiative and two proposals for the National Institutes of Health. All three were awarded for a total of more than \$2 million for their theses and dissertation.

The students are using data from the project for their Honors and Ph.D. theses.

“Working on research projects with students is why I am at the University of Maine. The students are bright, inquisitive, enthusiastic and want to make a difference,” King says. “Each of the students made their own contributions to the project based on their strengths. One student had taken several drawing classes and used her creativity to illustrate a model for the molecular mechanism based on synthesizing information from publications.”

“Working in an interdisciplinary team has revealed the **importance of communication and shared expectations**, qualities that are important in every team project. ... It was incredibly rewarding to get to know others in the lab and get to work with a project with so much **potential to help patients.**”

Grace Smith, molecular and cellular biology major (Hometown: Holden, Maine)

## Threats to Maine moose

RESEARCHERS PAULINE KAMATH and Sandra De Urioste-Stone led a project examining risk of zoonotic disease (diseases that can be transmitted from animals to people) in moose. They were joined by Anne Lichtenwalner, associate professor with University of Maine Cooperative Extension and the School of Food and Agriculture, and director of the Veterinary Diagnostic Laboratory. They partnered with Maine Department of Inland Fisheries and Wildlife, and the Penobscot Nation.

Winter ticks are a suspected contributor to periodic, widespread moose calf deaths. However, little is known about the role of other parasites, such as blood-borne *Anaplasma* bacteria that may exacerbate stress in moose experiencing heavy tick loads, says Kamath, an assistant professor of animal health.

The research team, which included one graduate and eight undergraduate students, examined the prevalence and intensity of parasite infections in Maine moose, and the effects of infections on calves. They also assessed how Native Americans, hunters, recreationists, wildlife management agencies, and others perceive and respond to disease threats in moose.

Annually since 2014, Maine Department of Inland Fisheries and Wildlife has collected biological samples from moose. The agency collaborates with the UMaine Extension Veterinary Diagnostic Laboratory to obtain comprehensive health data from Maine moose.

The Wildlife Disease Genetics Laboratory led by Kamath has optimized a genetic assay to detect and screen for *Anaplasma* in moose.

Their combined ecological and disease data found that moose in the western study site were more likely to be infected with *Anaplasma*, and male moose were more likely to be infected.

In a questionnaire and in interviews, stakeholders said they connected moose population health to maintaining cultural identity, supporting rural livelihoods and quality outdoor recreation opportunities in Maine, and enhancing economic vitality.

“This research collaboration has allowed for undergraduate and graduate students, and faculty to learn from one another, and develop a more robust research model to address this complex problem while integrating social and biological data,” says De Urioste-Stone, associate professor of nature-based tourism.





“Working with people with different strengths on the same team allowed me to have a pretty expansive learning experience because I was able to learn from my teammates who had different roles on the team. **The multidisciplinary aspect was probably the most rewarding part of working with this team** because I was able to show my strengths while learning from other strengths on the team.”

Eliza Bennett, new media major, minors in studio art, and film and video (Hometown: Windham, Maine)



## Smart farming

REDUCING COSTS and increasing profitability are important for Maine growers and farmers, says Joline Blais, whose team built an app to help produce food year-round. The associate professor of new media led the research project connecting computer science with agriculture to help Maine farmers monitor food production in four-season greenhouses.

“We hope that our mobile app will help greenhouse growers answer questions about what is happening in their growing environment,” Blais says. “This technology will take some of the guesswork out of growing plants in greenhouses.”

MAGApp (Maine Agricultural Apps Project) developed through a partnership with the University of Maine, the University of Maine at Presque Isle (UMPI), and the Maine Technology Institute’s Sustainable Year Round Agriculture (SYRA) Cluster Initiative.

“While this is currently being done with corporate farming in industrial farming scenarios, we wanted a version that could scale to Maine — involving farmers, makers, programmers and media production, and spurring or supporting startups across many sectors of the economy,” Blais says.

John der Kinderin, owner of Waste Not, Want Not, developed the sensors that measured conditions affecting plant growth rates, such as temperature, relative humidity and soil moisture. Students and faculty developed the app to read real-time data.

The MAGApp project encompassed aspects of workforce development, food security, systems-based problem-solving for climate instability, and community-engaged research, and linked high impact, low-cost technology with sustainable food production.

“Agricultural operation involves plant physiology, soil biology, economics, marketing, and maintaining a viable ecosystem to produce healthy crops. The interdisciplinary team was able to tackle more areas of investigation than a single disciplinary team would have been able to do,” says Blais.

New media undergrad Jack Lampinen was lead developer. Other members of the research team were Stephanie Burnett, an associate professor of horticulture at UMaine; Larry Feinstein, an assistant professor of biology at UMPI; and William Giordano of the University of Southern Maine, SYRA and Maine Sustainable Agriculture Society.

## Sensing instability for fall prevention

ALI ABEDI, a professor of electrical and computer engineering, led a project blending research in health and engineering to detect and prevent falls.

Abedi, who also is assistant vice president for research and director of the Center for Undergraduate Research, partnered with Northern Light Health; Vincent Caccese, a professor of mechanical engineering; and Marie Hayes, a professor of psychology. Babak Hejrati, an assistant professor of mechanical engineering, also helped with tests and data collection.

The team used different types of sensors placed on the body to monitor posture, movement and muscle activity to attempt to predict — and prevent — falls before they happen.

“Maine has one of the largest populations of older adults in the nation, with falls being the leading cause of injury, hospitalization or death,” says Abedi. “We hope this new line of research can help alleviate some of these preventable falls.”

He says an interdisciplinary approach is useful here because falls can have many different causes.

“Our team is composed of electrical, computer and mechanical engineers, as well as students from biology and psychology to look at the problem from multiple different perspectives and find solutions together as a team.”

According to Abedi, the team had promising results through preliminary testing, and there are plans for further research and development, including working with federal agencies and local industry to move toward commercialization.

IURC has been a catalyst to bring students and faculty together, addressing some of the most complex problems of our society, says Abedi. “(Students) learn using real-world problems and contribute to solutions that may not be possible otherwise.

“We hope with the development of these technologies and research around them, we can impact quality of life and lower health care cost.”





## Local food system sustainability

DEBORAH SABER, an assistant professor of nursing, led a 2019 project focused on food loss, food waste, and barriers to establishing a circular food system and environmental sustainability while addressing food insecurity.

In 2017, approximately 41 million tons of food waste were generated in the United States, which constitutes 22% of municipal solid waste, according to the United States Environmental Protection Agency. Food waste leads to the production of greenhouse gases and contributes to climate change, says Saber. And since the problem of food waste is multifaceted and dynamic, it requires an interdisciplinary team to work toward effective, sustainable solutions.

Researchers came from the disciplines of nursing, engineering, business and more, and from multiple University of Maine System campuses.

"The problem of food waste is far reaching to include Maine, the country and world. It is important to Maine because we contribute to food waste and can be part of the solution," Saber says. "For example, Maine researchers are working to develop (wood fiber-based) packaging products to increase food shelf life and decrease food waste."

Other faculty members involved in the research were Jean MacRae, associate professor of civil and environmental engineering; Cindy Isenhour, associate professor of anthropology and climate change; Balunkeswar Nayak, associate professor of food processing; Travis Blackmer, lecturer of economics; and Linda Silka, senior fellow at the Senator George J. Mitchell Center for Sustainability Solutions.

Tony Sutton, a Ph.D. student in ecology and environmental sciences, and Hannah Nadeau, a student majoring in nursing who participated in the first year of the project, helped coordinate and guide the research team.

While the research is important, Saber says it's just as important for students to learn how to work in a diverse interdisciplinary research group "to understand disciplinary languages and healthy group dynamics."

"We will continue to foster and build interdisciplinary teams that include stakeholders, industries and governmental leaders," says Saber.



## Rural communities and the new economy

CATHARINE BIDDLE, an assistant professor of educational leadership, led a project focused on the connections between rural education and communities in forested areas.

"We all had an interest in the way schools could play a role in revitalizing rural communities," she says. "Our hope

was to develop a natural resources lens for looking at education," says Biddle, who was joined in the research by Kathleen Bell, a professor of economics, and Mindy Crandall, now an assistant professor in forest policy at Oregon State University.

The needs of schools and forest-located communities in Maine are changing. People are using forest resources differently than they were a few decades ago, and there is a lack of awareness of the range of career opportunities in the forest economy. Those changes are occurring in the context of a national discourse that encourages migration to where jobs already exist rather than creating opportunities in place, according to the researchers.

And as the economic profiles of these communities change, residents could struggle to fund schools, and the possibility of consolidations and closures increases.

The research examined how to retain and attract highly educated people to a region, how to understand the multifaceted relationship between communities and forest ecologies, how sustainable relationships between communities and forests are built and maintained, and what the best way is for students to learn needed skills.

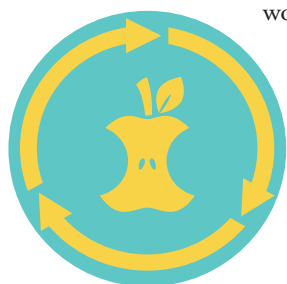
They identified four key themes: a transition in the way people use forest resources, uneven knowledge about the new forest economy, uncertainty about pathways to individual and economic vitality, and fiscal austerity and national prosperity.

Based on these findings, the researchers recommend school and community leaders take steps to "strengthen the relationship between the school and local workforce needs."

The big takeaway, she says, is the difference between "the old way of thinking about how forest resources are used, and what opportunity looks like" for youth now. Ideally, this research would inform professional development programs for school employees, and curriculum at different stages, beginning at the elementary level, to make sure students are getting exposure to the information, Biddle says.

“An interdisciplinary team’s greatest advantage is perspective. Diversity of backgrounds provides several perspectives and allows for the creation of new ideas and methods of solving long-lasting problems. ... The overall teamwork and long-lasting networks that I developed on the project were the most rewarding things about it.”

Owen VanDerAa, ecology and environmental sciences and economics double major, concentration in sustainability, environmental policy and natural resource management (Hometown: Acton, Massachusetts)





## Dimensions of tidal power

KRISTINA CAMMEN led a project investigating physical, biological and social dynamics of the Western Passage to create a better understanding of the coastal ecosystem, and to provide knowledge to inform policy and management decisions.

The project spanned disciplines in natural and social sciences, including marine biology, coastal engineering, human dimensions of natural resources and geospatial sciences.

The collaborative studied the fish, marine mammals, birds, humans and hydrodynamics of the Western Passage, located between Maine and New Brunswick, Canada.

“Near the gateway to one of North America’s preeminent tidal energy resources, Western Passage is considered one of the top sites in the United States for coastal development of renewable energy,” says Cammen, assistant professor of marine mammal science.

“Western Passage is also a unique and valuable natural environment, including iconic physical, biological and social features that require careful consideration in coastal development,” Cammen says. “Monitoring programs designed to inform management of ocean space for multiple, competing uses requires a holistic view to cope with uncertainty and the complexity of marine natural, social and regulatory systems.”

Research tasks included participatory mapping to document local and traditional ecological knowledge of the ecosystem, visual and acoustic surveys of marine mammals and fish, and field cruises to investigate hydrodynamic forces.

Cammen worked with Gayle Zydlewski, director of Maine Sea Grant and faculty in the School of Marine Sciences; Jessica Jansujwicz, a research assistant professor in the Department of Wildlife, Fisheries, and Conservation Biology; Lauren Ross, assistant professor of civil and environmental engineering; Tora Johnson, chair of the Division of Environmental and Biological Sciences and director of the GIS Lab at the University of Maine at Machias; Gabriella Marafino, a master’s student in ecology and environmental sciences; five other undergraduate students; two research associates; and a marine Extension agent.

“Our findings so far tell a story of tides,” she says. “This theme bridges all aspects of our ecosystem-based approach to monitoring, with clear implications for the biology, physics and human ecology of Western Passage.”



“The most rewarding part of this experience is getting to collaborate with so many wonderful and diverse minds. ... Being involved in something bigger than myself and learning from all of my advisors and collaborators was not only rewarding but also inspiring.”

Sarah Burton, marine sciences major, concentration in marine biology, minor in fisheries science (Hometown: Wolcott, Connecticut)

## Ticks and nature-based tourism

ALLISON GARDNER, an assistant professor of arthropod vector biology, and Sandra De Urioste-Stone, an associate professor of nature-based tourism, led a project focused on biophysical and social dimensions of tick-borne disease risk.

The density and distribution of blacklegged ticks on Mount Desert Island have increased dramatically in recent decades, likely as a consequence of climate change, and the goal is to reduce the likelihood of park visitors and staff encountering ticks while enjoying the outdoors, says Gardner.

She and De Urioste-Stone partnered with Sean Birkel, research assistant professor in the Climate Change Institute, and Danielle Levesque, assistant professor of mammalogy and mammalian health. Also participating: researchers from the National Park Service, Maine Medical Center Research Institute and Cornell University.

The focus of the project is understanding the interacting ecological and social drivers of tick-borne disease exposure risk in Acadia National Park. The researchers identified tick-friendly habitat, collected ticks in the park, and measured variables such as leaf litter depth, tree species, canopy cover, small mammal densities and deer scat densities.

The team also explored visitors’ perceptions of tick-borne disease risk, their personal protective behaviors to minimize the risk of tick bites, and obstacles to engaging in these protective behaviors.

“Maine has experienced a five-fold increase in incidence of Lyme disease in humans over the past decade, and multiple emerging tick-borne diseases also are on the rise, including human babesiosis, human granulocytic anaplasmosis, and Powassan virus,” Gardner says. “Tick-borne disease poses a major public health concern to both Mainers and out-of-state visitors, and it is critical to understand the ecological and social drivers of tick-borne disease exposure risk.”

Last summer, the project included not only UMaine students but three undergraduates from other universities who are part of the university’s One Health initiative.

“Our findings will inform evidence-based intervention strategies that can be implemented in cooperation with our National Park Service partners to reduce tick-borne disease risk on MDI,” says Gardner, noting that the research also could have implications for the study of other zoonotic (diseases that can be transmitted from animals to people) disease systems.







## Forests and streams

HAMISH GREIG, an associate professor of stream ecology, led a project looking at the effectiveness of forest management in balancing forest and freshwater resources and economies.

“Forests and freshwaters are two of Maine’s most iconic natural resources,” says Greig. “They are our cultural heritage, are critically important to Maine’s economy, and they support biodiversity and ecosystem services that we all rely on. Our research is generating information to help better manage and balance these resources.”

From 2001–07, Manomet and UMaine’s Cooperative Forestry Research Unit (CFRU) conducted an experiment involving harvesting the forest around 15 streams in one of five different riparian management approaches, says Greig. For the IURC project, he returned to this area to document how stream and forest ecosystems have responded, and assess the value of timber remaining in the riparian zone.

Greig was joined in the research by Amanda Klemmer, assistant professor of landscape ecology; Mindy Crandall; Robert Northington, now an assistant professor of biology and environmental science at Husson University; and Shawn Fraver, associate professor of forest ecology.

The team credits several partners in the forest industry who supported multiple field seasons.

The team measured forest canopy trees and saplings, stream insects and fish, and ecosystem processes like leaf litter breakdown and nutrient supply — all in the same streams at the same time — to document the dynamics of the watersheds.

Preliminary results suggest that aquatic insect communities are relatively resilient to forest harvest as long as some unharvested riparian forest is retained, he says.

The hope is that the research can serve as a model for collaborating with industry and public partners to guide management.

The project was a catalyst for collaboration on a watershed-scale forest management experiment at the University of Maine at Fort Kent, led by Irving Woodlands Forestry Professor Neil Thompson. Greig hopes that experiment will open more opportunities for UMaine faculty and students.

“I really enjoyed coming together in one room and collaborating with students, faculty and staff from all over campus. It demonstrated quite well how a diverse group of thinkers is often better equipped to answer big system/picture questions and, consequently, find better solutions. This experience definitely prepared me for the workforce.”

Kathleen Brown, then ecology and environmental sciences major, concentration in soil and water science (Hometown: Portsmouth, Rhode Island)

## Shifting shellfish resources

HEATHER LESLIE, director of the Darling Marine Center and an associate professor of marine sciences, led a project focused on the environmental and human dimensions of seafood production in the Damariscotta River estuary.

The study of town-managed shellfish resources connected students, researchers and other project partners statewide, including faculty from the University of Maine and University of Maine at Machias. It also involved local harvesters, and the towns of Damariscotta and Newcastle.

The goal was to figure out how soft-shell clams and other shellfish are distributed in the upper estuary, and how those patterns of abundance and species composition changed over time.

Data came from biological surveys and interviews with harvesters, enabling the researchers to gather complementary data about historical and current use patterns.

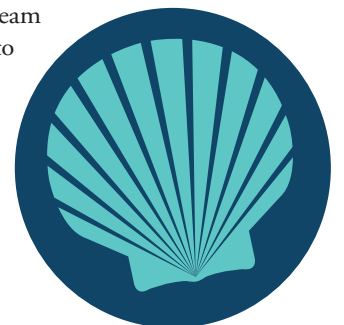
“This was the first systematic survey of these intertidal fisheries, to our knowledge,” says Leslie. “We were able to fill a data gap identified by local harvesters and towns regarding the health of Damariscotta River shellfish resources.”

The project also has established a foundation for a growing partnership between UMaine, local harvesters, and leaders in surrounding towns.

The research found that shellfish populations varied among locations and by tidal height, with higher densities in the high intertidal zone. More young soft-shell clams also were found in the predator-protected nursery boxes placed by researchers in the high intertidal zone than in the lower zone. And very few young clams were found in the mud next to the boxes, she says, which indicates that protection enables the clams to survive and thrive.

In interviews, harvesters said that shellfish populations have experienced change in the past 20 years, including an increase in wild oyster abundance and a decrease in soft-shell clam abundance. Their responses to these changes include targeting species not previously harvested, according to Leslie.

In summer 2020, the team plans to expand the research to the neighboring Medomak estuary in partnership with the town of Bremen, as well as continue the work with the communities of Newcastle and Damariscotta. ♦





# Setting the pace

## Valedictorian, salutatorian share a passion for the highest academic achievement — and running

**C**hemical engineering major Sierra Yost of Windham, Maine is the 2020 University of Maine valedictorian, and Grace Smith of Holden, Maine, a molecular and cellular biology major, is this year's salutatorian. Both Honors College students have been peer tutors and are members of All Maine Women. They also are community volunteers with young athletes active in running or track and field. And both are runners.

Yost is a member of the cross-country, and track and field teams. Her honors thesis focuses on the application of cellulose nanofibers as an alternative to plastics in disposable utensils. She completed a two-term co-op with Onyx Specialty Papers in South Lee, Massachusetts — an opportunity that she credits with sparking her love of research, which has inspired her to pursue a Ph.D. in chemical engineering.

Yost is a Mitchell Scholar, and Pulp and Paper Scholar. She is a member of the UMaine chapter of Engineers Without Borders, and was named to the America East All-Academic Team 2018.

Smith received a 2019 Goldwater Scholarship and an Undergraduate Research in Comparative Functional Genomics Senior Fellowship. She is a member of UMaine Club Track, and was a teaching assistant and Maine Learning Assistant. Her honors thesis research focuses on identifying novel regulatory genes that modulate phenotypic severity in muscular dystrophy.

Smith was selected for the Novartis Institutes for BioMedical Research Scientific Summer Scholars Program in Cambridge, Massachusetts and the Amgen Research Scholars Program at Washington University in St. Louis.

Smith will enter a two-year post-baccalaureate program at the National Institutes of Health. She then plans to pursue a dual M.D./Ph.D. ♦



Left to right: Sierra Yost and Grace Smith





# Worldview

School of Policy and International Affairs prepares  
students for global engagement

By Cleo Barker | Photograph by Holland Haverkamp



**M**any people choose to continue their education because they want to change the world.

At the University of Maine, students in the School of Policy and International Affairs (SPIA) are preparing to do just that.

SPIA was established in spring 2007 to offer a Master of Arts in Global Policy. The program stands out for its flexible interdisciplinary curriculum and myriad opportunities for hands-on experiences. Students can tailor the program to align with their issues of interest and career goals.

And their passion and high level of engagement are apparent in all areas of the program, in and out of the classroom.

“(Students are) always talking about global context and impact,” says James Settele, executive director of SPIA and retired U.S. Navy captain. “Hearing of the experiences of students from the Ivory Coast, Iran, Greece or Sri Lanka puts the learning in context and energizes them to impact the world. It is interesting to connect much of what they learn to the change we need right here in Maine.”

SPIA faculty are a great mix of practitioners and academicians, bringing international issues with real-world solutions to the SPIA students. Students are connected to former ambassadors, and current government leaders and CEOs who help prepare them for genuine global engagement.

The first cohort of eight began its studies in fall 2010. The incoming class in fall 2019 was the largest in program history, with 31 students and two more who joined in January to make 33 from 14 countries.

During their time in SPIA, in addition to getting a firm grounding in the important history and theory of their field, students learn practical and applied skills in diplomacy, international development, environmental politics, political economy, and more, says Kristin Vekasi, assistant professor in SPIA and the Department of Political Science.

“They take these skills around the state, country and world, creating change, whether based in tiny NGOs or (in) huge national or international organizations.”

Of four program concentrations, most students choose security and foreign policy, while others elect to study environmental policy, trade and commerce, or climate policy. SPIA also partners with the Maine Business School and the School of Economics to offer a dual master’s degree in global policy and either business administration or resource economics.

All SPIA students complete an internship, often abroad. To date, students have interned in 26 countries. In 2019, eight students held internships in the U.S., Bulgaria, Germany and Kenya.

Alumni go on to work in a wide range of public, private

and nonprofit sectors. Two are currently working in Maine Congressional delegation offices and more than a dozen others also are working in the Washington, D.C. area. Fifteen are working in Maine in a variety of fields, including education, business, environment, law enforcement, and trade and shipping.

SPIA regularly sponsors invited guest speakers on campus, as well as conferences like the second biennial conference “Can We Live with a Nuclear North Korea?” in October 2019 through a partnership with the William S. Cohen Institute for Leadership and Public Service.

“As a program that stresses the application of theory to practical issues, it helps prepare students to make meaningful change in the world and enriches the learning experience of UMaine,” says Settele.

As of December 2019, 75 students have graduated from the program. Nine students will graduate from the program in May 2020 — three from Maine, two from other states and four from other countries. Meet four of them below.

## Change agent

David Valls-Manclus, from Valencia, Spain, says the 2008 economic recession in his home country spurred his interest in policy and international affairs. He saw how it affected his family and friends, and wanted to be able to help.

“I’m very passionate about change in the world,” he says.

As an undergraduate studying business and finance at Husson University, Valls-Manclus had a friend in SPIA. Valls-Manclus decided to apply, drawn to the “small, personalized” nature of the program that could tailor to his interests.

For example, a class could focus on factors involved in terrorism, and students bring different perspectives based on their backgrounds and specific interests, from the environment to international aid or animal rights.

“One person can’t learn in depth about all areas. Those points of view balance each other, and we learn where people are coming from,” says Valls-Manclus, who has a concentration in trade and commerce, and is doing an independent study on the financing of terrorism.

Valls-Manclus says SPIA class discussions are “civil, respectful” and “how diplomacy should work,” allowing everyone to hear and learn from different perspectives and their applications to current events. “People can disagree while debating and representing a country, NGO or school’s position, but then still get along as people,” he says.

Valls-Manclus says he’s always had an open mind, which has taken him to dozens of places in recent years.

As a junior at Husson, Valls-Manclus studied in Korea in 2016.



There, he took a political negotiations class, which he says was influential and fascinating.

A year after joining SPIA, he interned in financial negotiations at the European Delegation to the United Nations in New York City. While there, he worked with the president of the European Commission, as well as prime ministers, kings and other leaders from throughout the world.

SPIA gave him the background knowledge, he says. And that knowledge informed the hands-on experience he gained from the internship.

He's also discovered an interest in lobbying, having seen how effective it is at the UN as an indirect method of influencing policy and passing bills.

January to June 2019, he traveled to more than 20 countries to increase his cultural exposure.

Valls-Manclus works as the graduate fellow for the Cohen Leadership Institute for Leadership and Public Service. He has helped with the promotion and planning of its biannual lecture, which this academic year hosted former Secretary of State John Kerry and former Secretary of Defense William Cohen. He also assisted with the institute's Projects for Peace program, and the leadership studies minor.

On campus, he's an assistant community coordinator for Residence Life and works with the International Programs Office.

After graduating in May he hopes to work in a field "connecting people and networking, finances and strategy." He also hopes to bring his knowledge and experience back to Spain to help there.

And his eventual goal? "Fight terrorism by stopping finances."

## Care for the world

Lacey Darling's interest in international affairs was sparked by news of the tsunami in Sri Lanka in 2004.

"My dream job was to work on the USS Comfort, one of the Naval hospital ships that formed an offshore, emergency response following the disaster," she says.

In her first three years as an undergraduate, Darling studied nursing. Then she found inspiration in the policy side of the health care field.

"I began to develop an intense interest in the policies that create an unhealthy, exclusive nature of good health, and the structure of the health care system that too frequently loses sight of both its own health care practitioners and the patients themselves," says Darling, who is from Norway, Maine.

Now she's well on her way to reaching her goal of a career in the international development field.

"In talking with my peers, we all share that same devotion to an idea of a better world — a world that is less violent, more equal, environmentally stable and takes better care of its citizens," Darling says.

In SPIA, Darling's studies focus on the health care and education sectors of society and policy, as well as international assistance and development — development programs, foreign direct assistance, and other forms of state and private, nongovernmental interventions in developing countries, and marginalized and vulnerable populations.

"In the absence of reliable, adequate and affordable health care services, I look at the phenomenon of disenfranchisement, and particularly how despair combines with disease and disability to produce push/pull factors for certain members of a given population into extremism," she says.

In 2018, Darling interned in Washington, D.C. with the Women's Democracy Network, where she focused on women's political and economic empowerment.

Darling worked largely in program development. She also helped organize and manage an international delegation of women serving in leadership positions, and the 2018 International Women's Day Celebration.

"Working in this space was a dream come true in many ways," she says. "The exposure I gained through my experience was immense. Often, it still shocks me how much I brought back from my placement, and how that experience has shaped who I am as a graduate student and professional."

Darling, the mother of a dinosaur-loving 3-year-old, is a graduate assistant in the UMaine Center for Innovation in Teaching and Learning, president of Graduate Student Government, and Northeast regional financial director of the National Association for Graduate and Professional Students.

After graduating in May, she plans to follow her project pursuits and hike sections of the Appalachian Trail.

## New direction

Michael Pierce from Grayslake, Illinois lived in the United Kingdom for seven years. Watching the 2008 election while abroad, he says he saw the stark differences in United States and U.K. perspectives, and sought to understand those differences and other aspects of politics.

Back in the States in 2014–18, he worked as a policy and research associate in North Carolina, an intern in Georgia and Washington, D.C., and a political consultant in New York and New Jersey. Pierce, who earned a bachelor's degree in international relations from Clark University in 2015, also was on a presidential campaign in Ohio and a gubernatorial race in Illinois.

He came to Maine in 2018 in search of a "new direction."

His sister, a SPIA alumna, recommended the program. He's focusing on U.S. foreign policy, and international security.

Pierce says his experiences with voters, volunteers and constituents on the Hill "offered perhaps the greatest joy and





inspiration” taken from his work in politics. Working with people “of all political stripes made it abundantly clear that we have more in common than what divides us,” he says.

Last summer, he interned with the Cohen Group, a global business consulting firm based in Washington, D.C., working with clients to help them manage political policy risk and open new markets for their businesses and organizations. The people he worked with place a strong emphasis on character, which he says was refreshing to see in practice, because it’s so frequently missing in politics.

Pierce also interned with Swordfish Consulting, an organization run by William Farrell, who also teaches in SPIA. He helped compile a database focused on countering violent extremism programming. The goal was to create a snapshot of that marketplace of programs and determine if donors, implementers and contractors were engaging in rigorous monitoring and evaluation processes for their programs, Pierce says.

He also expanded his understanding of the complexity in preventing violent extremism through interactions with experts from the United States Agency for International Development (USAID), the State Department, the United States Institute for Peace and other nongovernmental organizations.

“This was a great example of how SPIA offers a hands-on experience,” Pierce says. “We were able to work with a leader in the field and offer sound advice on a national security problem to stakeholders in the field.”

Pierce has been a graduate assistant in the Office of Student Financial Aid. After graduating in May, he will join the Peace Corps to teach English to middle and high school students in Liberia.

“I’ll probably learn more from them than they’ll ever learn from me,” he says.

## Global economics

Kristen Settele has lived all over the world, including a few years overseas with her family. Staying in Holden, Maine for about 10 years is the longest she has resided in one place.

She also grew up with family discussions about global events and weekend travel to different countries. All of the “very eye-opening” experiences led to her interest to international affairs.

However, she didn’t start thinking seriously about studying the field until she was an undergraduate at Colby College. She realized her interests in foreign affairs were stronger than those in organic chemistry.

Settele earned a bachelor’s degree in East Asian studies and global studies in 2018, and then enrolled in SPIA. She’s now a second-year graduate student with a concentration in trade and

ADDIS ABABA, ETHIOPIA\ AMMAN, JORDAN\ ATENAS, COSTA RICA\ BAGHDAD, IRAQ\ BANGKOK, THAILAND\ BIRMINGHAM, ALABAMA\ BISHKEK, KYRGYZSTAN\ BLAGOEVGRAD, BULGARIA\ BONN, GERMANY\ BOSTON, MASSACHUSETTS\ BUENOS AIRES, ARGENTINA\ CAIRO, EGYPT\ CALGARY, ALBERTA, CANADA\ CAPE TOWN, SOUTH AFRICA\ COLOGNE, GERMANY\ DADAAB, KENYA\ DEMOCRATIC REPUBLIC OF THE CONGO\ DILI, TIMOR-LESTE\ EL PORVENIR, PERU\ GYEONGGI-DO, REPUBLIC OF KOREA\ INCHEON, REPUBLIC OF KOREA\ IVORY COAST, WEST AFRICA\ IZMIR, TURKEY\ JAKARTA, INDONESIA\ JINOTEGA, NICARAGUA\ KATETE, ZAMBIA\ KATHMANDU, NEPAL\ KATOWICE, POLAND\ KOCHI, INDIA\ KYOTO, JAPAN\ LEIPZIG, GERMANY\ MANAGUA, NICARAGUA\ MAPUTO, MOZAMBIQUE\ MEISHAN, SICHUAN PROVINCE, CHINA\ MONTPELLIER, FRANCE\ MONTREAL, QUÉBEC, CANADA\ MUMBAI, INDIA\ NAIROBI, KENYA\ NEW YORK CITY, NEW YORK\ NIAMEY, NIGER\ OSH, KYRGYZSTAN\ PHNOM PENH, CAMBODIA\ PORT-AU-PRINCE, HAITI\ PORTLAND, MAINE\ PORTLAND, OREGON\ PUNTA GORDA, BELIZE\ ROCKLAND, MAINE\ SAMANÁ, DOMINICAN REPUBLIC\ SANTIAGO, CHILE\ SEATTLE, WASHINGTON\ SHARM EL SHEIKH, EGYPT\ SYDNEY, AUSTRALIA\ TACLOBAN, PHILIPPINES\ TOKYO, JAPAN\ ULAANBAATAR, MONGOLIA\ UPOLU, SAMOA\ VIENTIANE, LAOS\ WASHINGTON, D.C.

commerce, as well as a first-year graduate student in economics.

During her time at UMaine, Settele has had two internships with the State Department. She first worked with the Virtual Student Federal Service for a year, researching China’s economic involvement in Africa, and compiling reports to be circulated in the Beijing Embassy’s economic office and in Washington, D.C.

And this past summer, she interned full time in Washington, D.C. with the State Department, working with the Office of Taiwan Coordination.

“It really helped me with standing up and not being so afraid to put my voice out there,” says Settele, who is a graduate assistant at UMaine’s Hudson Museum.

After graduating in May, she hopes to work with the State Department as a foreign service officer with USAID, or with a nongovernmental organization. ♦



# SICK



## OF SEXISM

By Beth Staples | Photographs by Adam K  ykendall

**In Shannon McCoy’s psychology lab, the goal is to identify strategies for confronting the prejudice in order to improve outcomes for everyone**

**L**ots of women are sick of sexism.

Shelby Helwig is investigating whether that statement is true literally as well as figuratively: Does sexism affect women’s well-being?

The University of Maine psychology doctoral candidate also is exploring when and how women confront sexism, and the consequences of that on their physiological and psychological health.

To learn more, Helwig developed a lab study that mimics real-world sexism. In a controlled environment, she records women’s blood pressure, heart rate and blood flow as they experience sexism. She also records their facial expressions and what they say in response to men’s sexist comments.

A total of 140 women have participated in the studies in associate professor of psychology Shannon McCoy’s lab.

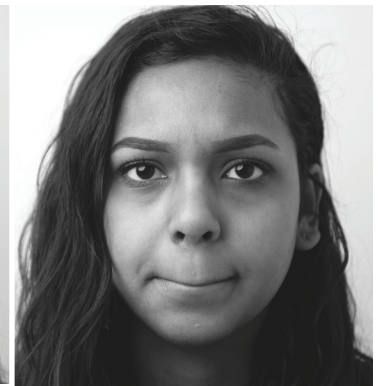
The 18- to 24-year-olds were told they’re part of a mock search committee and were asked to review resumes of two candidates — a woman and a man — for a job as a research assistant. While both candidates were well-qualified, the woman was objectively the clear choice based on her qualifications for the job.

The women who chose the female candidate discussed their choices via intercom with two male committee members. The men were actually lab assistants who always picked the male candidate and read scripted lines.

The meetings were structured so one of the men spoke first, followed by the woman, then the other man. The process was repeated three times and the women were told that everyone’s microphones were muted while others talked.

In the first round, the men ignored the female committee member. For instance, when the second man spoke, he only addressed the other male committee member: “You made some good points, man. I picked Robert, too.”






Women's heart rates went up from a resting baseline through the rounds of increasingly blatant sexism.

65% of women confronted the men's sexist behavior in some way.

Women who experienced sexism indicated on a 1-to-7 scale they thought the men's decision to hire was driven by the applicants' gender (6.89 out of 7) and they labeled the men as sexist (5.9 out of 7).

Women's heart rate variability — the fluctuation between heart beats — decreased as the sexism became more overt. Lower heart rate variability is correlated with increased efforts to manage emotions, including anxiety and anger, in a socially acceptable and personally beneficial manner.





In the second round, the men made ambiguously sexist remarks; that is, their statements could be open to more than one interpretation. One line they said: “I think she’s probably a better team player than a leader.”

In the third round, the men made blatantly sexist comments. “Most girls I know kind of just like to do what they’re told to do ... they don’t really think up their own ideas.” And, “If they want someone who picks up on stuff more quickly, better pick a guy.”

Helwig and the research team also conducted a comparison, or control, condition. While the women committee members were still in the minority opinion — they picked the female applicant and the men chose the male — the men didn’t ignore them and they didn’t make sexist remarks.

The women who had experienced sexism had visceral responses that those in the comparison study did not. Helwig found women’s heart rates went up from a resting baseline through the rounds of increasingly blatant sexism.

The results suggest that over a lifetime, sexism may take a toll.

**Decreased heart rate variability, if prolonged and repeated over time, is associated with decreased resilience to stress and increased risk for cardiovascular disease.**

This demonstrates that women differentiate between more subtle and blatant expressions of sexism. “The more overt the sexism the greater women’s autonomic arousal, suggesting greater intensity of emotional response,” says McCoy.

At the same time, the women’s heart rate variability — the fluctuation between heart beats — decreased as the sexism became more overt. Lower heart rate variability, says McCoy, is correlated with increased efforts to manage emotions, including anxiety and anger, in a socially acceptable and personally beneficial manner.

The results suggest that over a lifetime sexism may take a toll, says McCoy. Decreased heart rate variability, if prolonged and repeated over time, is associated with decreased resilience to stress and increased risk for cardiovascular disease.

When women thought they couldn’t be heard by the male committee members, they said, “I am livid” and “I am fuming” and other statements consistent with the “physiological findings that sexism makes your blood boil,” says McCoy.

Also consistent with the cardiovascular findings, the women who faced sexism reported on a mood questionnaire that they felt more angry and less confident.

Helwig and McCoy also were curious whether women would confront the sexist behavior in real time. And if so, how?

Prior research has shown women often attempt to refocus attention on the task at hand, or ask a question regarding the sexist comment, says McCoy. In 1999 in a similar study, Janet Swim and Lauri Hyers found 55% of women directly confronted sexist remarks.

But what about now, in light of #MeToo?

The context of the UMaine study would seem to make confrontation a likely possibility, says McCoy. It’s a psychological experiment; the men can’t see the women and don’t know who they are; and the women would be confronting the men on behalf of another woman.

And in private, after the committee meeting, the women who experienced sexism indicated on a 1-to-7 scale that they thought the men’s decision to hire was driven by the applicants’ gender (6.89 out of 7) and they labeled the men as sexist (5.9 out of 7).

But in real time, Helwig found that 65% of women confronted the men’s sexist behavior in some way, and only in response to the blatant sexism they exhibited in the third round. Of those who did confront the men, 12% called out their comments as sexist.



The remaining 53% of women (including herself) indicated that hiring decisions shouldn't be based on gender. McCoy says only about half of these women (29%) directly stated the men should not consider gender, and should not make these comments.

The remaining women (24%) were less direct and talked about how gender should not be a factor in the decision, or that "we" (including herself) shouldn't consider gender in the decision.

Research intriguingly suggests that women who use this more neutral approach might be more effective in combating sexism, says McCoy.

And while McCoy says she can't imagine not confronting the men who made such sexist comments, she knows — even though this is her area of study — that she doesn't always speak up when something similar happens to her.

While the more neutral approach could be perceived as letting the perpetrator off the hook, labeling him a sexist and humiliating him with jokes are "more likely to lead to backlash and entrenched bias rather than behavior change."

Calling men chauvinist or embarrassing them can result in backlash, or retaliation that could negatively affect a woman's career or well-being, says McCoy.

Plus, a person can verbally state one thing while their nonverbal expressions say something else entirely, says assistant professor of psychology Mollie Ruben.

And nonverbal expressions speak much louder than words.

Nonverbal expressions are everything but the spoken words, including general impressions of surprise, anger, anxiety, sadness, engagement (with the speaker and the task), and smiling, says Ruben. Smiling is included because the researchers are interested in how smiling helps women cope with sexism.

Ruben is a certified Facial Action Coding System (FACS) coder, meaning she analyzes facial expressions to assess emotions. She'll use videotapes of the study's committee meetings to code the women's nonverbal expressions in sync with their physiological reactions to, and recovery from, the sexist statements.

FACS is an anatomically based system for describing visually perceptible facial movements. The system breaks down facial expressions into individual components of muscle movements that encompass the brow, eyes, cheek, nose, lip, chin, jaw, mouth and more.

While some of the nonverbal expressions and behaviors are overt and easy to interpret — open mouths, rolling eyes, shaking heads — Ruben is helping the team develop a rigorous coding structure to differentiate anger from other negative emotions, like discomfort or anxiety.

Additional related research in the lab will explore if physiological stress responses and nonverbal expressions are predictors of whether women will confront sexist behavior, and if confronting sexist behavior is beneficial for women's well-being.

And, master's psychology student Margaret Gautrau will explore men's experience with the various confrontational styles observed in the study.

The plan, says McCoy, is to identify strategies for confronting sexism that improve outcomes for everyone.

Helwig, a Janet Waldron Doctoral Research Fellowship recipient, is interested in the interpersonal consequences of bias, with a particular focus on conflict resolution. While these studies are focused on learning about effects of sexism, Helwig says the paradigm could be used to examine physiological effects of various kinds of prejudice — including racism, classism, ageism, lookism and religious discrimination.

"Shelby began to conceptualize confrontation as a potential coping strategy. Like many of our coping strategies — eating ice cream when we are stressed, for example — not all confrontations are likely to be beneficial for both the target and the perpetrator," says McCoy. "To reduce conflict, Shelby is seeking to identify confrontational styles that both protect the well-being of the target and reduce the potential for future conflict with the perpetrator."

Helwig presented her work in February at the Society for Personality and Social Psychology in New Orleans. She's also scheduled to present at the European Association of Social Psychology in Krakow, Poland.

"It's rewarding to conduct research that can help people better themselves and can help improve society," Helwig says. ♦

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Shannon McCoy





## Synergizing health and environment: training One Health scientists

Advancing the understanding of disease dynamics at the intersection of human, animal, plant and environmental health is the focus of the One Health and the Environment initiative.

The National Science Foundation Research Traineeship program awarded nearly \$3 million to the initiative.

Globally and in Maine, environmental changes, an aging human population, and increasing prevalence of infectious diseases of animals, plants and people highlight the need for training professionals in an interdisciplinary approach.

Mario Teisl, director of the School of Economics, is principal investigator of the grant. Andrei Alyokhin, professor of applied entomology, School of Biology and Ecology; and Anne Lichtenwalner, associate professor of animal and veterinary sciences, School of Food and Agriculture; Extension veterinarian, and director of the Veterinary Diagnostic Laboratory, are co-principal investigators on the NSF-funded project.

Training in cross-disciplinary communication will enable students to engage with diverse scientific communities, stakeholders, citizen scientists and the public.

The project will encourage interdisciplinary environmental research by trainees in a range of systems, involve faculty from multiple disciplines, and complement a current NSF-funded Research Experience for Undergraduates program.

It's designed to increase the participation of women, first-generation students, veterans, students with disabilities and other traditionally under-represented groups. ♦

“

This program will train the next generation of researchers to **recognize these links and effectively work across disciplines** to find creative solutions to complex disease problems.”

Pauline Kamath, assistant professor of animal health, School of Food and Agriculture

## TASTES GREAT, LESS ACRYLAMIDE

Mary Ellen Camire has some good news about french fries. Those made with the new potato varieties AF4296-3 and Easton have much lower levels of a probable carcinogen than those made with the popular Russet Burbank variety.

Acrylamide is a probable carcinogen in fried potatoes. During the frying process the chemical forms from sugars and an amino acid that are naturally in potatoes.

For those envisioning the safer-to-eat, golden brown, crispy-on-the-outside, soft-on-the-inside fries with a sprinkle of sea salt and a splash of vinegar, hold that thought. The new spud varieties don't turn golden brown when they're fried. They turn whitish.

The University of Maine professor of food science and human nutrition says they still have the crispy texture, familiar flavor and smell of freshly cooked french fries. Forty-seven taster taste testers testified to that — rating the aroma, taste and texture of fries made with AF4296-3 and Easton potato varieties similar to Russet Burbank.

But they rated the whitish color of the new varieties significantly lower. An education or promotion campaign is likely needed to let the public know about the merits of the less-than-golden fry, says Camire, who conducted the pilot study with colleagues, including Gregory Porter, who heads the UMaine potato breeding and variety development program.

“Acrylamide is found in many foods that are baked, roasted or fried, but since frying is the most popular method for cooking potatoes, we wanted consumers to have a safer alternative developed by traditional breeding practices,” says Camire. ♦



“

It took years to convince consumers to switch from whole milk to low-fat or skim milk.

**Hopefully changing consumer acceptance of these fries will not take as long.”**

Mary Ellen Camire

## Tick surveillance

**39%** of deer ticks tested in 2019 by University of Maine Cooperative Extension Tick Lab were positive for Lyme disease.

**2,697** ticks submitted;  
**727 (38.2%)** found on people after gardening or yardwork.

Ticks came from **16 COUNTIES AND 358 TOWNS.**

To learn more, including how to submit ticks: [ticks.umaine.edu](https://ticks.umaine.edu). ♦







## Breast cancer technology

The University of Maine has developed a computational approach that could assist in the early detection of breast cancer. The recently patented technology may help identify dormant, potentially cancerous tissue before it progresses to an aggressive metastatic cancer, thereby allowing clinicians to take a proactive treatment approach.

The invention is a method that analyzes the characteristics of different regions of breast tissue on a mammography image. An algorithm based on an underlying biophysical hypothesis can identify the physical markers believed to be linked to malignant tumor onset and growth.

The UMaine inventors are Andre Khalil, professor of chemical and biomedical engineering and founding director of the Computational Modeling, Analysis of Images, and Numerical Experiments Lab (CompuMAINE), and Kendra Ann Batchelder, former graduate student. The Maine Cancer Foundation provided funding.

The long-term goal for the technology is to allow providers to extract more valuable diagnostic information from a regularly performed test.

"Breast cancer is the second-most common cancer among American women, and this technology has the potential to revolutionize the screening and treatment process," says Jake Ward, UMaine vice president for innovation and economic development. ♦

“

If successful, we could move away from the current reactive treatment status quo and toward a clinical strategy based on predictive medicine that **empowers both patients and clinicians.**”

Andre Khalil



**THE MAINE QUESTION**

## WHAT'S THE MAINE QUESTION?

The University of Maine's podcast, "The Maine Question," is now in its second season.

Host Ron Lisnet talks with UMaine pioneers, including those who explore backyard gardens, the depths of the oceans, Earth's highest peaks — or beyond. They share why they're passionate about their research and what it means for Maine and the world.

In the first season, Lisnet spoke with an assistant professor of human nutrition who makes tasty dog biscuits from green crabs; a sociologist who wrote a book about redefining the family and being child-free by choice; and the director of the Climate Change Institute who led the National Geographic and Rolex Perpetual Planet Everest Expedition.

Find the podcast at [umaine.edu/podcasts](http://umaine.edu/podcasts). ♦



## NUTRITIONAL NEEDS

The Eastern Area Agency on Aging, in partnership with St. Joseph Healthcare, the University of Maine Center on Aging and Senscio Systems, received a three-year, \$750,000 award from the Administration for Community Living to establish and test an innovative, technology-driven, nutrition enhancement and self-management program for adults 60 and older with multiple chronic diseases.

The project aims to improve the nutritional and health status of rural participants immediately following hospital discharge. Improving their nutritional status and, in turn, positively impacting their health-related quality of life could make it easier for chronically ill older adults to age in place.

Project partners will create an in-home nutritional module that can be locally tailored to individual health and cultural considerations, including nutrition tips, coaching and healthy recipes. They also will work to create a practical program manual for use by Area Agencies on Aging nationwide.

"This project is a prime example of how medical and social services, higher education and business organizations can effectively join forces and work together," says Lenard Kaye, director of the Center on Aging and professor of social work. ♦





## TERRORISM ON TWITTER

Sympathizers of the Islamic State of Iraq and the Levant (ISIL) use Twitter to justify mass casualty violence perpetrated against civilians by the terrorist group, according to a study led by Karyn Sporer, University of Maine assistant professor of sociology.

University of Nebraska Omaha researchers Michael Logan, Gina Ligon and Doug Derrick collaborated on the study.

The team collected and analyzed tweets associated with ISIL-affiliated accounts that were posted within 24 hours of three high-profile ISIL-attributed terrorist attacks.

Common themes were justifications for terrorism and mass casualty violence, including celebrating the events and rationalizing why or how such violence was valid in the eyes of sympathizers.

These findings have possible implications for counter-terrorism strategic communications — “tacit acceptance” of atrocities by soft-sympathizers could be amplified to lead to disagreement among their followers. Messaging campaign strategies that depend on identity-based appeals rather than rational appeals could be particularly effective, according to the study. ♦



Soft-sympathizers take **advantage of social media platforms to propagate ISIL’s message on a global scale** so that ISIL’s ideology and tactics can be recognized, normalized and accepted by the masses.”

Karyn Sporer

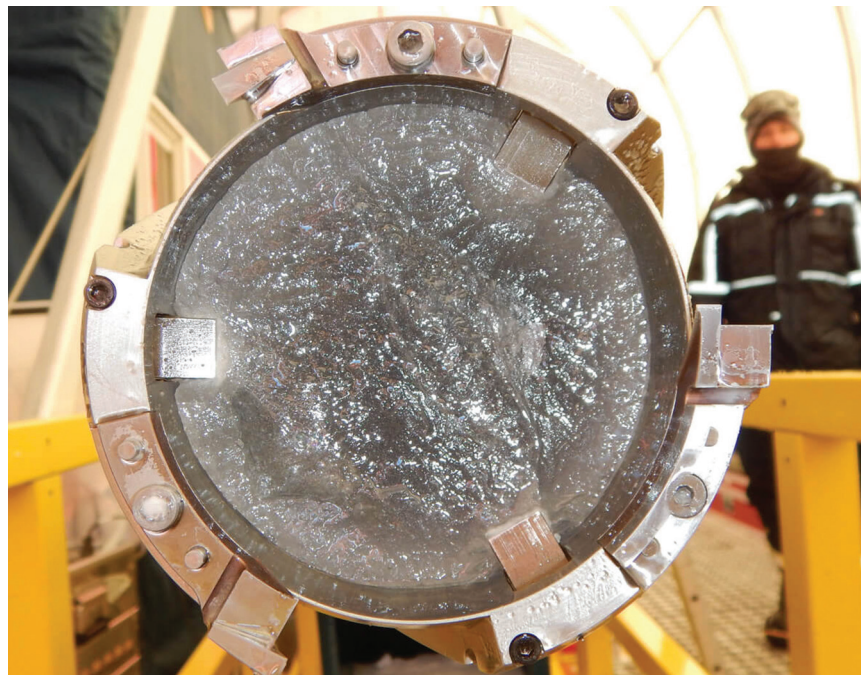


Photo by T.J. Fudge

## Ice cores yield clues to past

A discovery by University of Maine researchers challenges what was believed to be the established volcanic source of particles found in an ice core from the South Pole. The new findings also add to the global record of volcanic activity and are relevant to several research disciplines.

Detailed records of past volcanic eruptions are often required to understand volcanic activity-climate system interactions, and reconstructions of how past volcanic events have affected human history.

Unfortunately, in many parts of the world, historical records are sporadic, short and not well documented, according to Andrei Kurbatov, associate professor at the University of Maine School of Earth and Climate Sciences and Climate Change Institute.

In the last decade, Kurbatov and Martin Yates, electron beam laboratory manager and instructor of Earth sciences at UMaine, in collaboration with Nelia Dunbar and Nels Iverson from the New Mexico Institute of Mining and Technology, developed a method of extracting volcanic ash particles from ice core samples to measure their geochemical composition.

The methodology provides additional means to refine the history of global volcanism captured in polar ice core records, says Kurbatov.

Graduate student Laura Hartman examined microscopic volcanic ash particles in ice core samples from Antarctica’s South Pole, and the data brought into question the existing paradigm on long-range transport of ultrafine volcanic particles in the atmosphere.

With funding from the National Science Foundation, Kurbatov and his team plan to continue to explore volcanic deposits in the South Pole ice core to further refine the global record of volcanism. ♦



# Maine's climate future

Nearly every climate-related parameter measured in Maine is accelerating, according to the report "Maine's Climate Future — 2020 Update."

Key findings include faster rates of warming along the coast compared to interior and northern Maine, and changes in Maine winters. Average minimum temperatures in Maine are warming 60% faster than average maximums. Maine is getting three to four times more large storms, as well as more rain events of all sizes.

The growing season is more than two weeks longer with warmer springs and even warmer falls. In the Gulf of Maine, the summer season has warmed the most. And the weather is becoming more variable and more uncertain.

The report, whose lead author was Ivan Fernandez, University of Maine professor of soil science and forest resources, points to the growing evidence of impacts of these changes on Maine's farms, fields, forests, marine resources, and numerous aspects of our culture and economy.

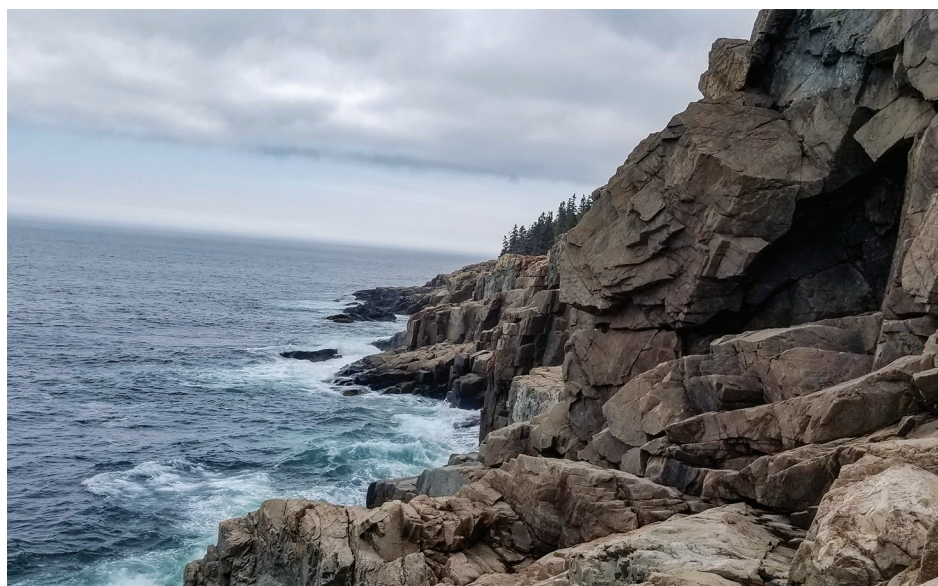
It also discusses possible future conditions in Maine, underscoring that steps taken now to reduce greenhouse gas emissions determine which alternative future Maine experiences.

Co-authors included Sean Birkel, Maine state climatologist and research assistant professor, and Catherine Schmitt, Schoodic Institute science communication specialist.

Scientists in the Climate Change Institute and Maine Sea Grant study the effects of climate change from across the planet to marine fisheries and coastal communities in Maine. In addition, UMaine scientists contribute critical expertise that informs Maine citizens and businesses about how to respond to the changing climate.

"Science-informed decision-making in the face of climate change about the future we want is always more cost-effective than constantly trying to catch up, or investing in the past," says Fernandez. "As the report states, business as usual is not an option." ♦

Average minimum temperatures in Maine are **warming 60% faster** than average maximums.



## SMART BUSINESS

The University of Maine Graduate School of Business began offering 12% tuition discounts toward the MaineMBA in January 2020.

The Workforce Partners Program, available to members of all chambers of commerce in Maine, improves access and affordability toward completion of the MaineMBA; participants will pay less than \$12,000 in tuition to complete the degree.

By leveraging resources of the Graduate School of Business and chambers of commerce, the program will equip Maine's workforce with knowledge and skills to fill the approximate 2,000 open positions requiring graduate-level education in the state.

Since 1964, UMaine's MBA has cultivated leaders. Following the merger with the University of Southern Maine graduate business program, the newly redesigned MaineMBA is a degree for the future. It provides knowledge in areas including management psychology, marketing strategy, and accounting principles, and concentrations in business analytics, finance, accounting and more. ♦



## SNOWMOBILING'S GOT TRACTION

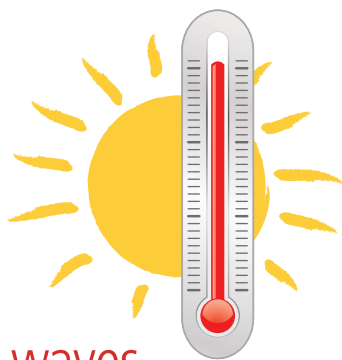
A University of Maine, Maine Snowmobile Association and state Snowmobile Program study found in the state in 2018–19, the activity:

- Contributed **\$459 million** in direct spending
- Supported **2,279** jobs

In addition,

- Residents registered more than **61,600** snowmobiles
- Average age of resident snowmobilers = **54**
- Resident snowmobilers' median annual income = **\$80,000 to \$99,999**. ♦





## Heat waves

As the climate continues to warm, scientists expect the frequency, intensity and duration of heat waves — consecutive days with extreme daily temperatures — to increase.

Bradfield Lyon found the spatial size of heat waves also is important.

By mid-century (2031–55), in a middle-of-the-road greenhouse gas emissions scenario, the average size of heat waves could increase by 50%.

And if greenhouse emissions continue unabated, the average heat wave size could increase by 80%, says the associate research professor with the Climate Change Institute and School of Earth and Climate Sciences.

“As the physical size of these affected regions increases, more people will be exposed to heat stress,” Lyon says. “Larger heat waves would also increase electrical loads and peak energy demand on the grid as more people and businesses turn on air conditioning in response.”

Lyon’s study could provide a framework for utilities to stress test their energy system’s capacity to meet demand requirements during spatially extensive heat waves. This could inform management decisions and planning. ♦



Larger spatial extent of heat waves strongly suggests **larger human exposure and increased energy demand**, and could also have implications for fire risk and air quality.”

Bradfield Lyon



## EXTENDS FRONTIERS

Brian McGill joined 23 Nobel laureates and researchers from nearly 60 nations as one of the 2019 Highly Cited Researchers.

The University of Maine professor of biological sciences examines biodiversity at large scales — substantial areas of space, long periods of time, and across many species — that are critical to addressing conservation and management questions.

McGill wants to be able to predict how species’ ranges will respond to climate change, as well as measure the impact of people on community structure.

Since 2003, his 106 publications have been cited 7,991 times. Highly Cited Researchers make up 0.1% of all researchers.

The list of more than 6,200 scientists “contributes to the identification of that small fraction of the research population that contributes disproportionately to extending the frontiers of knowledge and gaining for society innovations that make the world healthier, richer, more sustainable and more secure,” according to the Web of Science Group. ♦

## PRODUCES RESULTS

Since 2000, Maine Harvest for Hunger has distributed more than 3 million pounds of food to citizens grappling with hunger. In 2019, the University of Maine Cooperative Extension-coordinated program donated more than 193,000 pounds of fresh produce from more than 120 farms.

The donations went to 207 hunger-alleviation distribution sites.

Maine Harvest for Hunger had 365 volunteers in 2019, including UMaine Extension Master Gardeners, and eight corporate partners from 12 counties who logged more than 6,000 hours. The value of produce they harvested is estimated at more than \$327,000.

Over two decades, Maine Harvest for Hunger has built partnerships to improve the efficiency of supplying fresh produce to food pantries across Maine. For example, through volunteer planning and communications, several food pantries now send trucks and vans directly to farms where leftover crops are being collected. ♦

**More than 13.6% of Maine households — more than 182,000 people —** are food insecure, according to a United States Department of Agriculture estimate.







Sewall Co. aerial image of Bangor, Maine, July 22, 1965.

## AERIAL PERSPECTIVE

The James W. Sewall Co. donated more than 3,000 rolls of film containing about 1 million aerial images to the Raymond H. Fogler Library.

"In turning over these archival materials, the James W. Sewall Co. is essentially entrusting its DNA to the University of Maine," says Sewall president George Campbell Jr.

Daniel Hayes, assistant professor in the School of Forest Resources, says the photo archive — which spans about 65 years of Maine and New England — presents an exciting opportunity for faculty, staff and students.

"Maine's forest has been in constant flux over the course of history, including the changing composition of tree species, insect outbreaks, land use change, shifting management practices and climate change," he says. "The (archive) represents an unprecedented record of the continuing evolution of Maine's forest landscape."

The Old Town, Maine company provides services in aerial photography, surveying/GPS, photogrammetry, cadastral mapping, GIS, forestry consulting and engineering. It began offering aerial photography services in 1948.

UMaine History professor Anne Knowles says the aerial photos provide tremendous potential for study and examination across the university.

"They provide data about the growth and decline of the state's great pulp and paper industry, urban development, transportation, forestry practices, tourism, the impact of the ash borer and other environmental issues," she says. "Such a deep historical and visual record will support interdisciplinary research for decades to come."

The Special Collections Department at Fogler Library will catalogue and manage the photo archive, which is expected to be available to the public in 2021.

"Not only will Special Collections take excellent care of this important part of Sewall's — and Maine's — heritage, but will make it widely available to researchers as well. We could not be more pleased," says Campbell. ♦

## ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) — the development of computer systems that perform tasks that normally require human intelligence — once was considered to be futuristic science fiction.

But it's current reality at the University of Maine.

The University of Maine Artificial Intelligence Initiative (UMaine AI) brings together university, industry, government and community collaborators from Maine and beyond to advance the field.

The state's land, sea and space grant university addresses challenges of global impact and local relevance, including forestry modeling, cancer detection, space travel and autonomous vehicle programs.

"UMaine AI is dedicated to enhancing human life and societal well-being," says Kody Varahramyan, vice president for research and dean of the Graduate School.



It draws top talent and **leverages a distinctive set of capabilities from the University of Maine across many disciplines** and other collaborating institutions from across Maine and beyond, while it also recruits **world-class talent from across the nation and the world.**"

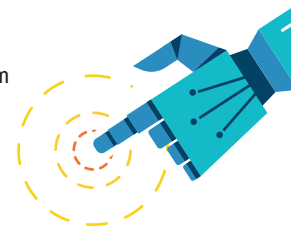
Kody Varahramyan

## Record-breaking

Habib Dagher says the Advanced Structures and Composites Center that he directs is doing what's never been done. In October, Guinness World Records agreed, documenting three World Records for:

- Largest prototype polymer 3D printer, which is **60 feet long (and expands to 100 feet), 22 feet wide and 10 feet tall.**
- Largest **(25-foot, 5,000-pound)** 3D-printed boat named 3Dirigo after the state's motto, "Dirigo," or "I lead."
- The boat, printed in **72 hours**, also is the largest solid 3D-printed object.

"The purpose of this is to see what's possible," says Dagher. ♦







## OPIOID-DEPENDENT MOTHERS

Mothers treated for opioid dependency showed less-responsive maternal behaviors toward their babies than mothers not dependent on opioids but similar in socioeconomic and lifestyle factors.

The mothers' sensitivity deficits were associated with reduced oxytocin (OT) release. OT is made in the hypothalamus and normally released when mothers interact with their babies, and during labor and lactation.

The mothers' behaviors could negatively affect mother-infant attachment, child stress adaptation in the long term, and children's social, emotional, behavioral and cognitive development.

Katrina Daigle made the discoveries when she was a University of Maine psychology graduate student. Psychology professor Marie Hayes advised Daigle, now a clinical psychology doctoral student at Suffolk University. Collaborators Julie Gosse and Juyoung Shim performed the oxytocin assays. The paper was published in "Developmental Psychobiology." ♦



## ADVANCED COMPUTING

The National Science Foundation awarded a \$350,000 Major Research Instrumentation grant for a project led by the University of Maine School of Computing and Information Science to develop a high-performance computing instrument. Roy Turner, associate professor of computer science, will lead the research, along with Bruce Segee, Peter Koons, Huijie Xu and Sofian Audry. The proposal also included over 30 senior personnel from UMaine, the University of Maine System, other colleges in Maine, and the state in general.

Deep learning (a subfield of artificial intelligence), modeling and simulation, and visualization are key technologies in many research fields, and depend on high-performance computing (HPC). Turner's team plans to create an HPC instrument that will support these needs for research at UMaine and across the state.

The researchers expect the HPC instrument's broader contributions to include scientific advances, increased use of deep learning in STEM projects, outreach to K-16 education and the public, training of undergraduate and graduate students, and enhancement to computational resources in underserved communities throughout the state. ♦

## Game-changing technology

The Advanced Manufacturing Center (AMC) was awarded two grants totaling \$2.5 million to upgrade equipment and accelerate the adoption of additive metal manufacturing in Maine.

The Maine Manufacturing Extension Partnership received a \$1 million National Institute of Standards and Technology Manufacturing Extension Partnership Competitive Awards Program grant to support and enhance AMC's Center for Additive Manufacturing of Metals.

AMC was awarded \$1.5 million for equipment upgrades to better meet the needs of industry partners and the state's workforce. The improvements will enable the center to build resilience into the state's manufacturing businesses by providing access to new technology, as well as innovative technical assistance.

The funding includes a \$750,000 investment from the U.S. Economic Development Administration. Matching funds come from UMaine's Office of the Vice President for Research and College of Engineering, as well as the Maine Technology Institute.

The purchase and installation of state-of-the-art additive and subtractive manufacturing equipment will give AMC the capabilities that current manufacturing R&D demands, as well as increase efficiency, says John Belding, AMC director.

The new equipment will be unique to the state and publicly available to entrepreneurs, businesses and their employees, he says. The technology will likely attract out-of-state companies, as well.

The upgrades include a Desktop Metal FDM additive metal machine with testing equipment, 5-axis machining center, hybrid metal additive cell, wire EDM (electrical discharge machining), and 4-axis lathe with live tooling. ♦

“

Learning on the latest technology is **critical to our students and industry workforce development.** If we can assist companies to adopt the latest technology without risk, it will be a huge win for the **entire state of Maine.**”

John Belding







“

**The goal for Green Endowment gifts of forestland is to provide long-term educational opportunities for students at the University of Maine.**

The professional staff at the University of Maine Foundation is available to assist landowners with gift options and estate planning ideas.”

Jeffery Mills, President/CEO  
University of Maine Foundation

## Forestlands for the future

**LOVE OF THE OUTDOORS AND NATURE** draws faculty, staff and students to the University of Maine College of Natural Sciences, Forestry, and Agriculture. The University of Maine Foundation Green Endowment is an opportunity for those who share a love of forestlands to give to UMaine in a special way.

The college seeks quality forestlands that can be managed to supply a long-term source of income. The lands will be managed for sustained yield of marketable resources, for wildlife habitat and recreational potential, aligned with the teaching, research and public service mission of the state’s public research university.

Two Alumni Place  
Orono, Maine 04469-5792  
207.581.5100 or 800.982.8503



75 Clearwater Drive, Suite 202  
Falmouth, Maine 04105  
207.253.5172 or 800.449.2629

[umainefoundation.org](http://umainefoundation.org) • [umainefoundation@maine.edu](mailto:umainefoundation@maine.edu)





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## IN THE NEXT ISSUE

**Traditional ecological knowledge:** Suzanne Greenlaw, front, and Shantel Neptune research sustainable sweetgrass harvesting in Acadia National Park. The fragrant perennial grass that grows in salt marshes and wet meadows is a resource for Wabanaki people, including in basketmaking.