

UMaine Today

CREATIVITY AND ACHIEVEMENT AT THE UNIVERSITY OF MAINE

SPRING/SUMMER 2018

Sea monsters

How can we better
forecast to prepare
for extreme weather?



An Honors class led by associate professor Mimi Killinger, the Rezendes Preceptor for the Arts, meets in Lord Hall Gallery on campus. As a University of Maine Signature Area of Excellence, the Honors College engages students in critical analyses of the foundations of society and civic responsibility. The college's rigorous liberal arts core curriculum and independent student research benefit from the breadth and depth of a land grant university. Small classes, combined with the living-learning communities, provide 750 undergraduates in the Honors College with a student-centered, engaged learning experience.

THERE'S NOTHING better than working for the people of Maine. As president of the University of Maine these last four years, and as a member of the UMaine community for more than 30, I have appreciated, enjoyed and embraced the mission of a public research university, and the difference it can make, near and far.

That commitment to teaching, research and community engagement is deeply held and widely shared by members of a land grant university community. It's what drives our university to do great work, most often in partnership with others and all for the greater good — in Maine and beyond.

As the state's public research university, UMaine plays a critical role in building collaborations that benefit our communities, businesses and students. It is rewarding to see what we have done — and continue to accomplish — together.

World-class engineers, marine researchers and climate scientists are at the University of Maine, collaborating with the National Weather Service to help the state predict and respond to increasingly intense coastal storms. Some of the top entomologists are at the university and, in the case of the recent infestations of brown-tail moths in the state, are on speed dial for communities battling the invaders.

State and national media covering the #MeToo and #TimesUp movements have extensively tapped our researchers' expertise on sexual harassment in the workplace and the power of social media. Some of the leading humanities scholars in the nation and the state are at UMaine, collaborating with graduate students whose research contributes to our understanding of Maine history.

Their stories are among those featured in this issue of *UMaine Today* magazine. They demonstrate how this public research university turns knowledge into solutions, contributes to quality of life in Maine, enhances scientific and societal understanding, and informs the UMaine student experience.

As president, I couldn't be prouder.

Susan J. Hunter, Ph.D.
President



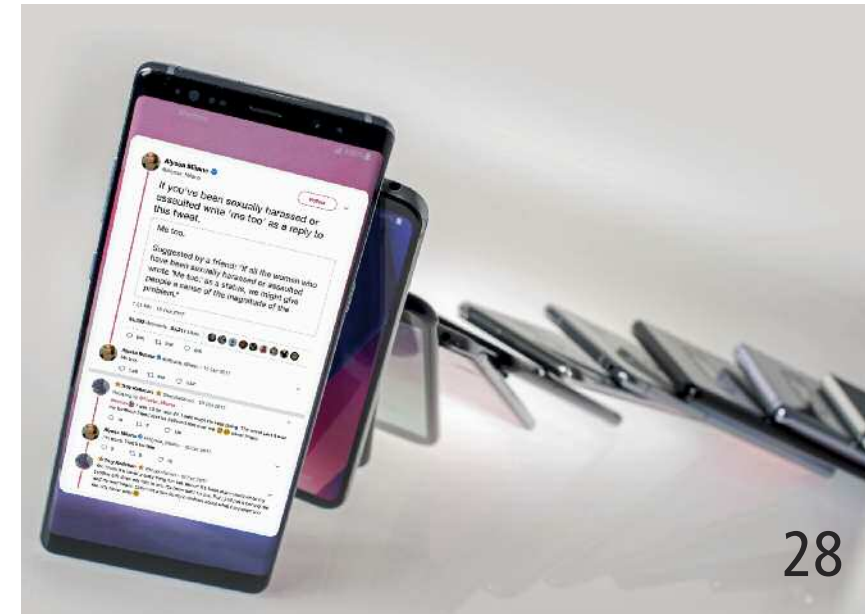
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Research and outreach in the humanities includes scholarship on Maine history. Profiles of three research projects by history graduate students provide insights into the past that has shaped the state's unique cultural heritage and identity, and informed its future.



Photo courtesy of Elizabeth Smith



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A satellite view of the Feb. 9, 2013 nor'easter slamming the East Coast, from northern New Jersey to Maine. Winter coastal storms often move up the Eastern Seaboard, cross Long Island, Cape Cod and the shallow banks of the Gulf of Maine, and then track east toward Nova Scotia as winds spiral back from the Northeast. Because of these and other strong storms that occur occasionally in Maine, the National Weather Service is working with the University of Maine to improve storm models and forecasts. A story about that research begins on page 44. Stocktrek Images/Getty Images



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Video magazine

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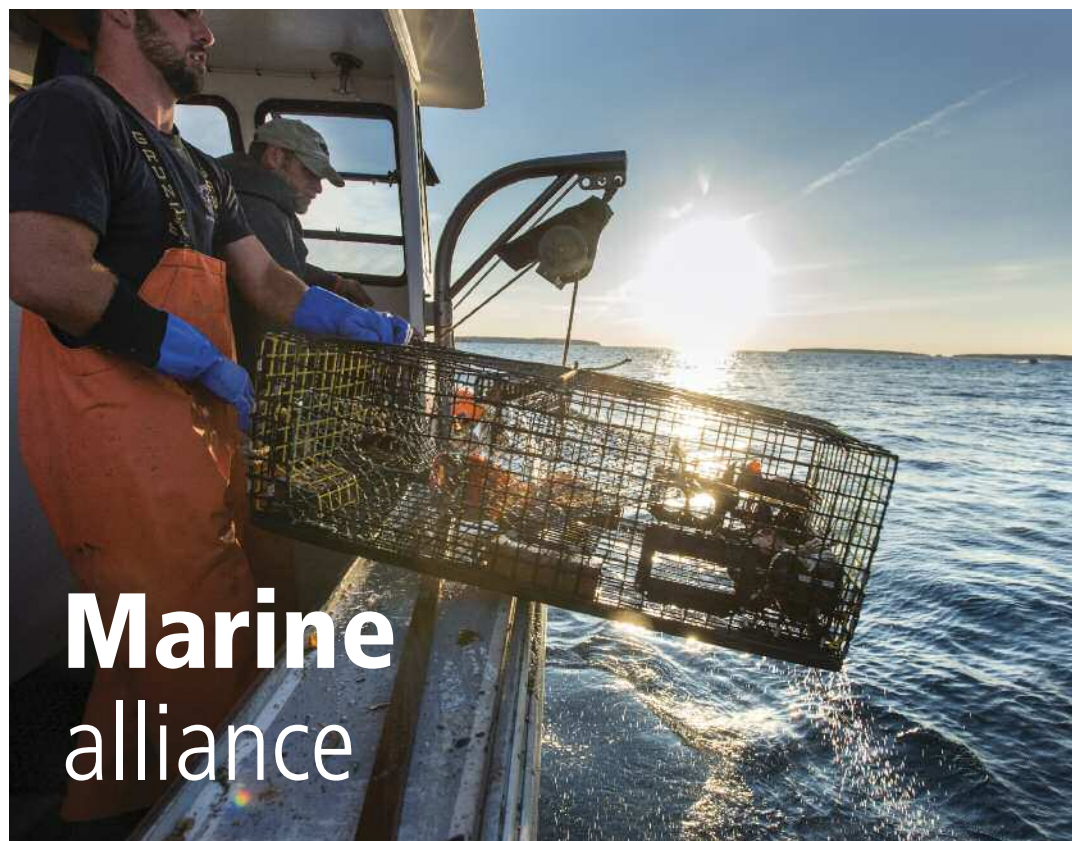
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THE ALLIANCE for Maine's Marine Economy is a developing initiative focused on emerging opportunities and challenges related to a productive and profitable marine economy. Alliance partners have identified projects and contracts aimed at attracting at least another \$50 million in additional private sector and federal grant dollars over the next 10 years. More information about the Alliance for Maine's Marine Economy is online: umaine.edu/alliance.



THE ALLIANCE for Maine's Marine Economy, a consortium of Maine-based marine businesses, research institutions and educational organizations, is investing in infrastructure and technologies with \$7 million in voter-approved bond funds, matched by more than \$7 million from Alliance members.

Led by the University of Maine, the Alliance is dedicated to ensuring that Maine seafood, fishing and aquaculture industries, and the natural ecosystems on which they depend, are healthy and benefit Maine people. These strategic investments support and diversify traditional fisheries, aquaculture and other marine-dependent industries.

On behalf of the state, the Maine Technology Institute (MTI) manages the finances of the Marine Economy and Jobs Bond. In partnership with the Alliance, MTI has invested in seven capital projects and awarded eight competitive capital grants. The investments include new processing capabilities at seafood businesses in York, Cumberland, Lincoln, Knox, Hancock and Washington counties, and new research and development, and commercialization facilities in Lincoln, Penobscot and Washington counties.

Capital investments in public institutions and private businesses will benefit the marine sector by facilitating business development, accelerating product innovation, assessing and preventing risks to resource health, forecasting changes in product supply and improving the value of Maine's seafood resources.

Maine's marine businesses will benefit from resources, technical assistance, information, educational opportunities, business training and capital that will allow them to grow and thrive in the face of the ever-changing ocean ecosystem and globalized economy. ■

Abundant beech

THE COMPOSITION of hardwood forests in the Northeastern United States is changing significantly. In the past 30 years in forestlands in four states, climate-associated changes have increased the abundance of American beech compared to three other hardwood species commonly associated with the regional forests, according to a University of Maine-led research team.

The significant shift to forests dominated by American beech, *Fagus grandifolia*, in Maine, New Hampshire, New York and Vermont is associated with higher temperatures and precipitation, according to Arun Bose and Aaron Weiskittel at UMaine, and Robert Wagner at Purdue University, the team that conducted the study — one of the first to examine broadscale changes over a long period of time in the Northeastern U.S. and Southeastern Canada.

The change from beech-maple-birch forests to more beech-dominated forestlands could have consequences for ecosystem structure and function, say the researchers. Beech is associated with a widespread bark disease and is known to limit natural regeneration of other species. In addition, the wood has less commercial value.

The significant increase in beech in the past three decades also has resulted in decreased incidence of sugar maple, red maple and birch. Factors in the changing forest composition include the ability of beech to shade out the other species.

“Our results emphasize the need for management strategies, such as higher intensity harvesting methods, vegetation control and limiting browsing pressure to reduce beech dominance,” according to the researchers, who published their findings in the *Journal of Applied Ecology*.

The researchers used U.S. Forest Service Forest Inventory and Analysis data, 1983–2014, for Maine, New Hampshire, New York and Vermont to study the occurrence and abundance of American beech, sugar and red maple, and birch saplings. Their assessment included sapling encroachment into new areas, and the abundance of the American beech relative to the other three species. ■



RESEARCHERS FOUND beech-dominated forests most evident in the Adirondack Mountains of New York, the Green Mountains of Vermont and the White Mountains of New Hampshire. Climate-associated changes in forest composition often include high mortality in sensitive species and disproportionate favoring of others that can better adapt to the new conditions. In the Northeastern U.S., beech sapling presence and abundance has likely been driven by additional factors, including the long absence of wildfire, browsing by deer, intensive harvesting and species characteristics, such as shade tolerance.





Coming home

“The intention of the map is to **create respect for indigenous homelands and sovereignties,** and a feeling for and **understanding of indigenous place names.**”

Margaret Pearce

TO MARK the 150th anniversary of the Confederation of Canada, the Canadian-American Center at the University of Maine has published a new map, “Coming Home to Indigenous Place Names in Canada.” The map honors indigenous place names in Canada and the assertion of indigenous authority through place names.

Commissioned by Stephen Hornsby, director of UMaine’s Canadian-American Center, “Coming Home to Indigenous Place Names in Canada” was researched and designed by cartographer Margaret Pearce.

The map depicts indigenous place names across Canada, shared by permission of First Nations, Métis and Inuit communities and people.

“One of the aims of the map is to represent Canada in a new way by highlighting the importance of indigenous names for understanding places and landscape features,” Hornsby says.

As described in the map, indigenous place names “express territorial rights and describe the shapes and sounds of sovereign lands. They mark the locations of the gathering places, the communities, the places of danger and beauty, and the places where the treaties were signed.”

The map does not depict all of the indigenous place names in Canada, nor are all indigenous nations and communities represented. Beyond the map’s names are thousands upon thousands more, “an ever-growing and expanding atlas of intimate geographical knowledge and experience.”

To make the map, Pearce spent months researching names, and calling communities and language keepers to ask permission to include their names.

The Canadian-American Center does not profit from the production and sale of the map. The public is invited to purchase a copy for the cost of printing and postage, or download a secure PDF through the center’s website. ■

Heat and power

THE U.S. Department of Energy has selected the University of Maine to lead one of eight regional partnerships dedicated to the promotion, technical support and deployment of cost-effective and highly efficient combined heat and power (CHP) technologies nationwide. UMaine, in partnership with the University of New Hampshire, University of Massachusetts Amherst and Watson Strategy Group, will oversee the CHP Technical Assistance Partnership (TAP) center in the New England region, including Maine, New Hampshire, Vermont, Rhode Island, Massachusetts and Connecticut.

The UMaine-led New England Combined Heat and Power Center (NECHPC) and the seven other CHP TAP program centers nationwide are supported by \$25 million of DOE funding. NECHPC will receive more than \$2.5 million of that total.

CHP — also known as cogeneration — is an efficient and clean approach to generating electric power and heat from a single fuel source, like biomass or natural gas. Heat and power can be produced on-site, reducing the need to purchase electricity from the distribution grid, greatly increasing energy security and resiliency.

David Dvorak, UMaine professor of mechanical engineering technology, is the principal investigator on the project. Other UMaine investigators are Scott Dunning, director of the School of Engineering Technology, and Brett Ellis, assistant professor of mechanical engineering technology.

The project is a natural fit within the scope of the School of Engineering Technology. Engineering technology faculty are licensed professional engineers with advanced engineering degrees are focused on industry application and applied research. This project will enhance opportunities for faculty and graduate students to provide direct technical assistance to industrial and commercial clients. ■

“

Combined heat and power systems offer **real solutions to today’s energy issues — supporting economic development** through improved energy efficiency, increased energy resiliency and lower energy costs.”

David Dvorak



THE NEW Engineering Education and Design Center (EEDC) will be sited on the current location of the Machine Tool Lab, located between Boardman and Barrows halls, with frontage along Long Road. The one-story Machine Tool Lab, built in 1936, currently houses teaching laboratory spaces and two classrooms, largely for the School of Engineering Technology. These functions will either be accommodated in EEDC or another facility in the engineering district.



Engineering Maine

AN ANONYMOUS gift of \$10 million from the family of a University of Maine engineering graduate has been committed to help construct UMaine’s Engineering Education and Design Center (EEDC). The critical infrastructure will help meet Maine’s engineering workforce needs and address increased enrollment demands for UMaine’s high-caliber engineering programs.

The donation is the single largest capital gift in UMaine history, bringing UMaine’s Vision for Tomorrow campaign to over \$148 million of the \$200 million goal, according to University of Maine Foundation President Jeffery N. Mills.

“This investment builds on the remarkable growth and success of UMaine engineering, one of our seven Signature Areas of Excellence,” says UMaine President Susan J. Hunter. “We’ve seen a 70 percent growth in undergraduate enrollment in the College of Engineering since 2001. The Engineering Education and Design Center will help the College of Engineering expand its capacity to help meet student demand and Maine’s need for engineers.

“In addition to thanking our anonymous donors, we also thank the state Legislature and Gov. LePage for investing \$50 million toward the construction of this much-needed facility,” Hunter says.

Members of the College of Engineering Dean’s Advisory Board, alumni, friends and corporate donors

have collectively contributed an additional \$1 million in gifts and pledges toward the construction of this facility to date. Up to \$19 million remains to be raised toward EEDC construction.

In December 2017, the team of WBRC Architects Engineers, based in Bangor, and Ellenzweig of Boston was selected to design EEDC, proposed to cost up to \$80 million. Approval by the University of Maine System Board of Trustees of the full design and cost estimate of the center is planned for later this year.

Groundbreaking is anticipated in spring 2020, with completion in 2022.

The donors wish to remain anonymous at this time, preferring to focus attention on the critical need to build an interdisciplinary academic environment to help educate engineers who will be prepared to innovate solutions to the world’s most complex problems. The academic and laboratory building will be the heart of undergraduate engineering education, and the new homes of mechanical engineering and biomedical engineering.

The center’s new laboratories and classrooms will focus on team-based, hands-on experience to prepare graduates for engineering careers. The additional space will support modern, interdisciplinary approaches to teaching, and room for groups to work on senior capstone projects. ■



Cultivating skills

**UMaine Extension's
gardening programs go
behind bars to benefit
convicts and communities**

By Elyse Catalina / Photographs by Adam Küykendall

The Maine State Prison has expanded its garden space to provide more food, cut costs for the prison and state, and assist inmates in developing employable job skills. University of Maine Cooperative Extension has partnered with the maximum security facility to provide horticulture skill training to inmates.



Greg, an inmate serving 37 years at the Maine State Prison in Warren, is one of about 20 men employed in the facility's composting, recycling and gardening program. Ryan Fries, captain of the prison, oversees the gardening efforts.

ON AN unseasonably warm September morning in Maine, four men work together to harvest kale, peppers and tomatoes.

One of the men is about twice the age of the others. With a bachelor's degree in environmental horticulture, he's viewed as a mentor, this day providing gardening guidance in how to harvest the ripest produce.

They work in close proximity, gently tossing vegetables from person to person and into a wheelbarrow. Once harvested, the produce is wheeled down a sidewalk — past compost piles, beehives and flower gardens — to a locked door. When all four men are standing there, present and accounted for, an officer permits them to proceed.

The men cart the day's bounty through an empty cafeteria and an industrial-grade kitchen buzzing with activity. In an adjoining room, the weight of the produce is recorded.

The fruits of the group's labor will be cleaned, chopped

and served as part of the evening meal for them and more than 1,000 other Maine State Prison inmates in Warren.

OVER THE past few years, the Maine State Prison has rein-vigorated its agriculture program. Under the direction of Warden Randall Liberty, the maximum security facility has expanded the amount of garden space to provide more food, cut costs for the prison and state, and assist inmates in developing employable job skills.

University of Maine Cooperative Extension has partnered with the prison to provide horticulture skill training to inmates.

The training began in 2001 for prisoners who were looking to develop job skills in the horticulture industry, according to Mark Hutchinson, a UMaine Extension professor, who helped initiate the program.

"The landscape industry was really short on labor, and

it's traditionally that way," Hutchinson says. "We thought that training people who were incarcerated with employable skills they could actually come out with and go into an industry that was looking for labor was a really good idea."

The course was offered almost every year, until 2014, according to Hutchinson. When Liberty joined the prison staff in 2015, he reached out to Hutchinson to see if UMaine Extension could restart the program. Hutchinson returned to organize a horticulture training course in 2016.

In the winter and early spring, UMaine Extension staff lead an eight-to 12-week program at the prison that focuses on gardening skills, including botany, plant fertility, soil health, crop rotations, vegetable production systems, integrated pest and weed management, and seedling production.

The program, offered at no cost, is capped at 12–15 participants at a time and includes many hands-on activities. Each class runs two hours and 30 minutes.

Hutchinson provides the dates and subject matter for the courses. Prisoners then apply and are selected based on criteria, including recent behavior. Currently, 30 men are on a waiting list to take the course.

Hutchinson estimates that almost 200 inmates have taken the horticulture training course in the 14 times it has been offered.

According to Hutchinson, prison staff have noticed positive behavioral changes among those who have taken the course.

"There are less incidences of demerits or behavioral issues for this group," he says. "It gives them a purpose and they have a sense of belonging, and they feel good about what they're doing and why they're doing it."

BEFORE BECOMING warden of the Maine State Prison two years ago, Liberty worked at the Kennebec County

Sheriff's Office for 26 years, nine as sheriff. He also took the Master Gardener Volunteer program with UMaine Extension, and initiated similar gardening efforts with inmate crews.

In Kennebec County, he oversaw the farming of 40 acres, which annually provided about 50,000 pounds of produce that was donated to food pantries, soup kitchens and schools.

At the Maine State Prison, Liberty saw potential in the yard's unused green space. He figured the facility could compost waste generated from the kitchen and rotate it into the soil. Now an estimated 1.5 acres of the prison grounds are used for gardening, as well as two greenhouses for winter planting.

"We started small as a pilot and we grew it; we may have quadrupled the size this year," Liberty says of the prison's gardening efforts, which evolved from mainly growing ornamentals to producing food.

The prison has about 20 men employed in the composting, recycling and gardening program, according to Liberty, who hopes to double the number this year.

"It's gone very well," he says of the reinstated agriculture program. "There are some things we can do here at the

prison that soften the culture, and the garden program is one."

One of the prison's challenges is making sure inmates have a reason to get out of bed in the morning, Liberty says. To provide outlets for purposeful, paid work, the prison offers the agriculture program, as well as a K-9 program where prisoners train dogs to assist disabled veterans, and a woodshop where inmates build everything from birdhouses to furniture.

Per Liberty's suggestion, the latest horticulture training program, offered January through March 2018, was taught as a UMaine Extension Master Gardener Volunteers program.

“The landscape industry was really **short on labor**, and it's traditionally that way. We thought that **training people who were incarcerated with employable skills** they could actually come out with and **go into an industry that was looking for labor** was a really good idea.”

Mark Hutchinson



Images left to right: In the winter and early spring, UMaine Extension staff lead an eight- to 12-week program at the prison that focuses on gardening skills. Mark Hutchinson, a UMaine Extension professor, center, helped initiate the program. He estimates that about 200 inmates have taken the horticulture training course since it began in 2001.

Gardening in prison offers its own set of challenges. Chad and other prisoners aren't allowed to use traditional tools, such as shovels, rakes and hoses, without supervision, if at all. Instead, they use their hands, cups and three-gallon water buckets. Despite the extra work, the men look forward to gardening for about six hours a day.

“

A lot of these people **have not had success in their lives**. One of the first things they tell me is **how many pounds of vegetables they have put into either the food bank or the kitchen, and they are so proud of that**. It's really a pleasure for me to see them have that success.” Mark Hutchinson

The Master Gardener program provides participants with around 40 hours of in-depth training in the art and science of horticulture. Trainees receive current, research-based information from UMaine Extension educators and industry experts. In return, trained Master Gardeners volunteer for community programs and activities.

To satisfy the volunteer requirement, the prisoners started seedlings for school and community gardens throughout the state, and will donate produce to local food pantries.

The Master Gardener program started in the state in 1982; Maine currently has 1,030 active volunteers.

While any inmate can apply for the training program, getting assigned to the gardening crew requires completing a job application and vetting process.

“Somebody who's willing to work and learn is sometimes better than somebody with a lot of experience,” says Ryan Fries, captain of the Maine State Prison, who helps select

participants for the gardening program. He notes that most of the men selected for gardening are dedicated to it.

“They see the future in it,” he says. “They see the ability to give something back to themselves.”

IN ADDITION to leading several of the classes, Hutchinson visits the prison throughout the growing season to check on the gardens' progress and offer feedback.

In September, the prison gardeners consulted Hutchinson about static pile composting. Hutchinson, an instructor for the Maine Compost School, took core temperatures and offered advice on different waste to use in order to get the materials to decompose properly.

Hutchinson often brings other UMaine Extension experts to assist with vegetable production, according to Liberty, who calls Hutchinson critical to the program's success because of his dedication throughout the years.

Even though Greg, the inmate with a formal education in horticulture, is familiar with gardening practices, he still appreciates having Hutchinson and other experts available to answer questions either in person or by email via Fries, who oversees the gardening efforts.

Greg recalls a time when the gardeners noticed radish leaves were getting chewed. After consulting with Hutchinson, they learned what type of bugs were threatening the plant, as well as strategies to keep them away.

“We can find out the answers to stuff almost immediately, it's wonderful,” he says.

Fries also sees the benefits of working with Hutchinson.

“The knowledge he brings guiding us to help our gardens flourish is just amazing,” Fries says. “And he makes it fit our environment, which is super. A lot of people come in and give ideas, but they don't realize that we're working inside a prison system.”



The prisoners grow produce that includes Swiss chard, kale, lettuce, collard greens, cauliflower, tomatoes, beets and other root vegetables, peppers and herbs. The bounty is shared with Rockland-based food pantries.

Gardening in prison offers its own set of challenges. Prisoners aren't allowed to use traditional tools, such as shovels, rakes and hoses, without supervision, if at all. Instead, they use their hands, cups and three-gallon water buckets.

"Every time we come up with an obstacle, we also try to find a reasonable solution to help them maintain and actually succeed," Fries says.

Despite the extra work, the men look forward to gardening for about six hours a day.

"Gardening is very therapeutic," Hutchinson says, noting that it's a way to eliminate some of the inmates' mental stress. "They look forward to the time out there, and getting their hands dirty and working."

Greg agrees. His favorite aspect of gardening is working in the soil.

"Whether it's planting seeds or pulling weeds or flipping compost piles over, I like the hands-on aspect of it," he says.

Greg's father was a landscaper. After earning his degree, Greg owned a landscaping company. When he was sentenced to 37 years, Greg was relieved to see a greenhouse at the prison. Now he often mentors inmates who are new to the program. He even led one of the horticulture training classes when Hutchinson was double-booked.

"To me, it's just like second nature; almost like I live and breathe horticulture because I've done it my whole life," he says.

Greg says he enjoys seeing new inmates come on board, especially those who have no prior gardening experience, but have the drive to learn.

"It's really nice to see people start out not knowing things and as the season progresses, they just flourish and they become experts," he says.

"They'll come to me and say, 'Hey, I was thinking we could do this.' At the beginning I had to encourage them to do it, and now they're part of the program and they just

take hold of it and get things working, and to me it's so rewarding to see that."

TODAY, THE prisoners grow a variety of produce, including Swiss chard, kale, lettuce, collard greens, cauliflower, tomatoes, beets and other root vegetables, peppers and herbs. They also continue to grow flowers, both as Mother's Day gifts and to attract bees.

In 2016, the inmates grew around 3,500 pounds of food and donated 600 pounds to a Rockland food pantry. In 2017, 8,000 pounds were grown, with another 700 pounds donated, this time to the Area Interfaith Outreach (AIO) food pantry in Rockland.

"Fresh produce is so expensive in grocery stores and the people who come to AIO for help feeding their families are so pleased to find such beautiful food," says Sherry Cobb, former president of the AIO board of directors. "We at AIO are grateful to the gardeners at the Maine State Prison for their hard work and for giving so generously to their midcoast neighbors who need this food."

To determine what type of vegetables should be grown each season, Fries consults with Roger Cordes, correctional cook supervisor at the prison. The pair determine what would best meet the needs of the kitchen while also making the most financial sense.

Cordes says he is always asking for any kind of greens because the inmates favor salad.

"Everyone talks about how good the salad is because there are fresh veggies," says Chad, a prison gardening crew member. "We don't really get that much stuff in the salad throughout the wintertime. So everybody looks forward to the cucumbers and the tomatoes and the fresh onions."

Currently, the prison is saving about \$3,000 a month on salad greens, which it hopes to supply annually from March through December, according to Cordes.

The kitchen prepares more than 3,000 meals a day, so everything that is grown can be consumed quickly, according to Liberty, who says the prison also uses food from the farm at nearby Bolduc Correctional Facility.

About 64 inmates work in the kitchen preparing the meals, according to Cordes, who says the experience gives them skills for future use in the restaurant industry.



About 64 inmates work in the prison's kitchen preparing more than 3,000 meals a day. Currently, the prison is saving about \$3,000 a month on salad greens, which it hopes to supply annually from March through December.



When Warden Randall Liberty joined the Maine State Prison staff in 2015, he saw potential in the yard’s unused green space. Today, an estimated 1.5 acres of the prison grounds are used for gardening from late spring (as seen here) through early fall, as well as two greenhouses for winter planting.

“It’s nice to reduce a little bit of the tax burden, and the inmates are doing the work themselves,” Liberty says. “I think there’s an expectation on the outside from the taxpayers’ standpoint that the inmates are gainfully employed and they’re growing some of their food, so it satisfies all those needs.

“With the salad bars, since we produce them here, there’s no cost to the taxpayer; there’s limitless salad, so they appreciate that.”

Significant savings in the prison also are being found through composting and recycling efforts.

According to Liberty, the kitchen produces about a quarter-million pounds of organic waste each year, which was costing about \$45,000 to be hauled off the property. Now the prison is collecting that waste, along with shredded paper, grass clippings and leaves, and composting it instead of paying to have it taken away.

In 2016, the inmates grew around **3,500 pounds of food and donated 600 pounds** to a Rockland food pantry. In 2017, **8,000 pounds were grown, with another 700 pounds donated**, this time to the Area Interfaith Outreach food pantry in Rockland.

“We rotate that back into the soil, greatly enhancing the nutritional value of the soil and increasing the production of the vegetables,” Liberty says, noting that beehives are being incorporated, also with Hutchinson’s help.

JAMES, WHO is serving a five-year sentence, took the horticulture training program at the prison and has worked on the garden crew for several years. He says gardening lets him spend time outside and gives him a small sense of freedom.

Having had some prior gardening experience, James says the program offered an opportunity to make a difference.

“People ask about you and what you’re doing all the time,” James says of inmates’ interest in the gardens. “They ask about the food, how long certain things grow.”

He recently was transferred to Bolduc Correctional

In March 2018, Mark Hutchinson and Ryan Fries were awarded the Source Trailblazer Award by the *Portland Press Herald* for their work in the prison. Every year, the newspaper’s Source Awards honor Maine residents, organizations and businesses working in sustainability.

Facility, a minimum security institution that houses incarcerated men who are transitioning back into the community. At the facility’s farm, James intends to continue practicing his gardening skills in preparation for reintegrating into society and finding employment.

“On the outside, I’ll be growing (plants) a lot,” James says. “I hope to work at another greenhouse.”

After all, the primary purpose of the Maine State Prison is to reduce recidivism, according to Liberty.

“We’re not here to punish them. Their punishment is being here,” he says.

Liberty says prison staff work to address the common factors that play a role in most convictions, such as substance abuse, mental health, anger management issues, poverty, neglect and learning disabilities.

“We try to address all those needs,” he says. “I think the agriculture program goes a long way to calming them and making them feel proud of something they’re doing.”

Liberty says having mentors such as Hutchinson also is meaningful.

“To spend time with a guy like Mark is priceless,” he

says. “They can see the example of a good man who makes a difference in the community.”

UMaine Extension has been a major player in the prison’s gardening efforts, says Hutchinson, who sees it as part of the university’s comprehensive outreach mission to engage learners of all ages and improve their lives.

“A lot of these people have not had success in their lives,” he says of the inmates. “One of the first things they tell me is how many pounds of vegetables they have put into either the food bank or the kitchen, and they are so proud of that. It’s really a pleasure for me to see them have that success.”

Hutchinson says he often sees men come in with little or no gardening experience who find a passion.

“Having that response from them has been a really positive experience for them and for me,” he says.

Eugene, who was sentenced to 30 years with all but 15 suspended, had limited gardening experience before coming to the prison. He says he likes the homesteading lifestyle and plans to continue gardening once he is released.

“It’s rewarding, it is. Granted, everything takes time, but I have nothing but time,” Eugene says. ■



Ode to nature

Greg Ondo's art is elemental, with methods and materials intrinsically linked to the environment

By Margaret Nagle / Photographs by Holland Haverkamp

NATURE LITERALLY and figuratively makes Greg Ondo's sculptures come alive.

It's elemental. Much of his inspiration comes from earth, air, fire and water. So, too, his materials and methods.

And for his large-scale works — from those measured in miles and lasting only minutes to those tallied by the ton and here indefinitely — nature in all its beauty, seasons and unpredictability is his choreographer.

The landscape, the setting, the sense of place are critical to his sculptures' meaning and, ultimately, their performances.

Take *Northern Lights*, a sculpture commissioned for the reception area of a health care facility in Bangor, Maine. The nearly 10,000 pounds of granite quarried from Mosquito Mountain in Frankfort, Maine was carved to inset five colors of kiln-fired glass. Maine pine timbers frame the work.

But the sense of place goes beyond Ondo's choice of materials.

His inspiration for the sculpture came from Maine's topography and natural beauty — from its algae and moss to the reflection of sunlight, the view of the Milky Way, and the way water meets land in the state.

And then there's the setting for this particular work. Skylights allow natural light to flood the large room, illuminating the sculpture in different ways hour by hour, day by day. As Donald Judd did with *100 Untitled Works in Mill Aluminum*, Ondo factors in the moving ambient light and shadows to make his sculptures living life-forms.

Greg Ondo teaches classes in sculpture, glass and metal casting. More often than not, he's introducing the artists in his class to new mediums and methods. He also introduces his students to other Mainers in the arts, providing inspiration for what's possible.

The effect — the physicality, colors, abstraction, wonder of the piece — is electric and magnetic for visitors to the facility.

“I knew the location and what the sky was like,” he says of the work that was more than 800 hours in the making. “With the materials and imagery, I needed to create something that spoke to the people of Maine.

“I wanted the piece to have its own life, to be abstract enough to evoke thought, but have enough recognizable aspects. Whether you see a heartbeat or the coast of Maine or the Penobscot, people in Maine relate to those shades of green and blue. It’s not supposed to be a literal interpretation of the coastline of Maine,” says the University of Maine associate professor of art. “I want people to have their own aesthetic experience and claim ownership.”

ONDO’S WORKS are as diverse in scale — 1 inch to 16 feet tall, 1 ounce to 10 tons — as they are in scope — community events and land art to permanent installations. His works often contain materials not typically juxtaposed — granite and glass, slate and straw, fire and ice. His goal is to touch people’s sensibilities, to have them explore the multifaceted, often unsettling associations.

“I want the viewer to be constantly questioning what’s going on, to think about the possibilities,” he says.

From the start of his career as a sculptor at Indiana University of Pennsylvania, steel has been Ondo’s primary medium. He’s been wielding a blowtorch since he was 12 years old, brazing exhaust systems with his dad.

Wood with steel was next. Precious metals. Ceramics. In the course of working with stone, such as obsidian, Ondo discovered the beauty of translucency and opacity. And he turned to casting glass.

Ondo also has a passion for incorporating found objects into his art, long after dumpster diving for materials was a necessity for the budding undergraduate artist.

As an undergraduate, Ondo studied with sculptor James Nestor, who introduced him to the importance of location-driven works. That spoke to Ondo’s roots.

“Understanding the environment around me was important when I was growing up,” says Ondo, who went on to study land arts of the American West with Bill Gilbert. As a graduate student at the University of New Mexico, Ondo found inspiration in the desert landscape so different from the Pennsylvania hills of home.

In the indigenous culture sites such as New Mexico’s Chaco Canyon, he discovered the rich ceramic tradition of the Anasazi. In Marfa, Texas, Ondo found the monumental sculptures of minimalist Donald Judd.

The influences have informed Ondo’s works.

He has created a granite and glass sculpture for the visually impaired, and a community event to celebrate the removal of Veazie Dam on the Penobscot River, complete with a fire installation called *Salmon Ladder*. For a group exhibition in Pennsylvania in 2012, Ondo created *aDay*, a 13-foot-high sculpture made of steel, straw, slate and a discarded 65-foot conveyor belt to memorialize the Holocaust.

This past August, Ondo completed a 9/11 memorial for the Cumberland County Sheriff’s Office in Portland, Maine. The World Trade Center Memorial, unveiled Sept. 11 and a year in the making, features two granite columns flanking a piece of steel from one of the twin towers.

Northern Lights

“**I knew the location and what the sky was like.** With the materials and imagery, I needed to create something that **spoke to the people of Maine.** I wanted the piece to **have its own life**, to be abstract enough to evoke thought, but have enough recognizable aspects.” Greg Ondo



“It’s important to have a conversation when the opportunity presents itself,” Ondo says. “That’s the thing with art. There are so many facets to it. You can escape reality or embrace reality.

“The role of the artist is to offer anything that can help that conversation along. It’s a different

approach than, say, that of a politician. People may be more comfortable talking to an artist or each other (with art as the catalyst).”

Ondo has created a granite and glass sculpture for the visually impaired, **and a community event to celebrate the removal of Veazie Dam on the Penobscot River**, complete with a fire installation called *Salmon Ladder*. He created the work titled *aDay* to memorialize the Holocaust.

ONDO’S great-grandfather and grandfathers were coal miners. Ondo’s father was a mechanic in the mines. In his off hours, his father customized Harleys and was president of the largest motorcycle gang in Western Pennsylvania. Ondo’s mother was an LPN who played piano and introduced her son to the Carnegie Museum of Art in Pittsburgh.

Both parents were determined that their only child would be a first-generation college student.

As a college sophomore, Ondo took his first trip to New York City with his art class. He discovered the art galleries by day, and by night, CBGB in the Bowery, “the undisputed birthplace of punk.”

Coming from a “one-light coal mining town,” the city was new and exciting.

“I felt alive. It was a whole weekend of visual and performing art,” Ondo says, recalling the large steel arches of Richard Serra, figurative bronze pieces of Magdalena Abakanowicz, and Mike Kelley’s human form and found objects photos.

“Their youthful exuberance was like a first kiss. For me, it was knowing that something can be so playful yet so serious at the same time. It gave me belief in my own ideas.

“Twenty years later, those first impressions have stuck with me and I’ve watched their work over the years.”

ONDO ATTENDED Indiana University of Pennsylvania to major first in physical therapy, then in psychology.

But when he took a drawing class, he discovered he was in his element, turning in 30 drawings to meet the 10-drawing course requirement and winning awards in the student exhibition.

Drawing was, after all, Ondo’s early art form. By age 8, the focus was comic book characters in underwater scenes. By 13, he was creating photo-realistic images of his parents and friends.

In his first sculpture class at Indiana University, work in plaster and clay was followed by metalwork, including welding.

At the suggestion of a faculty member, Ondo changed his major for a third time. Ultimately, he double-majored in sculpture and metalsmithing, with a minor in wooden furniture design. In those classes, where students were expected to produce a work every two weeks, Ondo had to get creative. On a couple levels.

“It got expensive buying materials,” he says, “but because I grew up in the area, I knew where to find construction debris. I loaded my truck with old tires, rope — any material to build with. And then there was good stone from nearby Lucerne Mines.

“I’m always looking for materials,” says Ondo, who admits to constantly keeping an eye out for disparate resources that he and his UMaine students turn into provocative works. Found objects, he says, all have a story to tell.

“To this day, I can’t drive by dumpsters without having the urge to look inside,” he says. “But now, people also let me know if they have items to repurpose. Yesterday, it was old parts of theater seats — steel, mahogany. Beautiful material with strength

Salmon Ladder



Ondo was determined to **expand the “language” of sculpture using textures, changing colors and temperatures** with shifts in light.

and integrity for the students to work with, and the possibilities are endless.”

One of his most intriguing finds: a 10-foot, 2-inch thick piece of bulletproof glass from a bank in Albuquerque. Ondo had to recruit a friend to help him wrestle it into his truck. The glass became a wind sail in a 1,800-pound sculpture of concrete, glass and ceramic titled *Chariot*.

There’s only one time that his salvage efforts in the name of art backfired. Ondo was headed off campus after his graduate school interview at Notre Dame when a dumpster filled with pieces of steel caught his eye. He was loading up his truck when campus police arrived. A couple phone calls later, including one to the priest he had just met, and Ondo was returning the steel to the dumpster.

He went to graduate school at the University of New Mexico.

WHEN ONDO was growing up, he had two posters on his bedroom walls — one of a motorcycle flying through the Carlsbad, New Mexico sky, and the other of the Maine coastline. Even then, they reflected his passion for “seeing the world from different perspectives.”

What he didn’t know is that those venues were his destinations.

As an undergraduate, he was drawn west to explore Yellowstone, the Grand Tetons and the Rockies. But it was in New Mexico as a grad student (1997–2001) that his art — both permanent and ephemeral performance installations — also took to the great outdoors to be more in sync with the landscape.

And be at its mercy.

Take *Arroyo Del Fuego*, a mile-long performance installation in Llaves, New Mexico in 1999. The work featuring a 1-foot wide swath of pine needles

and slash took a week to install and was to be set ablaze in the twilight. All calibrated to be simpatico with nature that August night in the desert.

Until the heavens opened up five minutes before the performance, washing the installation away.

“I never saw such a flood in all my life,” Ondo says. “The whitewater was incredible. (The loss) was intense, but I had to make (the piece) a reality, so the following March, we did it again.”

That spring, the ephemeral installation went off without a hitch, leaving a charred mile-long line on the canyon floor on the eastern slope of the Continental Divide.

“Often I plan an event during the change of seasons or (daylight saving) time changes when people have a heightened sense of their surroundings,” he says. “I use (the timing) as part of an art experience.”

Taking cues from desert flowers that bloom for only two hours every year, Ondo created *Flambé* in 2001, an installation of fire, glass, water, steel and ceramic. The work was timed to appear at sunset against the Sandia Mountains in the distance.

On the Continental Divide near Llaves, New Mexico in 1999, Ondo built Bottleneck, an adobe wood-fired kiln, and invited ceramic artists to use it to create their pottery. The artists formed the New Mexico Wood-Fired Guild and built similar nature-based kilns in the area. By the time Ondo left New Mexico for Maine in 2005, he and the other guild members had created more than 40,000 pieces of pottery.

ONDO MOVED to Maine to join sculptor Andy Mauery, UMaine associate professor of art. The pair first met as work study students in the library at Indiana University of Pennsylvania, and have collaborated for nearly two decades.

In Maine, Ondo rediscovered ice — how it cracks and moves, “how I can see myself and other people in it,” he says.

It was in Maine where Ondo undertook his first granite and inlaid glass sculpture with *Glow*. He learned how to cast glass through a mold-making process, opening the possibilities for incorporating it into his works. And he was determined to expand the “language” of the sculpture using textures, changing colors and temperatures with shifts in light to provide an experience for the visually impaired.

Glass inlays read as braille.

His first sculpture is installed outside Salty Dog Gallery in Southwest Harbor, Maine. *Glow II*, now in progress, will be sited in the lobby of the Iris Network in Portland, Maine, that serves people who are blind or visually impaired.

“Ever since I was in graduate school, I’ve thought about how I, as a visual artist, could reach as many people as possible. The poetry in sculpture limits people who don’t speak the languages using their sight,” he says. “I came up with incorporating braille into the work, but for years didn’t feel like that was enough there for the conversation. But with glass and granite together, different textures and colors heating up from the sun with different temperatures, it becomes a different conversation.”

Ondo also has been a linchpin in UMaine’s growing body of granite sculptures on campus. He and his students collaborated with the Schoodic International Sculpture Symposium when it came to campus in 2012. Ondo coordinated the Littlefield Artist-in-Residence Series, sponsored by UMaine and Littlefield Gallery in Winter Harbor, Maine that placed sculptors on campus for demonstrations and lectures as they completed their works.

Today, nearly a dozen granite sculptures are sited throughout campus, highlighting the art of internationally recognized artists and Ondo’s former students, including Matt Foster. His work, *Relic in Time*, is in the Buchanan Alumni House south garden. Schoodic Bench, a granite work created by the 2012 sculpture class, is near Alumni Hall. ■

A glass and steel work from the *Ice Jacket* series



Call for change

Amy Blackstone, Susan Gardner and Judith Rosenbaum provide perspective about sexual harassment, equitable workplace environments, and #MeToo and #TimesUp

By Beth Staples
Photo illustration by Adam Küykendall

IN OCTOBER, Amy Blackstone was at a conference in Cleveland when her email alert began to ding. Repeatedly. *The New York Times* had published Jodi Kantor's investigative piece in which Ashley Judd and others had accused Hollywood producer Harvey Weinstein of sexual harassment and assault spanning two decades.

Reporters with CNN, FiveThirtyEight, Yahoo and *USA Today* wanted to speak with Blackstone, a University of Maine sociologist. Blackstone — who studies the childfree choice and was presenting at the NotMom Summit — also is an expert on workplace sexual harassment.

For two decades, she has examined multiple facets of workplace sexual harassment, including repercussions ranging from depression to derailed careers.

Blackstone was back in Maine on Oct. 15 when actress Alyssa Milano extended an invitation to her 3 million-plus Twitter followers: "If you've been sexually harassed or assaulted write 'me too' as a reply to this tweet."

The tweet included: Me too.

Suggested by a friend: "If all the women who have been sexually harassed or assaulted wrote 'Me too' as a status, we might give people a sense of the magnitude of the problem."

Blackstone, who is a survivor of sexual violence, says witnessing the torrent of #MeToo posts, some accompanied by personal stories, was empowering.

"I knew I was not alone and that was so powerful," says Blackstone, who subsequently typed the two words on her Facebook timeline.

Facebook statistics indicated that 4.7 million users worldwide had accounted for 12 million posts, comments and reactions about #MeToo in the 24 hours after Milano's tweet.

And within nine days of Milano’s tweet, more than 1.7 million tweets had included #MeToo. And #MeToo had been tweeted at least 1,000 times in 85 countries.

WITH 68 million users in the United States and 328 million worldwide, Twitter presents unprecedented opportunities to create cultural and social change, says Judith Rosenbaum.

The assistant professor of communication and journalism recently analyzed thousands of tweets — including those with the hashtags “PantSuitNation” and “AllLivesMatter” — to inform her book *Constructing Digital Cultures: Tweets, Trends, Race, and Gender*.

“Twitter is seen as *one* of the moving forces behind many of the social movements that have shaped public discourse and altered political agendas, and, in some cases, overthrown governments,” she writes in the book.

Twitter’s stated mission: Give everyone the power to create and share ideas and information instantly, without barriers.

Rosenbaum’s former students at Albany State University, a historically black university in Georgia, sparked the idea for the book. During class discussions, her students, the vast majority of whom were African-American, said they felt their conversations on Twitter gave them a voice, made them feel included and helped shape their opinions.

People take to Twitter when a topic is particularly relevant to them, says Rosenbaum, as well as when they feel marginalized or ignored by the mainstream media.

McGill University sociologist Eran Shor’s study, “A Paper Ceiling,” exposes the media’s inaccessibility to some groups. Eighty-two percent of people cited in U.S. newspapers, online media and magazines from 1983–2009 were men.

In addition, men at the 20 top media outlets produced 62.3 percent of news reports, according to a Women’s Media Center report, *Status of Women in the U.S. Media 2017*.

For women of color, the news is bleaker. Women of color comprise less than 8 percent of staff in print newsrooms, less than 13 percent of personnel at local TV outlets and just over 6 percent of employees at local radio stations, according to the center’s *Status of Women of Color in the U.S. News Media 2018*.

Twitter, though, is said to be more inclusive and participatory, says Rosenbaum. Unlike mainstream media, Twitter provides anyone who wishes the opportunity to contribute to dialogues on topics of their choosing.

“The participation of such a varied group of people means that Twitter conversations produce a rich collection of ideas and beliefs that are not necessarily represented in the mainstream culture,” she writes in *Constructing Digital Cultures*.

Marginalized groups can galvanize on Twitter, says Rosenbaum. The 12-year-old platform magnifies groups’ voices, which can influence public opinion and ultimately drive the media agenda.

One of Twitter’s stated values: “We believe in free expression and think every voice has the power to impact the world.”

SEXUAL HARASSMENT includes unwelcome sexual advances, requests for sexual favors or other verbal or physical conduct of a sexual nature that alters conditions of a person’s employment and creates an abusive working environment.

It includes touching and sexist remarks directed toward employees — with the implication that employment or a promotion depends on their acquiescence.

Lin Farley, a former journalist and Cornell University lecturer, coined the term “sexual harassment” in the mid-1970s after every female student in her women and work

course indicated they had either left a job or been fired for rejecting a boss’s advances.

Farley was quoted in a 1975 *New York Times* article, saying sexual harassment “is literally epidemic.”

In 1986, the U.S. Supreme Court ruled that sexual harassment is a form of sex discrimination that violates Title VII of the Civil Rights Act of 1964 — a federal law prohibiting employment discrimination on the basis of sex, race, color, national origin and religion.

Twenty-seven years later, in 2013, a HuffPost/YouGov poll reported 32 percent of women said they had experienced workplace sexual harassment; 70 percent of those women said they didn’t report it due to fear of retaliation.

Because so much sexual harassment goes unreported, Blackstone says as many as 70 percent of women and 45 percent of men may have experienced workplace sexual harassment.

A FREQUENT, yet dated characterization of workplace sexual harassment is of a male boss chasing a female secretary around a desk. But the realities of sexual harassment are much more varied, says Blackstone.

Women in positions of authority may be more frequent targets than those in subordinate positions, she says. Female supervisors, relative to nonsupervisors, are more likely to report harassing behaviors and to define their experiences as sexual harassment, say Blackstone and research colleagues Heather McLaughlin and Christopher Uggen.

McLaughlin, a UMaine alumna, is now a professor of sociology at Oklahoma State University. Uggen, who is Blackstone’s mentor, is the Regents Professor and Distinguished McKnight Professor of Sociology and Law at the University of Minnesota.

Their study, “Sexual Harassment, Workplace Authority, and the Paradox of Power,” indicated female supervisors reported a rate of harassment 73 percent greater than that

of nonsupervisors. Male supervisors, though, were no more or less likely to experience harassment than other male workers.

Sexual harassment, says Blackstone, can act as an equalizer against women in power, including female supervisors who have authority over men and therefore challenge men’s presumptive superiority.

Harassment can be motivated more by control than sexual desire and serves to keep women who don’t conform to perceived gender roles — particularly in male-dominated work settings — in line.

Cultural images of harassers and targets haven’t kept up with changing workplace realities, says Blackstone. And moving beyond dated stereotypes is important so policies and training can more accurately reflect the diversity of workplace harassment experiences.

In addition, effective grievance procedures must enable those who are targeted to come forward without undermining their authority, she says. The team’s findings and suggestions were published in 2012 in *American Sociological Review*.

THAT SAME study revealed that men who diverge even slightly from rigid gender expectations are subject to more taunts and menacing responses than those who conform to societal gender expectations.

Blackstone and Uggen reported similar findings in a study, “Sexual Harassment as a Gendered Expression of Power,” published in 2004 in *American Sociological Review*.

Results indicated women are the most frequent targets of sexual harassment, including unwanted touching and invasion of personal space. Findings also suggested that financially vulnerable men are likely to experience harassing behaviors.

Me. too. Always dreamed of a huge day for all of us survivors to be together. We are not alone, we are strong, powerful people. #MeToo

The researchers also discovered that men who seek more egalitarian gender relationships are most likely to identify behaviors as sexual harassment.

“It’s about the privilege of being male,” says Blackstone. “Those who don’t fall in line with a very narrow, heteronormative image of what it means to be a man — both in terms of gender expression and sexual orientation — are more likely to be targets.”

Sexual harassment, she says, serves to police what we perceive to be “appropriate ways of doing gender” in the workplace and to penalize nonconformity.

PEOPLE’S UNDERSTANDING and awareness of sexual harassment evolve due to maturation, experience and changing historical and workplace contexts, says Blackstone.

She examined “Age, Experience, and Workers’ Perceptions of Sexual Harassment” with Uggen and former UMaine sociology student Jason Houle, now an assistant professor at Dartmouth. The findings were published in 2014 in *Sociological Spectrum*.

The team examined data from interviews with 33 participants in Minnesota’s Youth Development Study that tracked annual responses of 1,010 people who were 14 or 15 years old in 1988 and 26 or 27 in 2000. In 2002, the team then interviewed 14 men and 19 women from that survey who in 2000 indicated they had experienced sexual harassment at work.

Three themes emerged.

Respondents indicated some interactions they thought of as acceptable for adolescent workers may be less so for

more professional adult workplaces. While flirting and other sexually charged behaviors may be “normal” for some adolescent employees for whom socializing with co-workers was an important aspect of the work experience, they said the same behaviors felt less acceptable when considering adult employees. Thus, they labeled some behaviors differently depending on the life stage of those involved.

And they labeled other behaviors — even those they had once deemed acceptable — as “always inappropriate.” One behavior involved interactions between young employees and older co-workers, employers or customers.

An example included a teenage baby sitter who was subjected to unwanted touching by the father of children she baby-sat. Another was a high school-age waitress subject to an older customer’s sexually explicit remarks.

Participants — both targets and harassers — also later redefined experiences as harassment when the interaction was between multiple harassers and one target. Some participants said their outlook had changed because of historical context, including cases that garnered national attention.

One case was the Clarence Thomas Supreme Court confirmation hearings in 1991 in which law professor Anita Hill testified that Thomas had, despite her objections, talked to her about pornography, bestiality, rape scenes and his own sexual prowess.

“I was surprised by the number, without any prompting from me, who noted the impact the Thomas hearing had

#MeToo We were colleagues. He’s a doctor, I’m a nurse. Guess who had no choice other than to quit?

The collective voice

SUSAN GARDNER describes herself as a “first-generation everything,” from graduating high school in four years to enrolling in college. It’s the lens through which the youngest of six views higher education.

When Gardner — whose single mom worked three jobs — started college in St. Paul, Minnesota, she sometimes felt out of place navigating the world of post-secondary education.

Now, as director of the University of Maine Rising Tide Center, Gardner strives to create equitable, supportive environments for all to learn and work on campus.

The center, guided by the premise that “a rising tide lifts all boats,” launched in 2010 with a \$3.3 million grant from the National Science Foundation ADVANCE Institutional Transformation program. Its

purpose was to eliminate organizational barriers that impede full recruitment and participation of women faculty, and thereby increase their representation, satisfaction and advancement in academic science and engineering.

UMaine earned the funding on the first try, says Gardner, in part because it was honest about its imbalances and issues. Rising Tide initiatives have connected researchers in higher education, psychology, sociology, business and women’s studies “to create a multifaceted understanding of contexts and cultures that facilitate or impede the recruitment, retention and advancement of women faculty at UMaine.”

Involving multiple campus constituencies in decision-making is imperative to break down hierarchical

power imbalances and structures, she says.

The university has helped institute policies, including “stopping the tenure clock” during the probationary period for tenure-track faculty who are experiencing childbirth, adoption and other exceptional life circumstances.

UMaine has met or exceeded several targets for recruitment, retention and advancement of women faculty in STEM fields. For instance, in 2010–11, there were 21 female professors in STEM, 22 female associate professors and 14 female assistant professors. In 2016–17, there were 24 female professors in STEM, 27 female associate professors and 22 female assistant professors.

In 2015, surveyed female STEM faculty also reported increased job satisfaction compared to 2011.

While the NSF funding has ended, the center continues to evolve with financial support from the university and oversight by Jeffrey Hecker, executive vice president for academic affairs and provost. It offers faculty professional development opportunities, encourages use of family-friendly policies, conducts workshops about inclusive practices, and supports a targeted mentoring program.

In 2011, for instance, nearly 26 percent of UMaine’s assistant professors noted they didn’t receive mentoring from senior colleagues about the tenure process. That percentage was reduced to 17 percent in 2015.

The center also provides best-practices training for administrators, and search and peer committee members.

Gardner, who earned a doctorate in

higher education, explores the intersectionality of individuals in organizational environments at academic institutions. Her research areas have included partner accommodations; mentoring millennial faculty; and the role of academic disciplines in doctoral student success.

To stop sexual harassment, Gardner says hierarchies and accompanying power differentials in higher education need to be dismantled.

One power differential relationship is between advisers and the graduate students dependent on them for sponsorship and recommendations. Gardner experienced the dynamic as a doctoral student.

Her adviser — a popular professor, mentor and role model — leered, touched

her and made sexually inappropriate comments. His harassing behavior continued after she confronted him, so Gardner got a new adviser and filed a complaint with campus officials.

She also wrote an autoethnography that wove her personal experiences with an analysis of cultural constructs. “Coming Out of the Sexual Harassment Closet: One Woman’s Story of Politics and Change” was published in 2009 in the *National Women’s Studies Association Journal*.

A source of inspiration: Kathryn Mangus and Janette Kenner Muir, George Mason University educators who wrote in 1994: “In essence, we are learning to tell stories, and as each story is told, it is added to the collective voice which, in turn, will ultimately have an impact on public discourse and policy actions.”

on their awareness of harassment as an issue, and the impact it had in terms of their reflections on their own experiences,” Blackstone told CNN Money.

While all adolescents may be vulnerable to workplace harassment because of their age and lack of power, Blackstone says some females understood they were at particular risk because of their gender.

One participant, Angela, recalled that her early workplace experience was “a watershed where I really understood that being a woman in a workplace is really significantly different sometimes than being a man.”

Effectiveness of sexual harassment training, particularly on younger workers, could be examined, says Blackstone, as many adolescents considered training to be a joke. Training and policies might be more effective if they were tailored to workers at particular life stages, she says.

WORKPLACE SEXUAL harassment can take a heavy toll. Women and men who experience more frequent workplace sexual harassment have significantly higher levels of depressed

mood than those who aren’t harassed, even after controlling for prior harassment and depressive symptoms, says Blackstone.

She and a research team found that sexual harassment early in a person’s career can have long-term effects, includ-

ing depressive symptoms that last as long as a decade.

Harassed workers feel annoyed, angry and conflicted, says Blackstone, which can lead to self-blame and self-doubt.

In addition to negatively impacting mental health, sexual harassment can have long-term economic consequences, say McLaughlin, Blackstone and a team of researchers.

In a longitudinal study that incorporated data from

surveys and interviews, 80 percent of women who had reported either unwanted touching or other forms of harassment had changed jobs within two years. Among women who weren’t harassed, 54 percent had changed jobs during the same time frame.

Thus, women who were sexually harassed were 6.5 times more likely than those who were not to change jobs. This was true even when taking into account childbirth, which also can result in job changes.

The effect of sexual harassment is comparable to strain caused by other negative life events, such as serious injury, illness or being in jail.

Blackstone says women who experienced unwanted touching or offensive sexual jokes in 2003 reported significant greater financial stress in 2005.

In interviews with a subset of survey respondents, some women indicated they had left their job to avoid harassers, while others left because of how employers had responded to reports of harassment.

While some women can’t afford to leave a job, one interviewee said: “I’ll eat rice and live in the dark if I have to.”

Sexual harassment can knock women off course during the formative early years of their careers, says Blackstone. Some women switched to less lucrative careers in fields where they thought sexual harassment and other sexist or discriminatory practices would be less likely to occur.

For women who stayed in their job, many faced toxic environments. And women who challenged the harassing environments often were labeled as troublemakers and experienced career stagnation, says Blackstone.

“What was surprising was just how much harassment can derail a person’s entire career,” she told *Elle* magazine.

TIME MAGAZINE named the “Silence breakers” — including Judd and Milano — its 2017 People of the Year for being “voices that launched a movement.”

While women have talked about and reported sexual harassment for decades, people in power — including those in the media — often have not listened, believed or responded. And in prior decades, women did not have Twitter.

These “silence breakers” do. And the platform has amplified their resonating messages and calls for change in real time, in a politically charged climate.

It’s important to remember that a decade before #MeToo, there was “Me too.” Tarana Burke, program director of Girls for Gender Equity in New York, coined the phrase to help young women of color who were survivors of sexual assault. While known locally, the phrase didn’t spread virally. But a decade ago, Twitter, or rather Twtrr, was in its infancy. Then, people’s “chirps” often initially informed friends about mundane aspects of their day.

By December 2017, people were sending 6,000 tweets a second — 500 million each day — many about politics, sexism and racism.

Stories on Twitter provide a rich tapestry of meanings that reflect every imaginable perspective on race and gender in American culture, says Rosenbaum. And people use the platform “to share, lament, celebrate, reject, and mock the mainstream understandings of race and gender.”

In prior decades, Rosenbaum says tackling social injustice and being part of a social movement meant sitting-in, marching or participating in consciousness-raising groups. But today, a 280-character tweet with a predesignated hashtag has the potential to start a movement.

“The logistics of aggregation have changed,” Rosenbaum says. “Now it takes one person, one idea, at the right time.”

The platform has become the thermometer for the country’s mood, says Rosenbaum, and it plays an inexorable role in writing and recording history.

Since the #MeToo movement started in late 2017, high-profile men in power have been fired, suspended or have resigned — including mogul producer Weinstein, NBC

Today host Matt Lauer, *New York Times* reporter Glenn Thrush and U.S. Sen. Al Franken.

#MeToo gave rise to #TimesUp. And #TimesUp inspired the TIME’S UP Legal Defense Fund. Formed by about 300 women in Hollywood, the fund seeks to address “systemic inequality and injustice in the workplace that have kept underrepresented groups from reaching their full potential” and seeks to shift “society’s perception and treatment of women.”

As of March 8, the campaign that originated just three months earlier had raised more than \$20 million and helped 1,500 women file harassment suits against their employers for abuse and assault.

The fund also supports legislation to discipline companies that tolerate pervasive harassment, as well as to dissuade using nondisclosure agreements to silence survivors.

“From movie sets to farm fields to boardrooms alike, we envision nationwide leadership that reflects the world we live in,” states the TIME’S UP Legal Fund letter.

Blackstone, whose parents worked to improve lives of migrant farmworkers, hopes the #TimesUp movement results in positive cultural and workplace changes.

“We know that male-dominated environments have been found to foster higher harassment rates, so hiring and promoting more women is one strategy employers can use to reduce harassment,” says Blackstone.

Twitter, says Rosenbaum, will continue to provide space for millions of people to respond to, discuss and make sense of events — including sexual harassment — in real time. While Twitter, like the rest of society, is not free from misogyny and mansplaining, dialogue on the platform — even when uncivil and combative — can ultimately be constructive and serve to strengthen democracy, she says. ■

It’s taken me months to muster up the courage to admit this to myself and to say this, but ...
#MeToo

#TimesUp The same attitude that has allowed a gender wage gap and under-employment epidemic in Hollywood has paved the way for rampant sexual harassment sadly.



The brown-tail moth was introduced into Northeastern North America from Europe in the late 1800s and rapidly spread through New England. At its height, before its populations collapsed in the 1920s and '30s, the moth's range reached from Long Island to Nova Scotia. Beginning in the 1990s, small outbreaks of the insect began appearing at mainland sites in Maine's midcoast region. Today, almost all of the North American brown-tail moth population is found in Maine.

Aliens and body snatchers

To stem the spread of invasive moths, UMaine entomologists turn to the species' natural enemies

By Walter Beckwith / Photographs by Holland Haverkamp

HIGH IN the trees, as soon as the first leaf buds begin to open in the early spring, tiny brown-tail moth caterpillars emerge from their winter nests. The larvae feed voraciously on the young leaves, with a particular appetite for those from hardwood species, like apple and oak.

A heavily infested tree can contain more than 1,000 nests, each home to upward of 400 hungry caterpillars.

While large infestations can cause serious harm — or even mortality — to host trees, it's the small toxic, barbed hairs on a caterpillar's body that are of the utmost concern for public health, says Eleanor Groden, a professor of entomology at the University of Maine.

The tiny hairs can induce painful poison ivy-like rashes and serious respiratory distress in those who come in contact with them. The irritating urticating hairs often detach from the growing, molting caterpillars and become airborne, settling on line-drying clothing, backyard picnic tables, patio furniture and the ground beneath infested trees. The hairs can retain their toxicity for as long as three years.

Groden's research focuses on understanding the brown-tail moth's natural enemies — the various parasitoids, fungi and viruses that target the caterpillars — that may be used to help curb the rapidly expanding moth populations affecting Maine's communities.

UMaine research is part of a larger initiative, working in collaboration with the Maine Forest Service, as well as a growing network of concerned citizen groups that monitor and identify new infestations, and develop pest management strategies in areas experiencing an outbreak.

THE BROWN-TAIL moth, *Euproctis chrysorrhoea*, is an invasive species introduced into Northeastern North America from Europe in the late 1800s. At its height, before its populations collapsed in the 1920s and '30s, the moth's range reached from Long Island to Nova Scotia.

In subsequent decades, moth populations were largely isolated on the tip of Cape Cod and a few islands in Casco Bay. But beginning in the 1990s, small outbreaks of the insects began appearing on the mainland in midcoast Maine.



UMaine entomologist Eleanor Groden and her research team are working in collaboration with the Maine Forest Service and communities in the state to identify the natural enemies of brown-tail moths and when they have the greatest impact.

In the past several years, the population and range of the brown-tail have grown significantly. An outbreak in 2003 resulted in about 10,700 acres of defoliation, but then populations dropped until 2015. In fall 2015, populations started to shoot up, and about 12,000 acres were defoliated. By the following spring, this had increased to 24,000 acres and by fall 2016, 64,000 acres, Groden says.

Currently, almost all of the North American brown-tail moth population lives in Maine.

“We’re seeing an expansion of this insect that we haven’t seen in over 100 years,” Groden says.

The epicenter of the brown-tail epidemic has been focused largely around Merrymeeting Bay in the central and midcoast regions, says Groden. But new infestations

are being identified statewide, and adult moths have been captured from southern Maine to Down East, as well as inland in Millinocket.

“I have a picture of a pupating brown-tail moth on a child’s stroller, so they get moved around inadvertently by people traveling through the infested areas,” says Groden. “It’s very possible that the infestations we have now in Burnham and Eddington may have resulted in pupae being moved into the area rather than moth flight.”

Adult brown-tail moths have pure white wings and bodies with a patch of contrasting dark brown fur at the rear of their abdomens — a defining feature which gives them their name. In late summer, a single female moth can lay as many as 400 eggs on the undersides of leaves.

Without preventative measures, outbreaks can spread quickly, and many people who live in areas not historically affected by the insect may be caught off guard, not knowing how to identify signs of an outbreak or how to take precautions against them.

According to Groden, the best time to spot a brown-tail infestation is in winter when their nests are most visible. In the fall, newly hatched caterpillars build tightly formed nests on the outer tips of branches and spend the winter inside, protected from the elements.

On particularly sunny winter days, the gossamer silk of the nests almost seems to glow high in the trees.

In the spring, the caterpillars emerge and begin to grow. Brown-tail caterpillars are easily identifiable — they are fuzzy and dark brown with white dashes along their sides. Two distinctive bright red dots punctuate the center of their back end. With each successive molt, their hairs become more and more toxic, reaching their highest potency in June, just before they build their pupal cocoons.

One of the most effective management strategies involves removing and destroying the web-like nests from infested trees during the winter before the larvae emerge.

Active community and state programs tasked with eliminating the nests on school grounds, and in public parks and people’s yards have been successful in slowing the population’s expansion in certain areas. In many other locations, the nests are situated high in trees and far from reach.

Another way to slow the epidemic is to harness the various parasitoids and pathogens that plague the insect.

“(Our research) is tasked with both looking at the natural enemies impacting the brown-tail moth and trying to understand under what conditions these natural enemies are having the greatest impact on the population,” Groden says.

ENTOMOPHAGA AULICAE, a fungus that infects the brown-tail, is one of these natural adversaries. The disease it causes in the caterpillars can decimate regional populations. However, the success of a disease outbreak, or epizootic, is largely dependant on uncontrollable seasonal and environmental variables, including temperature or amount of precipitation during the phases of larval development.

The study of this complex relationship in organisms is



Hillary’s wasp

SCIENTIFIC DISCOVERIES can happen when you least expect them, and nobody knows that better than Brunswick, Maine native Hillary Morin Peterson.

In summer 2014, she was a University of Maine undergraduate doing fieldwork for her Honors College thesis while assisting graduate student researcher Kaitlyn O’Donnell in her investigation of the invasive winter moth. Their research home was in the laboratory of entomology professor Eleanor Groden.

Peterson also was working closely with Maine Forest Service entomologist Charlene Donahue.

Peterson’s samples of native insects that prey on the invasive moth included a stingless wasp the size of a grain of rice.

A year later, after Peterson graduated from UMaine, she headed to an internship at the Smithsonian Institution National Museum of Natural History, supported by the Maine Forest Service. There, it was discovered that the wasp she found living in the oak trees of Harpswell, Maine was a specimen of a new species. Peterson and her Smithsonian colleagues validated the new species, characterized by translucent opal wings, large crimson eyes and chiton chrome-finished with the same iridescent green-brown color of oil on water.

And Peterson got to name it: *Ormocerus dirigoius*, after her home state’s motto — Dirigo.

It turns out that Peterson also found two specimens of the closely related species, *Ormocerus latus*, which were previously unknown to exist in North America. Until Peterson’s analysis, the range of *O. latus* was only thought to be in Eurasia.

Now a Ph.D. student in the Department of Entomology at Penn State University, Peterson continues to seek new ways to weaponize native fauna to help defend against the seemingly never ending tide of insect invaders.

She is broadening her research in the deadly lives of parasitoid wasps by looking into how they interact with the brown marmorated stink bug, yet another invasive insect showing up in Maine. This one is from Asia and has the potential to cause agricultural damage. She is hoping to discover which of the region’s native parasitoid wasps that lay their eggs inside native stink bugs also are targeting the newly arrived invasive stink bug.

A hairy situation

THROUGHOUT MUCH of the late spring and summer, brown-tail moth caterpillars shed barbed toxic hairs that can cause a painful rash similar to poison ivy. Since detached hairs retain their toxicity for years, reactions due to loose hairs in the environment are possible at other times throughout the year. Symptoms of the “brown-tail moth itch” range from bumpy red patches of itchy, blistered skin to a severe respiratory reaction, particularly in people with asthma. Symptoms often appear within hours of exposure. The following precautions may help to reduce the risk of exposure for people living in an area infected by the brown-tail moth.

- Keep car and house windows closed.
- Wear a respirator and protective eyewear, and cover exposed skin.
- Do yard work on damp days or wet the areas you’re working in.
- Avoid drying laundry outdoors.
- If exposed to hairs, immediately wash clothes and take a cool shower.
- Remove nests from infested trees.
- Consult your physician if you develop a severe reaction.

Information provided the Maine Department of Agriculture, Conservation and Forestry, and the Maine Forest Service Division of Forest Health and Monitoring.

called phenology. Small variations in seasonal timing and weather — if spring is early or late, warm and dry, or cold and wet — can greatly influence when development phases occur, including when caterpillars leave their nests to feed, and when they begin to pupate or lay their eggs.

For example, during a cold and rainy period in May 2017, the fungus took hold in some of the state’s brown-tail population. Wet conditions allowed the naturally occurring fungus to proliferate, infecting the feeding young caterpillars that, due to the cold snap, had temporarily retreated to the protection of their winter nests.

In the tightly packed webs, the disease ran rampant, resulting in a mass die-off. However, the impact was highly localized. Despite the collapse of brown-tail populations in some areas, other areas were not similarly affected.

Had the spring been drier, the fungus may never have spread. Alternatively, had the temperature been higher, the population of young caterpillars may have been too dispersed for the disease to spread quickly, limiting the mortality rate.

Had the fungus taken hold later that spring, or even in early summer, the infected caterpillars would have been further along in their larval development with toxic hairs at their most potent.

A mass die-off during this stage could result in thousands of dead brown-tail caterpillars raining from the high trees onto yards, parks, playgrounds, cars and houses — losing their urticating hairs to the breeze — and putting people in the area at risk for years.

This underscores the delicate balance between the slight year-to-year variations in seasonal weather, and the timing of key biological events of the brown-tail and its enemies’ life cycles. It’s also why manually distributing the fungus and other pathogens, even pesticides, as a means of pest management presents a tremendous challenge.

Understanding how these complex phenological interactions either stack the deck for or against the brown-tail is critical in effectively developing and using these methods of population control.

IN GRODEN’S lab, glass jars and stacks of petri dishes containing brown-tail caterpillars from throughout the state are organized beneath a ventilation hood designed to limit

harmful exposure to toxic fumes, vapors or, in this case, airborne caterpillar hairs.

Cloaked in a long white lab coat with rubber gloves taped over the cuffs, graduate student Karla Boyd inspects caterpillars for signs they have fallen prey to parasitoid wasps and flies.

Some native species of wasps and flies inject their eggs inside live brown-tail moth caterpillars. When they hatch, the larvae eat the host caterpillar from the inside out before using the carcass to pupate.

Boyd’s graduate research largely is focused on trying to find ways to exploit this natural adaptation to help stem the expanding moth population. It’s also important that the natural means of control are the least detrimental to other species, Boyd says.

“There is still so much we don’t know so much about (the brown-tail) even though it’s popping up in everyone’s backyard,” says Boyd.

In Eleanor Groden’s entomology lab, graduate student Karla Boyd inspects brown-tail caterpillars for signs they have fallen prey to their natural predators — parasitoid wasps and flies. Boyd’s research focuses on finding ways to use natural adaptation to help stem the tide of the expanding moth population. As part of her brown-tail moth research, she will collaborate with Smithsonian Institution scientists to better understand the complex ecology of the natural body snatchers.



Identifying invaders

AT LEAST five invasive moth species call Maine home. The leek moth and the ermine moth (not pictured) were first identified in 2017. The males of the species, pictured here (not at actual size) are most likely encountered by humans.

Illustrations by Annie McKelway, an entomology technician with the Maine Department of Agriculture, Conservation and Forestry

Brown-tail moth
1.4–1.7-inch wingspan



Gypsy moth
1.5-inch wingspan



Winter moth
up to 1-inch wingspan



Leek moth
.5-inch wingspan



In the course of her research, she has become painfully aware of the rashes the caterpillars cause. Despite the protective measures in the lab and the full-body Tyvek coveralls the researchers wear in the field, the occasional rash is par for the course. And, according to Boyd’s firsthand experience, with each successive exposure to the toxin, the more severe the reactions can become.

The painful consequences of interacting with the brown-tail, as well as its highly localized population range, have historically made the study of the species difficult. As a result, very little concerted research on the insect has been done; the brown-tail moth and effective pest management strategies remain enigmatic.

“One of the things about this insect that makes it challenging to develop a research program is that right now, it’s not impacting anyone outside of the state of Maine. That makes it more challenging to get the resources to work on this project,” says Groden. “But because members of the community are willing and motivated to help in our project, it has helped us be able to address some of the issues with our research.”

CHARLENE DONAHUE, a forest entomologist with the Maine Forest Service Insect and Disease Laboratory, works closely with Groden. Her office supports the UMaine research by sharing samples and providing access to locations and site monitoring, as well as occasional funding.

She also organizes outreach and educational events, and helps to implement new management strategies bringing new findings straight to the affected communities.

“The Maine Forest Service is so happy to have (Groden) and her students perform the research on forest pests that we simply cannot do; we don’t have the people or the time,” says Donahue, who received her bachelor’s and master’s degrees from UMaine in 1975 and 1982, respectively.

“It’s a huge benefit to the state of Maine.”

Over the winter, the Maine Forest Service conducted its annual survey of webs to gauge the size and extent of the overwintering brown-tail population.

Though the numbers are forecast to be lower than 2017 in some areas in the center of the outbreak region, 2018 winter web surveys indicate the outbreak region is expanding.

Many communities will continue to be affected by the brown-tail menace, and new areas will begin to experience the effects of the irritating insect for the first time.

The brown-tail isn’t the only invasive moth Groden, her students and the Maine Forest Service are keeping tabs on. According on Donahue, Maine is now home to at least four other invasive moth species: gypsy, winter, ermine and leek. The ermine and leek moths were first identified in 2017.

The winter moth began spreading into the southern part of the state in 2011. While winter moth caterpillars forgo the toxic hair of their cousins, infestations of the larvae can wreak havoc on the state’s leafy hardwood trees. They will even eat blueberry bushes clean of their leaves. And like the brown-tail, the winter moth has its own share of parasitoids.

ACCORDING TO the Maine Forest Service, areas in Bowdoinham and Topsham were particularly hard hit by the brown-tail in 2016. The issue prompted local residents to form the Bowdoinham Browntail Moth Task Force. Its mission is to educate homeowners and community members about the brown-tail, as well as effective ways to mitigate the population. The task force works closely with members of the Maine Forest Service and UMaine researchers.

Groden, Donahue and Kate Cutko, the library director of the Bowdoinham Public Library, are task force members.

“When we learned that people could clip the winter nests out of the low trees in their yard, the library went ahead and purchased a 16-foot pole pruner that could be borrowed by patrons,” Cutko says.

The task force also produced a short video about clipping the winter nests, and it hosts regional informational meetings at the library. And it created Midcoast Maine Browntail Moth Support, a social media group that disseminates information statewide about the insect.

“To be able to have (Groden) and (Donahue) on speed dial is a gift,” says Cutko. (Groden) is one of the few people studying this problem, and her research is vital to giving people hope that we will see the cycle; we will get to the other side of our daily life in Bowdoinham.”

Groden says that many residents are supporting and



Kate Cutko directs the Bowdoinham Public Library, which provides information and equipment to combat brown-tail moth infestations in the hard-hit community.

facilitating her research — from sending her pictures of brown-tail activity to providing her access to infested trees.

“The interest and willingness of landowners to support this project is what has enabled us to conduct our sampling program and help us identify areas we can monitor,” says Groden.

“Like all good public libraries, we spread information,” says Cutko. “And when we’re lucky enough to have University of Maine scientists feeding us the latest information, it’s a great collaboration.” ■



Sea monsters

**Coastal storms research helps Maine
anticipate and prepare for extreme weather**

By Catherine Schmitt and Aliya Uteuova

Surf crashes along the shoreline in Camp Ellis, Maine. Winter coastal storms and other strong weather events that occur year-round in Maine are increasing in frequency and intensity. That's why meteorologist John Cannon at the National Weather Service in Gray, Maine is working with University of Maine researchers to improve storm models and forecasts. Photo by Jill Brady/Portland Press Herald/Getty Images



In October 2012, Superstorm Sandy sent storm surges over seawalls, like this one in Kennebunk. For most of Maine, the greatest damage often occurs when storms coincide with a high astronomical tide and are slow moving, thus generating large, battering waves. When winter storm wind strength increases, then both surge and waves can be higher, with a greater potential for impact on coastal property. AP Photo/Robert F. Bukaty

ON JAN. 4, 2018, a powerful storm pummeled Maine, bringing blizzard conditions and strong winds out of the Northeast. On the coast, the peak of the storm arrived at the same time as the highest tide of the year due to the position of the Earth and moon.

Waves surged over breakwaters and seawalls and into coastal towns, carrying seaweed and blocks of ice into yards and closing roadways. The path of damage followed Route 1 from York and Scarborough to Lincolnville and Lubec, where currents dislodged the historic McCurdy’s Smokehouse brining shed and sent it floating toward Canada.

Seawater submerged landmarks — Chebeague Island pier, Boothbay Harbor footbridge, Rockland Breakwater and Deer Isle causeway. Downtown waterfronts of Portland, Kennebunkport, Damariscotta and Belfast were inundated.

The winds caused a storm surge over 2 feet, pushing the storm tide to 13.8 feet at the Portland tide gauge, the third-highest water level on record and the worst tidal flooding since the Blizzard of 1978. The tide

remained above flood stage for nearly three hours, causing millions of dollars in damage statewide.

“This storm produced the highest water levels along the coast in decades,” says John Cannon, a meteorologist with the National Weather Service (NWS) in Gray.

It was one in a series of major nor’easters in Maine in recent years.

These winter coastal storms, also known as “extra-tropical cyclones,” move up the Eastern Seaboard and then, after crossing Long Island, Cape Cod and the shallow banks of the Gulf of Maine, track east toward Nova Scotia as winds spiral back from the Northeast. Strong storms also occur occasionally at other times of the year: hurricanes in summer and hybrid storms in late fall, such as Superstorm Sandy and the Perfect Storm of 1991, when the water is warm enough to support a hurricane, but the jet stream has moved to its winter position that generates winds out of the Northeast.

For most of Maine, the greatest damage comes when storms move slowly, and thus have time to gen-

erate large, battering waves. Especially when a storm coincides with a high astronomical tide, according to Cannon, who, since 2012, has worked with University of Maine researchers to improve storm models and forecasts.

Wave data for the models come from a network of buoys in the Gulf of Maine, part of the Northeastern Regional Association of Coastal Ocean Observing Systems. The buoys are maintained by Neal Pettigrew, professor in the UMaine School of Marine Sciences.

“Wave information is essential for characterizing storms, probably more so than actual wind direction or barometric pressure,” Cannon says. “The buoy network shows differences in open ocean waves along the coast that are a result of storm tracks. Storm tracks are part of our forecast, designed to give enough lead time to warn coastal communities.”

While the January storm did not inflict a lot of wave damage, it did illustrate more areas that are — and will continue to be — vulnerable to flooding.

As the “saltiest guy” in the NWS office, Cannon looks at storms from a coastal perspective. Waves are his passion. His forecasts focus on the narrow zone where ocean meets land and where storm winds pile up water, forcing it farther inland — a phenomenon known as storm surge. Strong winds can whip up waves on top of the surge, making it that much worse.

Forecast models used by the National Weather Service today are nimble, able to reveal and predict conditions within the short time window required in the fast-paced world of changing weather. In the case of the Jan. 4 storm, computer models sent conflicting signals, showing a likelihood for “moderate” flooding well in advance of the storm, but underestimating the magnitude of the event.

“The storm tide built up faster than predicted despite a northerly wind direction, which normally is less problematic as the winds were not onshore in this case. Meteorologists plan on studying this event to determine why it was so significant,” says Cannon.

“Every storm provides new information about the coastal processes involving the wind, wave and



Southern Maine Volunteer Beach Profile Monitoring Program members, from left, Bruce Bjork, Judy Spiller and John Lillibridge, working on Wells Beach in December 2017. Photo by Dave Cleaveland, Maine Imaging

Measuring state of Maine beaches

BEFORE 1999, state and federal officials had no way to track the impact of storms on individual beaches. There are 200 miles of sandy beach within Maine’s nearly 3,500-mile coastline — too much for one or two people to cover adequately.

That’s where the Southern Maine Volunteer Beach Profile Monitoring Program comes in. Trained citizens measure the shape or “profile” of beaches from York to Scarborough every month, providing an indicator of seasonal, annual, and long-term erosion and other changes.

Kristen Grant, an associate with Maine Sea Grant and University of Maine Cooperative Extension, worked with Sea Grant-funded researchers to expand the program. Today, the 121 volunteers include seasonal and year-round coastal property owners, and students, like those in the sixth-grade class at Loranger Middle School in Old Orchard Beach.

Profilers measure a cross-section of the beach from the top of a dune to the low waterline. They enter the measurements into an online database where they can be viewed, graphed and downloaded by others, including Stephen Dickson with the Maine Geological Survey.

Dickson has analyzed the beach profile data and shown how beaches change over time and recover after storms. Profiles in Wells and Ogunquit show beaches there are relatively stable, with some sand buildup in recent years. However, Dickson cautions that over the long term, Maine beaches seem to be losing sand.

“The 2007 (Patriots Day) storm was a great example of erosion,” he says. “There were tree stumps exposed on Higgins and Goochs beaches, but we were able to show that the beach came back over a couple of years.”

A low point for Maine beaches came in 2010, when regional ocean and atmospheric conditions led to an anomaly of sea level conditions nearly a foot higher than some winter storm seasons.

“Without the profiling data, we would not have known that higher sea levels would have such an instantaneous effect on beaches. We couldn’t have predicted such a fast beach response,” he says.

State regulatory authorities and coastal towns use the beach profiling data to inform decisions about managing beaches and siting development.



Meteorologist John Cannon at the National Weather Service in Gray, Maine works with UMaine researchers to improve storm models and forecasts. Every storm provides new information about the coastal processes involving wind, wave and storm surge relationships along Maine’s unique and complex shoreline, he says. Photo by Holland Haverkamp

storm surge relationships along Maine’s unique and complex shoreline.”

IN 2014, with funding from Maine Sea Grant, Cannon began collaborating with university researchers who have access to powerful computer models and the latest ocean data.

“It is a really big project, because we are including flooding and erosion, landscape features and future projections,” says Dongmei Xie, who conducted the Ph.D. research under Jean MacRae, associate professor of civil and environmental engineering, and former UMaine researcher Qingping Zou.

In the project’s first phase, Xie combined existing open-source models of waves, tides, surge and ocean circulation, and zoomed in on the Saco Bay region, which is the largest stretch of beach in Maine and has perennial issues with flooding and erosion.

Then, she added high-resolution, large-scale maps of the ocean floor (bathymetry) and coastal zone, both of which influence the force and direction of waves and currents. The bathymetry allows for modeling

water depth in addition to the lateral extent of flooding — not just how far inland, but how deep flooding will be. The dynamic model calculates the path of water through the bay, around islands and over land.

With more accurate representations of the coastline, Xie validated the newly adjusted model using data from the April 2007 nor’easter known as the Patriots Day Storm. That storm generated big waves that were recorded by wave buoys and a surge recorded by tide gauges. The slower a system moves, the more time there is for damaging waves to develop. As winds increase, wave energy increases dramatically.

The Patriots Day Storm lasted through multiple high tides. A surge of nearly 3 feet flooded Saco Bay, inundating not only flood-prone areas like Camp Ellis and Scarborough River, but also Goosefare Brook and most of the Ocean Park neighborhood.

The “clouds-to-coast” approach, which integrates multiple models of weather, tides, currents, wave movement and land interaction processes specific to local areas, makes Xie’s work unique from existing models that take more of a “bathtub” approach and

predict flooding over land as static, or of equal height across different areas.

After testing the models, Xie and her colleagues asked themselves what information they could provide to local communities, such as the effect of storm surge where it intersects and overtops coastal infrastructure like seawalls.

“We can actually predict how areas will flood, and how to apply the information to other areas, such as rebuilding seawalls or making dunes taller for coastal adaptation and flood mitigation,” she says.

Xie also has generated maps predicting flooding with different sea level rise scenarios.

IN THE past century, sea level along the Maine coast has risen approximately 2 millimeters per year — about 7.5 inches per century — similar to global ocean trends, according to the Maine Geological Survey.

However, over the last 20 years, global sea level rise rates have almost doubled.

Data from the Portland tide gauge also have shown an increased rate — about 3 millimeters per year. Some of the highest annual mean sea levels ever recorded in Portland have occurred since 2009.

Coastal erosion is another concern. To address this, Xie added data on sea floor sediment, which is picked up by storm waves and moved by currents.

“We want to see where the most erosion happens, and make corrections based on actual data on sand grain size,” she says.

With millions of data points, Xie’s model is slow, taking hours to run its computations. But since the results successfully mirrored what happened during past storms, they know the programs can be used to improve short-term forecasts.

“Our next step is to work with the National Weather Service to make the model usable, improving the computational efficiency so that it can run automatically and produce real-time forecasts,” says Xie.

Cannon is responsible for how the information ultimately will be applied. For example, forecasts provided to towns could help them prepare for a storm, and emergency managers could activate Citizen Emergency Response Teams to assist the public.

The Northeast Regional Ocean Council has cited a need to enhance ocean observing systems to support storm surge and flood forecasting and response.

To address this need, Cannon works with another

A nor’easter that hit Maine Jan. 24, 2017 caused flooding in Kennebunk and other coastal areas. A focus of UMaine’s Sensing Storm Surge Project, funded by the National Science Foundation, is improving warnings associated with wind, waves and flooding.

Photo by Gregory Rec/Portland Press Herald/Getty Images



Sea monsters



Undergraduate engineering researchers Kyah Lucky and Dylan Schlichting monitor buoys in Bar Harbor. Photo by Holland Haverkamp

Mapping storm surges

KYAH LUCKY'S great-grandfather was an underwater explorer who wrote books about his discoveries in the deep sea.

She moved 13 times across the United States, living in California, Washington and Idaho before coming to the University of Maine.

Now a fourth-year undergraduate student in civil and environmental engineering, Lucky is a research assistant focused on coastal engineering. In particular, she is involved in research funded by the National Science Foundation and the Sustainable Ecological Aquaculture Network (SEANET) that seeks to understand how storm surge impacts coastal Maine.

Lucky and a team of faculty and graduate students are creating storm surge maps of three Maine estuaries: Penobscot, Bagaduce and Bass Harbor. Lucky is assessing how different physical estuary properties affect the storm surge.

"One physical property, in particular, is the geometry of the estuaries," says Lucky. "For example, the Penobscot is funnel-shaped."

This past winter, she collaborated with citizen scientists deploying and monitoring buoys equipped with sensors to measure water levels and weather parameters. Among their challenges: instruments frozen in the ice.

"I've always loved the water," says Lucky, who has accepted a position as environmental engineer at CDM Smith in Hartford, Connecticut. "This project involves being on the boat and doing data analysis. Coastal engineering — the whole aspect of solving problems, designing equipment, learning about this technology — is really something I want to do."

team of UMaine researchers, including Damian Brady, Huijie Xue and graduate student Stephen Moore, to look at present and future storm patterns and storm surge in Saco and Casco bays.

In their work, funded by the National Science Foundation (NSF), they also use computer models of historic storms, such as the Blizzard of '78 and Patriots Day Storm, to study the individual components that lead to storm tides.

Moore looks at salinity, atmospheric pressure and other elements to better understand their contribution to storm tides and the resulting coastal inundation. Their models have been successful in simulating storms of record, and they are creating inundation risk maps under varying sea level rise scenarios for two major storm events.

Eventually, the UMaine research will help towns plan for future flooding and erosion. Meanwhile, for real-time data on storm impacts, Cannon has turned to citizen volunteers with the Southern Maine Volunteer Beach Profile Monitoring Program who provide measurements of beach erosion before and after storms.

STORM SURGE is acute, visible and dramatic — a sudden realization of global climate change that most of the time seems subtle and slow.

Both the effects of climate change on the coast and people's engagement with climate change are part of the NSF-funded Sensing Storm Surge Project.

Project leaders are Kimberly Huguenard and undergraduate student Kyah Lucky in the Department of Civil and Environmental Engineering, and Laura Rickard and graduate students Abby Roche and Kevin Duffy in the Department of Communication and Journalism.

Huguenard, whose specialty is coastal engineering and water resources, wanted to look at storm surge in systems with different physical characteristics.

Rickard is interested in the human dimension. How can we improve the warnings associated with wind, waves and flooding so that people respond?

The team recruited 20 citizen scientists to monitor water levels using computerized instruments deployed in three locations: Bass Harbor bay and marsh on Mount Desert Island; the small, uniquely shaped Bagaduce estuary; and Penobscot Bay, where a large, funnel-shaped estuary amplifies storm surge.

Volunteers collect data once a month and upload their information with narrative and photos to the project website.

Students Lucky and Roche pounded the pavement to recruit volunteers. They had the most success on Mount Desert Island, where they found year-round residents with access to the water and an interest in the project. Rickard's research tracks volunteer activity, and how they think and feel about the data they are collecting.

"There's not a lot of information on reliability of data collected by volunteers or comparisons of different training methods for citizen scientists," says Rickard. "We also want to know what makes people engage in climate change issues."

STORM DAMAGE is happening against a backdrop of rising sea levels, the result of ocean warming, expanding water and melting glaciers forcing the sea higher against the East Coast.

According to the 2015 "Maine's Climate Future" report, the frequency of intense precipitation events, with more than 2 inches of rainfall in a 24-hour period, has increased across the state.

The Jan. 4 storm's "bomb" in falling pressure generated winds, although the waves didn't get a chance to develop prior to high tide, so the erosion aspect was not as critical as it could have been, according to Cannon.

"I am concerned with the recent strength of storms that have approached hurricane strength. We may be looking ahead to a time when 'winter-canes' are more problematic than the dreaded nor'easter," says Stephen Dickson of the Maine Geological Survey.



Two GEER engineering teams were dispatched to Florida to conduct forensic investigations of Hurricane Irma's impact on infrastructure, including the Lake Hampton dam. Photo courtesy of Melissa Landon

Documenting Irma's wrath

HURRICANE IRMA was one of the most powerful Atlantic hurricanes in recorded history. When it made landfall in September 2017, it brought damaging winds, torrential rain, powerful storm surges and flooding to much of Florida. Nearly 7 million people were without power. NOAA lists it as the fifth-costliest U.S. hurricane.

Two weeks after the storm, Melissa Landon, a University of Maine associate professor of civil and environmental engineering, was on the ground in Florida, surveying the damage in some of the hardest hit areas.

Landon was a member of the National Science Foundation-sponsored Geotechnical Extreme Events and Reconnaissance (GEER) Association team deployed to northern Florida. GEER dispatches rapid-response teams of scientists and engineers who volunteer to go to areas affected by extreme environmental events, such as tsunamis, earthquakes and hurricanes.

Geotechnical engineers perform forensic investigations to understand the conditions that led to infrastructure damage or failure, and provide solutions for repair or improvement.

In the weeks following Irma, two GEER teams were dispatched to Florida. Landon and colleagues from the University of North Florida and West Virginia University co-led the group investigating the geotechnical impacts of the hurricane's intense rainfall, storm surge and resulting flooding in the northern and eastern parts of the state.

Repairing washed-out roads, bridges and levees can be a crucial step toward the recovery efforts after a major storm. As a result, much of the damaged infrastructure is repaired or replaced as quickly as possible by crews on the ground focused on restoration.

GEER's mission is to investigate and document damage and failures — without slowing down recovery efforts. The hope is that the collected data will improve engineering standards and inform the future planning, design, construction and risk assessment of new infrastructure in places that are prone to extreme events.



A March storm with powerful waves washed out parts of Surf Street in Saco, damaging dune grass that helps protect the beach from erosion. The Saco Bay region, the site of the largest stretch of beach in Maine with perennial issues of flooding and erosion, has been the focus of UMaine modeling research to predict how areas will flood.

Photo by Gregory Rec/Portland Press Herald/Getty Images

Dickson also worries about shifts in the larger, global climate system that drives our seasonal weather. His Ph.D. work at UMaine suggested that beaches, dunes and other natural coastal barriers may owe their existence to upwelling currents forced by the prevailing westerly winds of the jet stream. Storm tracks affect wind direction, and winds drive currents that can deposit sand on beaches, or wash it away.

“If the jet stream changes significantly as it does in El Niño winters or in polar vortex wobbles, westerlies of the past that built Maine’s beaches may not be as prevalent to restore beaches after future storm erosion,” he says.

Understanding current and future storm tracks and beach responses will be critical to predict if the balance will “make or break” Maine beaches.

Sean Birkel, Maine state climatologist and research assistant professor in the UMaine Climate Change Institute, and Ph.D. student Julia Simonson are working on ways to incorporate storm damage predictions into weather forecast models. They are using 2013 ice storm information and an analysis of how severity of coastal storms is likely to change.

“Observations over the past couple decades show an overall increase in intense rain and snowstorms,” Birkel says. “The intensification has been tied to changes in air circulation across the Northern Hemisphere stemming from warming oceans and steep decline of Arctic sea ice.

“The tendency toward more extreme storm events is likely a new normal,” says Birkel.

To Cannon, research universities like UMaine have the hardware, technology and time to study storms such as the Jan. 4 blizzard with fine detail. NWS has the capability to locally run and distribute computer models, analyze output and create a forecast in a short temporal schedule.

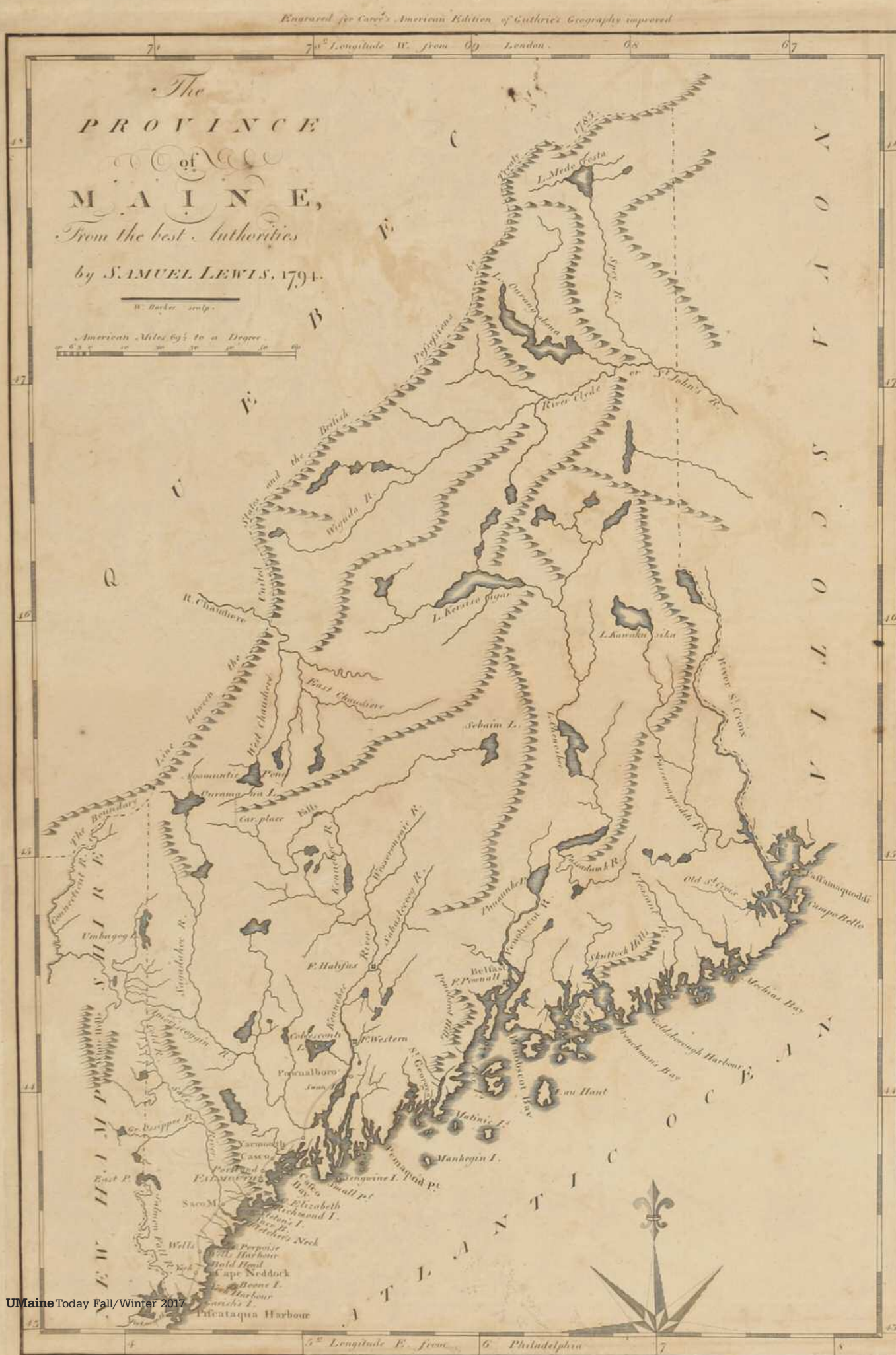
“These two approaches and methodologies complement each other,” Cannon says. “Other storms more intense than the Jan. 4 blizzard will come. It’s all just a matter of time — and we need to prepare accordingly.” ■

Five pins

Four-time National Collegiate Wrestling champ heading into a nursing career



WALKING ONTO the center mat for the last time in Allen, Texas, Samantha Frank’s goal was to wrestle to the best of her ability. “I think I did,” says the Windham, Maine native, noting that she pinned her challenger in 31 seconds. With the pin, Frank earned her fourth National Collegiate Wrestling Association crown and concluded her career at the University of Maine with a perfect 44–0 record. Even more exceptional, for a record-setting fourth time, officials and coaches voted Frank the Most Outstanding Wrestler. **TRUE GRIT:** Since her victory during spring break, the nursing student has snowboarded, eaten all the foods she missed while maintaining competition weight and immersed herself in classes for her degree. She’ll attend Commencement May 12, and will be in the School of Nursing pinning ceremony in December. After earning her first national title, Frank says her goal became to four-peat. She vowed to remember the elation she felt and use that to fuel her grueling workouts. UMaine co-wrestling coach Aaron James says grappling is like sprinting uphill for 7 minutes while on fire. Frank has the grit to push through pain. “You cannot do more than what she did in four years wrestling at UMaine,” he says. **UP NEXT:** For Frank, wrestling is excellent preparation for nursing. “(Nursing) is really hard. The biggest thing for me is I have strong faith and a big heart. I’ll deliver the best care and hope to make a difference in people’s lives.” Frank was 2 years old when she chose her career. She informed her parents after visiting her grandfather in the hospital that she wanted to be a nurse to care for people like him. ■



Then and now

Three humanities research projects bring Maine history to life

By Walter Beckwith

BROADLY DEFINED, the humanities encompass a diverse collection of fields that explore the human experience, past and present, and inform our existence. In fostering both creative and critical thinking skills, the humanities empower us to reason and evaluate the more qualitative aspects of our world.

At the University of Maine, the Clement and Linda McGillicuddy Humanities Center champions research and outreach to promote the cultivation of cultural knowledge, intellectual curiosity, and critical and creative reflection.

In the College of Liberal Arts and Sciences, world-class scholars are renowned educators and researchers in the humanities who share their expertise broadly — in the classroom, in their academic fields and in the community. And their contributions in the public sphere are multifaceted — from writing seminal books to providing leadership in humanities initiatives on local, state and national levels.

One of the many examples of this UMaine leadership in the humanities is the Department of History. Faculty members are among the top experts in their respective fields,

contributing to the greater scholarship dialogue nationally and globally, and in Maine — from organizing Maine National History Day for teachers and students in grades 6–12 to editing the *Maine History* journal and collaborating on the state's upcoming bicentennial observance.

That scholarship and community engagement inform the classroom experience for UMaine undergraduate and graduate students. And those leading faculty scholars collaborate with graduate students who conduct their own research.

In the case of Ph.D. students Daniel Soucier, Elisa Sance and Eileen Hagerman, that research focuses on Maine history.

Collectively, their research projects span 200 years — from the Revolutionary War in the 1770s to the small-farm revolution of the 1970s. Soucier has studied Benedict Arnold's ill-fated 1775 expedition to Quebec through the “howling” wilderness of Maine. Sance has explored the Madawaska French of “the Valley” and Hagerman has examined the intersect of the counterculture “back-to-the-landers”

Period maps like *The Province of Maine, from the best authorities*, by Samuel Lewis, 1794, provided Benedict Arnold little information about the northern wilderness he and his troops would encounter on their march to invade Quebec.

Courtesy of Special Collections, Fogler Library, University of Maine

Then and now

and Maine’s aging traditional farming population that ignited the locally grown and organic food movement. Their humanities research provides valuable insights into the past that has shaped the state’s cultural heritage and identity, and has the potential to inform Maine’s future.

Navigating the Eastern Country Wilderness

IN EARLY October 1775, along the Kennebec River near the small frontier village of Norridgewock, Simon Forbes noted in his diary: “This was the last English settlement on our route. Now commenced our walk into the wilderness.”

The 19-year-old was a soldier in Benedict Arnold’s expeditionary force to Quebec City to rout the British garrison there. The march required traversing a poorly charted network of rivers and portages in the vast wilderness between Massachusetts and Canada that would eventually become the state of Maine.

The soldiers had been traveling for nearly a month, sailing from Massachusetts to reach the Kennebec River, then heading farther north in a flotilla of leaky bateaux, over a series of rapids and steep falls to reach Norridgewock.

But this was just the beginning. The army of more than 1,000 then faced a journey into the unknown, untamed wilderness.

According to Daniel Soucier, the region was so isolated and untraveled that muskets and other items dropped by the soldiers remained undiscovered for another 80 years.

For many early colonial Americans, the wilderness was a place of chaos and isolation, void of humans, says Soucier, who is studying how the landscapes and environments of the Northeast shaped the soldiers and conflicts of the Revolutionary War.

Through the diaries and letters of the soldiers on Arnold’s ill-fated march through the Maine woods, Soucier has learned a great deal about the environment they encountered. Their detailed firsthand accounts of the landscapes suggest a deep sense of fear and isolation, but also curiosity, wonder and reverence, despite the hardships they faced throughout their journey.

“It was fascinating to see common soldiers waxing poetically about the wilderness,” says Soucier, who likens their



musings on the wilderness to those attributed to 19th-century intellectuals Henry David Thoreau and Ralph Waldo Emerson.

Many of the soldiers went to great lengths to catalog and understand the flora and fauna they encountered. Soucier says it was a way to assign order to the natural chaos that engulfed them.

The passages in the diaries suggest the soldiers saw the wilderness as lush and providential. The value they ascribed to each of the elements they described in the otherwise unfamiliar landscape helped the expedition navigate — even survive — the wilderness, says Soucier.

The longer the soldiers spent in the Maine woods and categorized what they were seeing, the more the land made sense, which made it a far less imposing force in their journey to Quebec.

But it wasn’t just the usefulness of their surroundings



Benedict Arnold’s march to invade Quebec required the troops to traverse a poorly charted network of rivers and portages in the vast wilderness between Massachusetts and Canada that eventually became the state of Maine. Their challenges in the wilderness included Skowhegan Falls, above, as seen before dam construction. A drawing, left, by Sydney Adamson that appeared in 1903 in *The Century*, an illustrated monthly magazine, depicts Arnold’s troops portaging with boats at Skowhegan Falls. Photograph courtesy of the Collections of Skowhegan History House; illustration courtesy of Library of Congress.

they documented and appreciated. In their writings, many found great beauty in the forest’s isolation, which perhaps distracted them from the intense hardship of the journey, Soucier says.

The march to Quebec was plagued with bad maps, bad weather and bad luck. Arnold’s map of the Kennebec–Chaudière route was incomplete and failed to account for nearly 200 miles of terrain. A severe storm, which blew through a few weeks after they left Norridgewock, flooded the area and made game scarce. Combined with the desertion of 300 of Arnold’s soldiers, who took most of the expedition’s remaining provisions, the food supply became dangerously low. Many soldiers resorted to cooking and eating anything they could stomach, including their shoes and candles.

Almost 200 others died during the march.

“Instead of being fearful of the wilderness, they were, instead, overwhelmed with complex feelings of intrigue,

wonder and curiosity,” all while suffering great hardship in the Maine wilderness, says Soucier.

The members of Arnold’s expedition should be regarded equally as soldiers and amateur naturalists, he says.

“Understanding how individuals thought about the natural world during the founding movement of America can help inform our political and social discussions regarding the environment today,” says Soucier. “It shows us the intertwined histories between humans and nature.”

Arnold and his remaining soldiers barely made it out of the wilderness. They arrived at the gates of Quebec City in December, only to suffer a devastating military defeat in a New Year’s Day blizzard.

At Quebec, Forbes was captured and held as a prisoner of war. In August 1776, he escaped and made his way back to Massachusetts via the same wilderness route he and the other soldiers had used nearly a year before.

Wanted: Bilingual teachers

MANY MAINERS know the northern region of the state simply as the Valley. For locals, it's "chez nous" — our place.

The Valley's strong cultural identity is a product of its French-Acadian and French-Canadian roots, including the widely spoken dialect. Generations lived in the territory that spanned both shores of the upper St. John River.

That was until 1842, when the final border between Maine and New Brunswick, Canada was drawn. The new border split the Valley in two and the French-speaking families of the Madawaska territory found themselves on different sides of international lines.

According to Elisa Sance, the linguistic and cultural differences between the Madawaska French and the English-speaking governments of the countries resulted in many challenges in the establishment of public institutions in the area, including schools.

Sance is studying the relationships between teacher training and the education of non-English-speaking students in Maine and New Brunswick at the beginning of the 20th century. She's particularly interested in the role of public education in the assimilation of the francophone population of the Valley on both sides of the border.

"One of the missions of a public school system is to shape the citizens of tomorrow," Sance says. "Unfortunately, school can also be a place where one is forcefully stripped of their identity and heritage."

In Maine and New Brunswick, English was the language of public education. To the Madawaska French, however, English was more or less a foreign language — one that almost no one in the Valley spoke or understood.

Maine's answer was to create the Madawaska Training School in 1878 to teach local bilingual teachers who could educate the French-speaking children.

It started as a traveling school operating in the larger communities in the Valley, then found a permanent home in Fort Kent, Maine. As the first of its kind in the state, the Madawaska Training School focused on immersion for native French speakers to become fluent in English while learning the educational subjects and skills to teach them.

In her research, Sance traced the lives and careers of the school's graduates, who were mostly women from small

communities in the Valley. Most stayed to teach in area schools, but some taught on both sides of the border.

Maine's assimilation agenda was neither neutral nor harmless, and likely fostered a deep sense of alienation among the Madawaska French, says Sance. It may have also brought some unforeseen economic, educational and social changes to the isolated region — potential effects Sance is continuing to explore in her research.

Sance argues the assimilation effort also served as a powerful incentive for the Madawaska French to preserve their culture and traditions — including their language.

According to the recent census, two-thirds of the Madawaska population reported French as their first language. In some towns, such as nearby Frenchville or St. Agatha, that number is even higher.

And each year the region hosts the Acadian Festival to celebrate the Valley's French heritage.

Sance, a native of France, grew up in a multilingual and multicultural family. Through her research, she hopes to highlight some of the challenges faced by minorities — like the Madawaska French — regarding their integration, identity and sense of belonging.

For three years, she taught beginner and intermediate French at UMaine and the University of Maine at Farmington, where she encountered students who expressed a desire to learn the language as a way to reconnect with their Franco-American and Acadian roots. Many of the youth had never been taught the language by their older generations out of a fear of discrimination.

"Exploring the early relationship between language, identity, citizenship and the school systems in Maine and New Brunswick can give us great insights into the history of the region. It can also inform us on how to foster better intercultural communication in our increasingly diverse societies," Sance says.

From Youth Rebellion to Rural Renaissance

TAKE A drive along a rural route anywhere in Maine this summer and you will likely encounter dozens of roadside produce stands, farmers markets, and homemade signs advertising produce for sale ranging from farm-fresh eggs to eggplant. This is in addition to the restaurateurs and



In 1878, Maine Gov. Selden Connor signed an act to establish a training school for teachers in the Madawaska territory. It began as a traveling school, then found a permanent home in Fort Kent. Maj. William Dickey, who was instrumental in the founding of the Madawaska Training School, is pictured here with 1894 graduates. In the century since its inception, the school evolved to become the University of Maine at Fort Kent in 1970.

Photos courtesy of Blake Library Special Collections, University of Maine at Fort Kent

grocers who buy and use organic, locally grown foods from throughout the state.

There's no doubt Maine's locally grown organic food culture is special. Small-scale family farming has, for generations, been as much a part of the state's cultural heritage as lobstering.

"I couldn't help (but) notice something unique in Maine's agriculture, something that set it apart from my home state of Kentucky and from nearly everywhere else in the country," says Eileen Hagerman, whose research in environmental and agricultural history focuses on the development of the local food and farm movement in northern New England, including what made the back-to-the-land movement of the 1970s so successful in Maine.

"Maine had begun to reverse its rural decline and was experiencing a major farming renaissance long before the 'locavore movement' of the 2010s arrived. I was in awe of

how far ahead of the curve the state seemed to be in this regard," she says.

According to Hagerman, much of the state's agricultural success is attributed to the scores of back-to-the-landers who arrived in Maine during the '70s — but not solely. Rather, it was the relationships that formed between the newcomers and their often overlooked "old-timer" farming neighbors that made success possible.

These partnerships allowed the state's small farming communities to revive and thrive, and laid the foundation for the innovative and cooperative initiatives that followed.

The back-to-the-land movement drew scores of young, idealistic transplants to Maine's tight-knit rural communities in hopes of starting new lives rooted in the land. Cultivated from the seeds of 1960s counterculture, and faced with growing economic and environmental concerns, many back-to-the-landers sought simplicity and self-sufficiency

The thrill of the journey

TO DO research in the humanities is to explore how humans — past and present — access, interpret and participate in the world around them. Unlike research pursuits of the physical sciences, most aspects of the human experience simply cannot be measured in quantifiable terms. As a result, research in the various disciplines of the humanities can — and often does — take a stunning variety of forms and functions.

Humanities research projects can take place within a genre of literature or music or the cultures that built around them. They could include a collection of art or a social movement, or perhaps how one became the catalyst for the other. Data sets can range from antiquated manuscripts from medieval Europe to contemporary comic books.

According to Caroline Bicks, who holds the Stephen E. King Chair in Literature at the University of Maine, research in the humanities “is a quest that requires some wandering.”

“It’s never obvious how we are to get from point A to point B,” says Bicks, who adds that sometimes her own research into the brains of teenage girls in Shakespeare’s England has led her down unexpected paths and toward surprising sources — from 16th-century medical texts to a treatise on lovesickness.

What gives humanities research its ability to be so broad and diverse also can serve as a barrier to entry, particularly for students who might not know where to start or even know that their interests could be a topic of research.

Which is why she organized the “How did you think of that?” conference to help undergraduate students learn how to turn their passions into humanities research projects of their own.

The one-day conference and workshop in April was co-sponsored by the McGillicuddy Humanities Center and open to undergraduates unfamiliar with humanities research, or looking for inspiration or guidance on research topics for capstone or honors thesis projects.

The event featured discussion panels with UMaine humanities faculty and graduate students, who shared perspectives on what sparked their interests, and what their research or creative processes look like. Undergraduates who recently completed humanities-based capstones and honors theses also shared their experiences.

Students heard about humanities funding and research opportunities from representatives of the Center for Undergraduate Research, Office of Major Scholarships and Fogler Library.

Humanities research “takes you on a journey,” says Bicks. “It’s rarely boring and you never end up where you thought you might.”

through an agrarian lifestyle. But few actually possessed the experience or skills to be successful farmers, Hagerman says.

Many of those who found their way to Maine were inspired by the writings of Helen and Scott Nearing, radical activists and Depression-era back-to-the-land experimenters. Their 1954 book, *Living the Good Life: How to Live Sanely and Simply in a Troubled World*, and its anti-establishment, do-it-yourself message resonated deeply throughout the movement.

However, by the time the Nearings’ message began drawing hundreds of back-to-the-landers to their farm in Harborside, Maine, the state’s rural communities were nearing a century of steady decline.

The increasing reliance on large, out-of-state producers and wholesalers gutted the local small-scale farming economy of the state. Farming was becoming a nonviable way of life and, as a result, many rural children were forced to leave their parents’ farms in search of better jobs elsewhere. The few small family farms that remained struggled to sell their products, and were operated by an increasingly poor and aging population, says Hagerman.

The back-to-the-landers who came to Maine found affordable, abundant, abandoned farmland, Hagerman says. Many also found something idyllically authentic in the spirit of the state’s rural people, and an opportunity to learn from them the rapidly disappearing local knowledge and traditional skills they lacked.

Hagerman says many of the back-to-the-landers would never have stayed on the land long term if it wasn’t for the initial support they received from older neighbors.

Rural Mainers have a curious reputation for being fiercely individualist and harboring a general wariness toward outsiders, she says. However they often also possess a strong sense of community.

According to Hagerman, due to the hardships that come with living in rural Maine — the harsh climate, short growing season, sparse population and poverty — neighborly mutual aid was as much a survival strategy as it was a virtuous way of life.

Old-timers were a wellspring of local knowledge, often built on generations of Maine farmers’ know-how, she says. More often than not, their experience in organic farming

was due to frugality rather than environmental idealism. It was priceless to the inexperienced back-to-the-landers.

Concurrently, the older local farmers needed help on their own farms. Many were concerned about the survival of their way of life following decades of out-migration by younger community members, Hagerman says.

Hagerman’s research shows that older farmers cautiously placed the future of Maine farming in the hands of back-to-the-landers by adopting the newcomers as extended family and as members of their tight-knit communities.

And, thus, the stage was set for an unlikely alliance. One founded in hard work and hardship that bridged both the cultural and generational gap. The cross-cultural pollination began to turn many counterculture back-to-the-landers into stable, rural citizens, while the old-timers became accidental agrarian radicals, says Hagerman.

As Maine’s farm movement gathered steam, initiatives like the Maine Organic Farmers and Gardeners Association (MOFGA) were established, she says. Many of these groups were imbued with the same interdependent values of the local farmers who helped shape them. And, they slowly rebuilt Maine’s local farming economy.

“Maine’s rural renaissance was a hybrid movement, propelled by both the actions and interests of locals and back-to-landers,” says Hagerman, “and I think this story has implications for present-day discussions around the arrival of ‘new Mainers.’”

“I think the back-to-the-land movement shows a precedent for Maine benefiting from its willingness to embrace newcomers and positive change. By embracing those newcomers and that change, the Maine that local people know and love can live on indefinitely.” ■

The anti-establishment, do-it-yourself message of Helen and Scott Nearing in their seminal 1954 volume, *Living the Good Life: How to Live Sanely and Simply in a Troubled World*, was a clarion call for back-to-the-landers. Many of those who came to Maine found older farmers willing to share their knowledge. Their unlikely alliance helped Maine’s local farming economy gain momentum. In this 1983 photo, well-wishers observe Scott Nearing’s 100th birthday. Photo by Lynn Karlin



“

The Zephyrus team is showing us how you can **take an idea you have as a student and turn it into a product** that can go out into the world and start to help people.”

Caitlin Howell

270 native species

- ☒ SAND BEE
- ☒ SWEAT BEE
- ☒ EASTERN BUMBLE BEE
- ☐ EUROPEAN WOOL-CARDER BEE

THE BEE LIST

THE FIRST checklist of Maine bees has been compiled using wild blueberry research records from the 1800s to the present, as well as private and public collections, and citizen science observations. It has documented

a total of 278 species — all but eight of which are native, according to a scientific team led by University of Maine bee and pollination experts.

The new inventory of Maine bees is designed to serve as a baseline for measuring the effects of anticipated climate and habitat changes on native and exotic bee populations in coming decades, according to UMaine conservation biologist Alison Dibble, and entomologists Francis Drummond and Constance Stubbs. The 278 bee species reflect 37 genera and six families. The largest genera are sand bees, *Andrena*, and sweat bees, *Lasioglossum*, each with more than 50 species.

The hope is that bees associated with other crops — including apple, highbush blueberry, cranberry, squash and pumpkin — can be studied and added to the checklist. The researchers — Dibble, Drummond, Stubbs, Michael Veit and John Ascher — published their findings in the journal *Northeastern Naturalist*.

A foundation for the inventory comes from decades of UMaine research of lowbush blueberry pollinators in the state. The earliest scientific studies of Maine bees include reports of entomological collecting trips beginning in 1861. Other sources of information for the checklist include taxonomic catalogs, and specimens in collections in the northeastern United States, such as the American Museum of Natural History, the Peabody Museum of Natural History, university collections at

Breathing lessons

A GROUP of University of Maine bioengineering graduates has been selected by nonprofit VentureWell to receive funding and training to develop its medical simulation startup.

The students received a \$5,000 grant for their spinoff company, Zephyrus Simulation LLC, which is based on their senior capstone project — a cost-efficient simulator to train medical professionals in diagnosing and responding to critical respiratory situations.

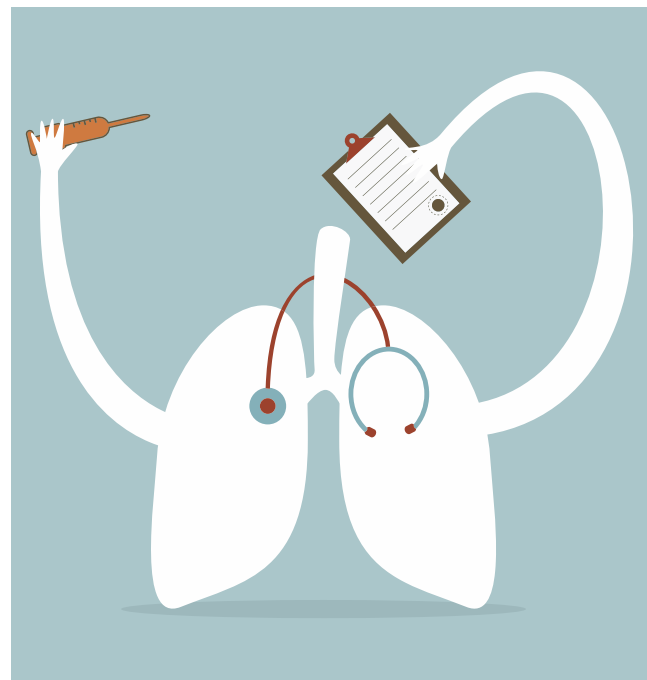
The funding comes from VentureWell’s E-Team Student Grant Program, which awarded 18 student teams more than \$200,000 in its winter 2018 cohort. The program targets students with an idea or invention that could solve a real-world, social need.

E-Teams receive grants and participate in an early-stage innovator training program. The training provides peer networking, expert coaching, national recognition and hands-on workshops to move innovations forward.

Biomedical engineering professors Caitlin Howell and Karissa Tilbury advised the students — Patrick Breeding of East Granby, Connecticut; Banton Heithoff of Oldwick, New Jersey; Amber Boutiette of Skowhegan, Maine; and Madeline Mazjanis of Portland, Maine. Breeding, Boutiette and Mazjanis now are pursuing master’s degrees in biomedical engineering at UMaine. Heithoff is a researcher at IDEXX in Westbrook, Maine.

In March, the team won the \$5,000 first-place prize at the 2018 UMaine Business Challenge. Last October, Zephyrus Simulation, based in UMaine’s Foster Center for Student Innovation, won \$500 in the Big Gig pitch event for innovators and entrepreneurs. This spring, the company will compete for the \$5,000 grand prize offered by Big Gig.

Zephyrus Simulation is pursuing a patent for the prototype, and has received grants from the Libra Future Fund and Maine Technology Institute.



POSITIVE INTERVENTION

UNIVERSITY OF Maine faculty and graduate students in the College of Education and Human Development will collaborate with local school districts to train teachers in Positive Behavior Interventions and Supports (PBIS) as part of a grant from the Maine Department of Education (DOE).

The three-year, \$246,000 grant is one of 11 projects to receive funds in the second round of a DOE initiative called EMBRACE — Enabling Maine students to benefit from regional and coordinated approaches to education. A total of \$4.6 million was awarded to schools across the state in this round of EMBRACE grants.

The grant will allow local schools, in collaboration with UMaine faculty, and prevention and intervention doctoral students, to create a sustainable, regional professional development model to support a multitiered PBIS framework. PBIS is an evidence-based model for fostering positive school climates, and promoting behavioral growth and academic engagement.

Courtney Angelosante and Karen Robbie, doctoral students in the Prevention and Intervention Studies Program, and their adviser, Jim Artesani, associate dean of graduate studies, research and outreach in the College of Education and Human Development, will provide the ongoing professional development and evaluation.

“It is expected that 80 percent of students in a given school will respond favorably just by implementing the first tier of PBIS, and 95 percent of students will have most of their needs met by implementing the second tier,” Angelosante says.



On Ulleungdo, **the hemlock grows on north-facing rocky ridges** up to 1,640 feet above sea level, where the forests are dominated by Japanese white pine.

A NEW HEMLOCK

A NEW species of hemlock has been identified on Ulleungdo, an island east of the Korean peninsula, which may lead to the temperate conifer being considered for conservation.

The Ulleungdo hemlock (*Tsuga ulleungensis*) was identified by an international team led by Garth Holman, a research associate in the School of Biology and Ecology at the University of Maine. The team published its findings in the journal *Systematic Botany*.

While discovering a new tree species is not uncommon, finding a new temperate conifer is unusual. Most plant species are found in the tropics, where diversity is higher. Conifers and other gymnosperms (nonflowering plants) constitute less than 10 percent of living plant species, whereas angiosperms (flowering plants) make up the majority.

In recent decades, only a handful of new species of temperate conifers has been identified, often in the mountains of eastern Asia and central America.

The discovery of Ulleungdo hemlock stems from research on the hemlock woolly adelgid by Nathan Havill of the U.S. Forest Service. In North America, the Asian insect is an invasive that threatens the eastern hemlock; in eastern Asia, the hemlock woolly adelgid co-evolved with southern Japanese hemlock.

As part of his Ph.D. research, Havill studied a molecular phylogeny of hemlock woolly adelgids and their host plants. The Ulleungdo hemlock was thought to be a disjunct population of the southern Japanese hemlock until Havill’s research found that the two species are genetically dissimilar.

That led Holman, who is a UMaine alumnus, Havill and other members of the research team to work to identify the species growing on Ulleungdo and better understand its evolution in relation to other hemlocks.



WORLD-CLASS PORTFOLIO PERFORMANCE

SPIFFY, THE Student Portfolio Investment Fund in the Maine Business School, won first-place in a worldwide portfolio competition this spring.

The competition was part of the Quinnipiac Global Asset Management Education (G.A.M.E.) VIII forum, March 22–24 in New York City, in which 1,500 students from more than 160 colleges and universities interacted with industry leaders and learned best practices in investment strategy.

The annual event also featured a portfolio competition that compared the performance of student-managed investment funds. Each college investment team submitted its portfolio account statements, along with asset holdings.

This is the first time SPIFFY has won the competition (first place — value portfolio), according to Sebastian Lobe, assistant professor of finance, who co-advises SPIFFY with finance and accounting lecturer Matt Skaves.

“Since portfolio performance is measured by evaluating the monthly returns during the calendar year 2017, the award pays homage to SPIFFY members from the last academic year, as well as from the current year,” Lobe says.

SPIFFY oversees nearly \$3 million for the University of Maine Foundation. The club was established in 1993 with a donation of \$200,000. Today, with more than 50 undergraduate members from a variety of disciplines, SPIFFY meets weekly to discuss changes to its portfolio.

Former UMaine finance professor and SPIFFY founder Bob Strong, who led trips to the G.A.M.E. forum each year, from 2000 until his retirement in 2015, says he “always enjoyed seeing UMaine students rub shoulders with participants from much larger schools and proudly point out that the SPIFFY funds were considerably larger than theirs.”

SCIENCE-INFORMED POLICY

AIR AND water quality monitoring and related research that have informed effective environmental policy in the United States in the past 25 years, reducing adverse effects of pollutants on humans and ecosystems, need to continue as part of fact-based decision-making, according to a team of 11 senior researchers, including a University of Maine scientist.

Documentation of the progress made on a number of air pollution concerns — from emissions and lead concentrations to atmospheric deposition of mercury and ozone — was undertaken “to inform public discourse amidst attempts to negate the relevance and value of scientific data and fact-based analysis in favor of partisan opinion and ideology,” wrote the team, which published its findings in the journal *Environmental Science and Policy*.

“America has a remarkable record in the last half-century of science driving environmental policy that is successful and pays back many times the cost of implementation to the American people,” says co-author Ivan Fernandez, a UMaine professor in the School of Forest Resources and Climate Change Institute.

GROWING COLLABORATION

MAINE’S FOREST industry annually harvests up to 7 million cords of wood to build homes and make products. But only 25 percent of students in biology courses on six University of Maine System campuses knew incorporation of CO₂ gas from the atmosphere into molecules by leaves is the process that contributes most to increase timber biomass. Faculty members identified this and other misunderstood concepts involving light, energy, carbon dioxide and nutrients, and developed an active-learning lesson about trees and other regionally relevant photosynthetic organisms, including potatoes and kelp. After the lesson, 92 percent of students knew the answer and demonstrated short- and long-term knowledge gain, says Michelle Smith, associate professor in the School of Biology and Ecology. Actively engaging students in STEM classes increases their performance and decreases their failure rate when compared to courses where lecturing is the instruction method. It also narrows the achievement gap for first-generation students, and nearly 42 percent of full-time students in the system fit that description.



“What wonderful timing, since **SPIFFY celebrates its 25th anniversary this September.**”

Sebastian Lobe

“It is my belief that the U.S. needs many **more scientists and engineers** than it has in order to prosper.”

Jay Spenciner ’66
Provided the naming gift for the Spenciner Family
Introductory Biomedical Engineering Laboratory
for the new Engineering Education and Design Center



Vision for Tomorrow

RECENT DONATIONS to the Vision for Tomorrow comprehensive campaign for the University of Maine have greatly exceeded projections. Alumni and friends have been very generous and loyal to the college of our hearts, always. Two of the largest gifts will support the Engineering Education and Design Center.

An anonymous gift of \$10 million will include naming rights

for the building. Another gift by alumnus Jay Spenciner ’66 will support the Biomedical Engineering Laboratory in the new facility.

Contact the University of Maine Foundation if you would like to know more about fulfilling your philanthropic goals and the priorities for the Vision for Tomorrow comprehensive campaign to benefit UMaine.

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