December 2022

Nelson Institute for Environmental Studies
UNIVERSITY OF WISCONSIN–MADISON

THE COMMONS

For alumni and friends of the Nelson Institute for Environmental Studies at the University of Wisconsin–Madison

2022 • Year in Review

Take a look back at some of our favorite moments of 2022.

A new look at how Earth's orbit affects weather
Page 12

Nelson makes UW history with an NSF grant
Page 14

Meet our winter class of 2022
Page 23

EDITORIAL STAFF

Kevin Berger, Graphic Designer
Eric Klister, Web Editor
Chelsea Rademacher, Editor
Diane Stojanovich, Managing Editor

STAFF WRITERS

Rachel Carrier
Anica Graney

CONTRIBUTORS

Abigail Becker
Dea Larsen Converse
Elise Mahon

DEAN'S OFFICE

Paul Robbins, Dean, Nelson Institute for Environmental Studies
Shelly Strom, Assistant to Paul Robbins
Anna Gade, Associate Dean for Research and Education
Colleen Godfriaux, Associate Dean for Administration
Ann Swenson, Associate Dean for Advancement
Diane Stojanovich, Distinguished Associate Dean for Communications

CONTACT US

We'd love to hear from you! Send us feedback or questions about this issue, or share story ideas for future issues.

Nelson Institute for Environmental Studies
550 Science Hall
Madison, WI 53706
communications@nelson.wisc.edu

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We're reducing our carbon footprint! We hope you enjoy our digitally published magazine, sent monthly to Nelson alumni, students, and friends.

Cover photo by Althea Dotzour/UW-Madison

INSIDE

FEATURES

FACULTY/STAFF IMPACT

STUDENT SNAPSHOT

ALUMNI SPOTLIGHT

FROM THE DEAN

Dear Nelson community,

No matter the year, it's always surprising to see how quickly the semester flies by. It's an exciting week for us here on campus, with preparations well under way for the Winter 2022 Commencement ceremony (happening this Sunday). Among the graduates will be 57 Nelson Institute undergraduates, master's students, and a PhD candidate. To our soon-to-be newest alumni, I offer a hearty *congratulations*! Read the names of our Nelson graduates on page 23, then head to any of our social media channels to share your congratulations.

As with each issue of *The Commons*, you also have the chance to learn about some of the outstanding research from our faculty members. An affiliate from the Department of Entomology, James Crall, is researching the social behaviors of bumblebees and how novel stressors like increasing temperatures and pesticides are putting their habits at risk. Dan Vimont of the Center for Climatic Research changed our understanding of how Earth's orbit affects climate events in the tropical Pacific — truly groundbreaking work. And from our partnerships with UniverCity Year and the Wisconsin Initiative on Climate Change Impacts, learn about the negative effects of road salt (and what you can do to salt safely) and the importance of creating climate-resilient infrastructure.

I'm also proud to announce a new grant that several Nelson faculty members (including me!) — led by Andrea Hicks — received this year from the National Science Foundation. This grant will help us support low-income students who want to pair their STEM majors with Nelson's sustainability certificate. The first cohort will arrive in fall; read more on page 14. And speaking of Andrea Hicks, I'd like to wish her a relaxing and invigorating sabbatical in Ireland next semester!

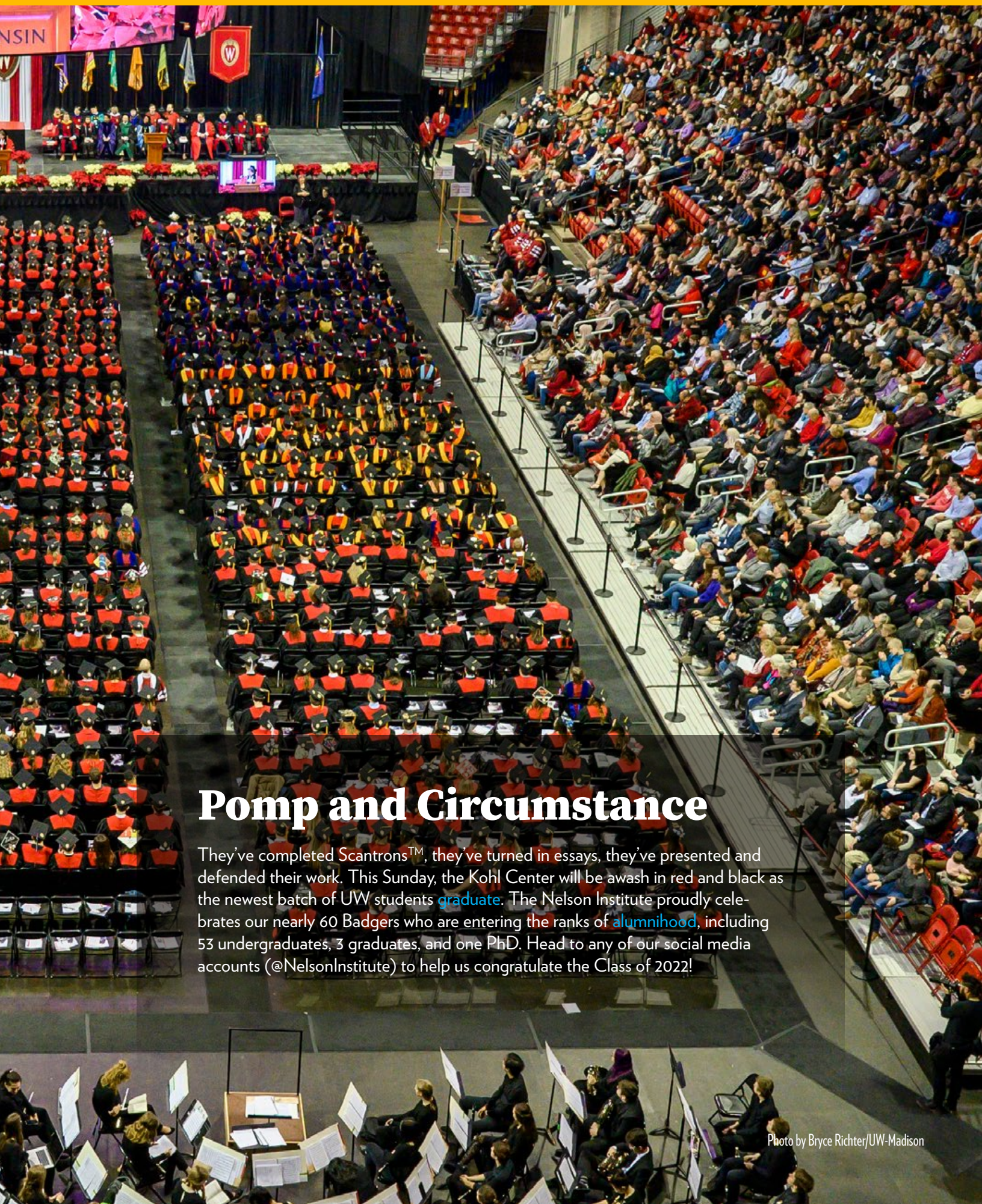
The year's end provides us an important opportunity to pause and reflect on both our triumphs and our shortcomings. Page 4 gives you a snapshot of some of the Nelson Institute's proudest moments, from prestigious awards to exceptional students to times where Nelson shined on the national stage. This is just a sampling; browsing past issues of *The Commons* is the perfect accompaniment for your morning cup of coffee or tea!

But as we recognize our shining moments, we must also look toward areas of growth and opportunity. First, our community outreach efforts have always been second-to-none, but we have had virtually no impact on recruiting new students to UW–Madison, especially historically underrepresented ones. That's going to change; a new recruitment strategy is emerging, which combines the recent NSF grant and our CESP program, and the recent hire of an amazing outreach specialist, Christopher Kilgour, with a far more active presence in area schools. Similarly, our engagement with private sector partners has never been fully adequate or effective. Here too, new programs are emerging. Stay tuned, for example, for our new internship program aimed at business sustainability. We have some ways to go in these areas, but we are on the move.

See you in 2023!

Paul Robbins
Dean, Nelson Institute


WISCO



Pomp and Circumstance

They've completed Scantrons™, they've turned in essays, they've presented and defended their work. This Sunday, the Kohl Center will be awash in red and black as the newest batch of UW students graduate. The Nelson Institute proudly celebrates our nearly 60 Badgers who are entering the ranks of alumnihood, including 53 undergraduates, 3 graduates, and one PhD. Head to any of our social media accounts (@NelsonInstitute) to help us congratulate the Class of 2022!

Photo by Bryce Richter/UW-Madison

Feature

2022 • Year in Review

We're closing out the year with these 2022 highlights.

By Chelsea Rademacher

January

Former Nelson Institute for Environmental Studies Professor and Director Emeritus Thomas Yuill is recognized by University of Guadalajara for his scientific career and achievement in environmental sciences.

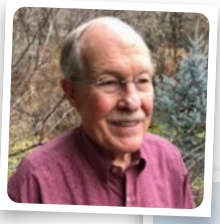


Photo by Finn Ryan

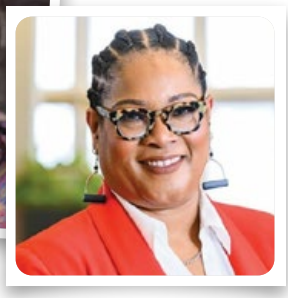
February

"It's a modern Wisconsin Idea in action." – Dan Vimont on the release of the Wisconsin Initiative on Climate Change Impacts (WICCI) report.

March

"CESP targets historically underrepresented and marginalized students in environmental studies, so I instituted a mentorship component into that program." – Nelson PhD alumna Vaishnavi Tripuraneni wins a UW-Madison Teaching Assistant Award for Exceptional Service

Photo by Megan Spielbauer



April

"So much of the scholarship around the Great Migration concentrates on families like mine who left the South. I think there's been insufficient attention on the Black families who stayed." – Monica White, founding director of Nelson's Office for Environmental Justice, on winning a Carnegie Fellowship.

May

Professor Grace Bulltail is appointed to serve on the Not Invisible Act Commission, which addresses violent crime within Indian lands and against American Indians and Alaska Natives.

June

Andrea Hicks, who serves as a Nelson Institute affiliate, director of sustainability education and research, Hanson Family Fellow in Sustainability, and associate professor of civil and environmental engineering, is named a 2022-23 Fulbright Scholar.

Photo by Jeff Miller/University Communications

Photo by Jeff Miller/University Communications

July

Leaders of UW-Madison and the College of Menominee Nation meet to sign a transfer-student agreement, a partnership facilitated by the Nelson Institute.

August

Jonathan Patz, Nelson professor and John P. Holton Chair in Health and the Environment, makes the national media rounds with a coauthored study showing that climate hazards worsen more than half of infectious diseases.

September

Longtime Nelson staff member Jim Miller is honored with the naming of the Jim Miller Graduate Scholarship for Excellence in Water Resources Management (WRM), thanks to the generosity of former WRM program chair Linda Graham.

Photo courtesy of the U.S. Department of Energy

October

Tracey Holloway, Jeff Rudd and Jeanne Bissell Professor of Energy Analysis and Policy, is elected to the National Academy of Medicine.

November

In honor of Native American Heritage Month, the Village of Waunakee raises the Ho-Chunk Nation of Wisconsin flag and installs new emblems on a welcome sign – efforts made possible by a partnership with UniverCity Year.

Photo by Abigail Becker

December

The Nelson Institute becomes the first UW-Madison entity to win a National Science Foundation S-STEM grant, which will support low-income students interested in combining a STEM major with the sustainability certificate.

Pass the Salt

UniverCity Year partnership helps Marathon County get less salty.

Illustration by R_lion_0/iStock

By Abigail Becker, UniverCity Alliance

During Wisconsin's winter months, Marathon County's municipalities field calls from concerned residents driving on icy streets to put down more salt to help clear the roadways.

Andrew Lynch, former transportation planner at the Wausau Metropolitan Planning Organization, thought this method was inefficient and potentially leading to using too much salt that could affect the county's environmental resources.

"The idea was to bring the different communities together through the Wausau Metropolitan Planning Organization and begin the discussion," said Lynch, who is now an assistant planner with the City of Wausau. "We looked at how we can spread best practices and how we can treat the vulnerable areas to avoid any excessive runoff or infiltration into the water supply."

Addressing road-salt use was one of several topics that included economic development, evidence based decision making, equity, and emergency medical services that Marathon County partnered with UniverCity Year (UCY) to pursue from 2020–23. Researching the use of road salt in Marathon County also harnessed the skillsets of University of Wisconsin–Madison students in three academic disciplines: environmental studies, applied leadership in engineering, and geography.

"They asked different questions, and that's often very helpful in terms of trying to break anyone's mindset when looking at a problem," Lynch said. "They were all able to bring a different perspective."

"We had one project: road-salt use. But the project was more complicated than answering one simple question."

— Gavin Luter, UniverCity Alliance

Environmental studies students created a comprehensive chart of road salt practices throughout the Wausau Metropolitan Area, documented recent efforts to adjust practices, and outlined considerations for collaboration.

Students enrolled in an interdisciplinary engineering course analyzed data on salting practices of each municipality to determine what a consistent policy for each municipality would look like. Finally, geography students mapped Marathon County to find out what sensitive areas are affected by road salt use.

UniverCity Alliance managing director Gavin Luter said this project illustrates the possibilities for communities working with UCY. "We had one project: road-salt use. But the project was more complicated than answering one simple

question," Luter said. "By listening to what Marathon County needed, we found three different classes who could help them think through different parts of this complex challenge. Now the county has more information that can be used to help build a more informed approach to the issue of road salt use."

Lynch also recognized the benefits a program like UCY has for students and for the greater community. During his graduate program at the University of Iowa, he participated in the Iowa Initiative for Sustainable Communities. Like UCY, this program is a member of Educational Partnerships for Innovation in Communities Network, which is a network of institutions with community partnership models that match student learning with real-world challenges.

Civil and environmental engineering students offered preliminary designs to improve roadways, including the intersection shown above of Forest and North Sixth streets, in downtown Wausau. Photo by Gavin Luter

"The UCY program is a great resource for students and for the state as a whole," Lynch said. "I found [the Iowa Initiative for Sustainable Communities] absolutely invaluable, and it provided me with the real world experience that you don't often get as a student."

This story was originally published by UniverCity Year.

Did You Know?

It only takes one teaspoon of salt to pollute five gallons of water to a level that is toxic to freshwater organisms, according to Wisconsin Salt Wise.

To practice safe salting use this winter, follow these tips:

1. Clear walkways before snow turns to ice. The more snow that is removed, the less salt will be needed to melt ice and the more effective it will be.
2. If you're using salt to melt ice, scatter it so that there is space between the grains. A coffee mug of salt is enough to treat an entire 20-foot driveway or 10 sidewalk squares.
3. Salt doesn't work in extremely cold temperatures. Use sand when temperatures drop below 15 degrees.
4. Use resources like Wisconsin Salt Wise, a statewide coalition that provides training and promotes practices that reduce salt pollution, to continue minimizing your road salt use.

Learn more or tune into a free webinar during Wisconsin Salt Awareness Week: January 23–27, 2023.

Creating Climate-Resilient Infrastructure

Wisconsin's changing climate conditions affect the structures and facilities we use daily.

By Dea Larsen Converse

Flooding in Brookfield, Wisconsin's Lamplighter Park after the June 2008 storm. Photo by Tom Grisa

Rural roads, highways, airports, ports, dams, and stormwater and wastewater systems — everything that supports our lives and livelihoods — have been designed using rainfall statistics that are out-of-date for current conditions and will become increasingly inaccurate in the future. According to the Wisconsin Initiative on Climate Change Impacts (WICCI), the last two decades have been the warmest on record in Wisconsin, and the past decade has been the wettest.

Current climate conditions in Wisconsin include more frequent and intense precipitation, higher annual precipitation amounts, earlier thawing in the spring and more freeze/thaw cycles, higher water table elevations, extreme variation in lake levels, and more humid heat waves. As the climate continues to warm, each additional degree of warming will intensify these conditions and accelerate wear and tear on infrastructure. New approaches to funding, designing, building, and maintaining infrastructure are needed to make communities more resilient to climate change impacts.

Local governments are essential in affecting climate change response by reducing greenhouse emissions and adapting sustainable practices. With new federal funding directed towards accelerating the pace of climate resilient practice, many locals are starting to examine their vulnerabilities. However, institutional barriers such as current regulations that mandate the use of outdated climate data impede progress.

The infrastructure sector also has a role in decarbonizing our communities. Currently, the process of creating the most common construction materials, like concrete and steel, as well in all phases of an infrastructure project, are substantial sources of greenhouse gas emissions. New materials, manufacturing techniques, and reuse programs can reduce emissions and benefit the regional economy.

The WICCI Infrastructure Working Group is actively working to help local governments with initiatives such as the Wisconsin Rainfall Project that provides updated rainfall statistics to aid in the design of new infrastructure.

"Changing climate conditions and uncertainty in the climate change projections available to local officials is leading to inefficient planning and expenditures."

— Robert Montgomery,
WICCI Infrastructure Working Group Chair

Support WICCI

The Wisconsin Initiative on Climate Change Impacts (WICCI) is a statewide collaboration of scientists and stakeholders formed as a partnership between UW–Madison's Nelson Institute for Environmental Studies and the Wisconsin Department of Natural Resources. WICCI's goals are to evaluate climate change impacts on Wisconsin and foster solutions. Gifts to the WICCI Program Fund provide general, discretionary program support and enhance and expand WICCI's teaching, research, and public service roles. Gifts also support partnership-building activities, including faculty, staff, and student recruitment, retention, and morale.

This article is part of a series highlighting the contribution from each WICCI Working Group for the 2021 WICCI Assessment Report. Next month, learn about community sustainability.

Wind damage to house in Baraboo, Wisconsin. Photo by Rick Eilertson

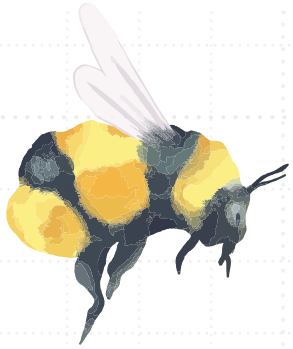
Flooding is putting infrastructure investments at risk. Photo courtesy of City of Madison Engineering

Infrastructure Working Group

Back-to-back flooding events in the City of Brookfield

Embodied carbon emissions in construction materials

Flooding impacts on the built environment in Madison



Q & A: Meet James Crall

Get the buzz on the social behaviors of bumblebees and the novel stressors that they're facing.

By Chelsea Rademacher

Have you ever wondered how insects fly? If you have, you've got good company in James Crall, researcher in Nelson's Center for Ecology and the Environment and assistant professor in the Department of Entomology. (And if you haven't, you probably are now.) Crall started his academic career with a degree in sociology. "I basically fell into a biological research rabbit hole," he says. "I was doing a project on these really fine details of insects and how they fly, which got me totally fascinated with how insects are put together and how they do what they do." He took an intentional detour to work in a lab for a year, which turned into two years, which turned into a PhD in organismic and evolutionary biology from Harvard. His research started on the organismal scale: how insects fly in chaotic wind conditions. That translated into looking at whole bumblebee colonies, which piqued his sociologist brain: what are bumblebees' social behaviors, and how are stressors like pesticides and climate change affecting them? "In some ways, getting interested in bees got me back to where I thought my original path was going to be," Crall says.

"As colonies are larger, the ways they congregate and behave collectively buffer the combined stressors of climate and agrochemical exposure."

— James Crall

Wait … how *do* bees fly?

It's cool! They have some very, very unique aerodynamics. They're kind of rotating. Their wings sort of flap back and forth really fast, like hundreds of times a second. It turns out they basically create little vortexes at the end of each wing strip. Their aerodynamics are very different than how a plane stays in the air. They're amazing little machines.

Why do you study bumblebees?

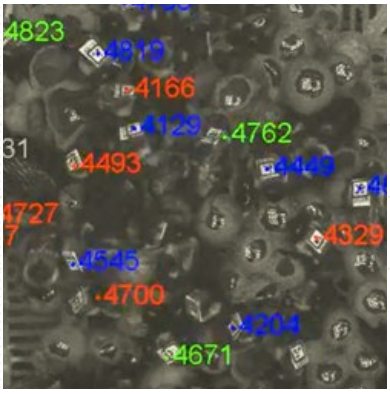
They're probably our most important native pollinators in North America. They also have this cool annual social system. They build up a colony each year. They're an interesting system for thinking about how social behavior might affect sensitivity. We often study them at that big, mature colony phase, but around here, in April or May, those colonies are just starting out. If we want to understand how the chemical or physical environment is going to impact bee populations, we're largely focusing on the wrong stage.

So, colony size plays a part in their resilience?

We think that as colonies grow and get larger, they become more robust to environmental stressors. As colonies are larger, the ways they congregate and behave collectively buffer the combined stressors of climate and agrochemi-

cal exposure. That is, from a basic biology perspective, really fascinating.

How are pesticides affecting their social behavior?
Neonicotinoid pesticides target the insect's central nervous system, disrupting many fundamental aspects of behavior. We incorporate the compound into seeds, and the compounds are taken up systemically by the plant. If you're a grower, that's great, because your plant has resistance through the whole course of crop growth.

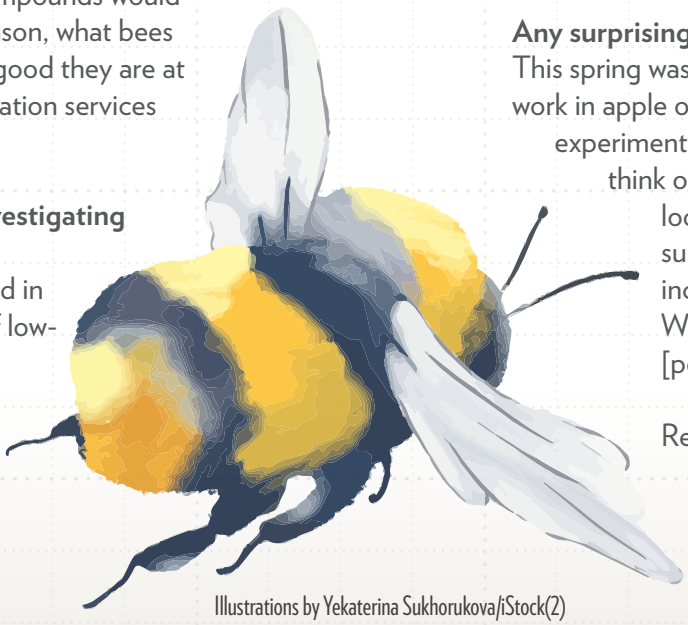


Example using the BEEtag software to track individual bumblebees 24 hours after consuming 0.1 ng (blue) or 1.0 ng (red) of imidacloprid, or a control sucrose solution (green). Image courtesy of James Crall

But why is that bad for pollinators?
Because the compounds are systemic, they show up in all parts of the plant, including nectar and pollen. These concentrations are way below lethal levels of exposure, but work that we've done has shown that even really low levels of exposure disrupt all kinds of behaviors and processes, including social behaviors. Bees stop interacting with each other, they shift out to the periphery of the nest, and they become less active.

What are the risks of those behavioral changes?
Within bumblebees, we suspect it translates to impaired colony growth. It also might change how they respond to thinkgs like temperature stress. That's one of the big concerns — that the compounds would change, within a season, what bees are doing and how good they are at delivering the pollination services we care about.

How is your lab investigating those effects?
We're very interested in taking advantage of low-cost electronics and rapidly improving computer-vision techniques. We've been building a low-cost, "smart" pollinator camera: something you put in the field, it watches a flower, and then it can actually identify when different bees are visiting, who they are, and maybe how they're responding to different temperature conditions. We have a fun prototype we've built, and we have some of our first experiments going.



Illustrations by Yekaterina Sukhorukova/iStock(2)

Bumblebees fly around flowers at the UW-Madison Arboretum. Photo by Leo Kim/University Communications

Any surprising initial findings?
This spring was our first test of this system. We did some work in apple orchards. We happened to be doing those experiments during a substantial heat wave. We often think of insects as being very heat tolerant, but it looks like during that heat wave, there were substantial reductions in visitation. With increased temperature fluctuations here in Wisconsin, could we be experiencing even less [pollination] time for our crops?

Read an extended interview with Crall.

How the Tropics Work

Earth's orbit is more important in driving tropical Pacific climate than previously thought.

Photo by Brutto Film/iStock

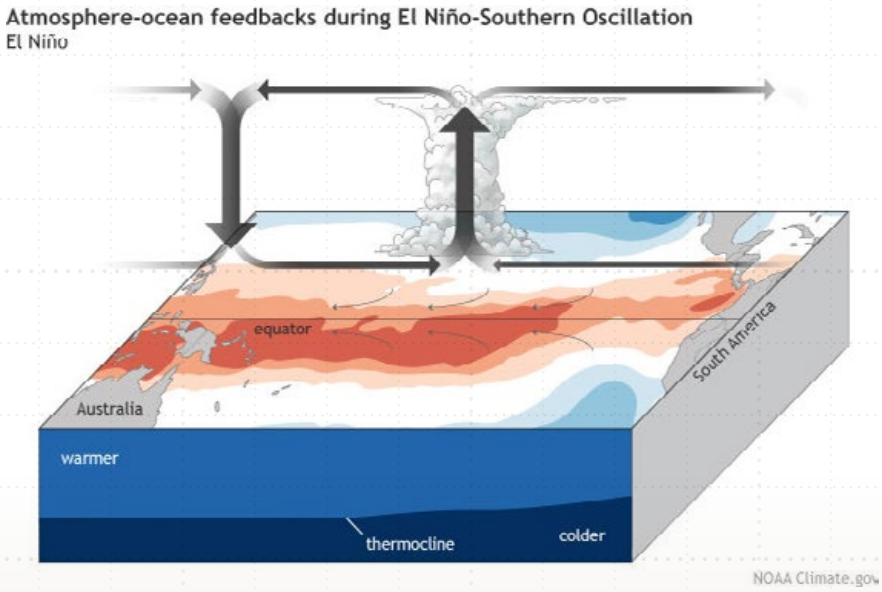
By Elise Mahon, University Communications

For years, the prevailing belief among climate scientists was that Earth's tilt was the primary factor in determining seasonal climate in the tropical Pacific. But new research from scientists at the University of Wisconsin–Madison and several other institutions around the world highlights an overlooked factor that has an equally important role: the "distance effect" of Earth's orbit, which affects the planet's proximity to the sun.

"This study is a great opportunity to push our understanding of the tropical Pacific, which we know affects the rest of the world."

— Dan Vimont

"You'd think that our understanding of the seasons is pretty well established. But right on the equator in the tropical Pacific, we have a lot of trouble simulating the seasonal cycle," says Daniel Vimont, a researcher in the Nelson Institute's Center for Climatic Research and collaborating author of the paper. He explains that closing this gap is important for understanding the tropical Pacific because it's a critical region that influences the rest of Earth's climate system.



The atmosphere and ocean interact through exchanges of heat and momentum. When warm water and clouds move from west to east in the tropical Pacific during a climate event like El Niño, it changes the weather that happens on a global scale. Image courtesy of NOAA

For instance, it's where El Niño occurs, a climate pattern Vimont describes as the biggest thing that can happen in Earth's climate system on year-to-year time scales. During El Niño events, winds push warm water from the Western Pacific toward the Eastern, bringing with it warmer surface conditions, and decreased upwelling of nutrient-rich, cold water that affects what marine species can flourish where.

Since the ocean and atmosphere are also connected, when warm water and clouds move from west to east during a climate event like El Niño, it changes the weather that happens on a global scale, too.

The equator is also the perfect place to isolate the impact of the Earth's orbit from its tilt since the effects of the Earth's tilt are minimized on the equator (the effects are strongest at the poles).

Vimont and his lab were already modeling this ocean-atmosphere connection when they were asked to join the study led by John C. H. Chiang of the University of California, Berkeley, which was recently published in *Nature*. The researchers revealed that both the "tilt effect" and the "distance effect" play equally important roles in influencing climate seasonality in the Pacific.

It just so happens that in the tropical Pacific's current climate the two cycles are aligned, obscuring the full weight of influence the distance effect has and making it seem like the Earth's tilt had an outsized role in determining the seasons.

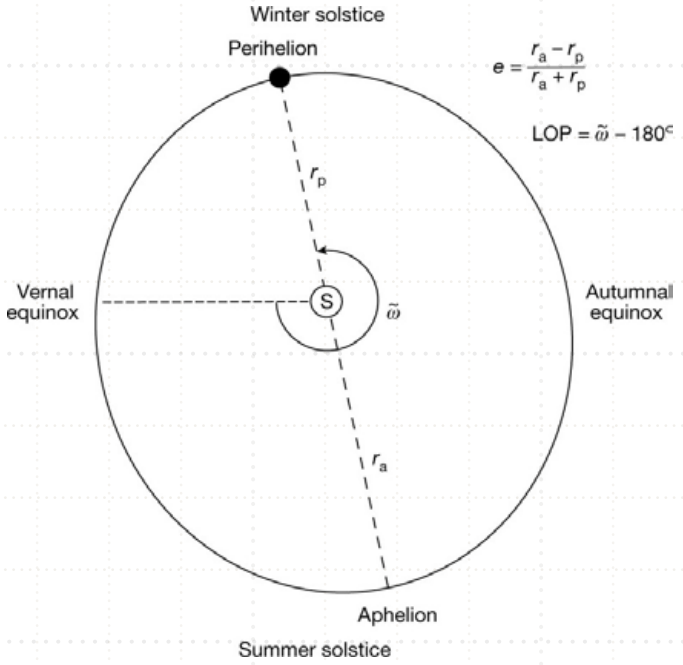
For the study, Vimont used computer simulations to "break the physics" of the real world to model how the ocean and the atmosphere interact and influence the timing of the seasonal cycle in the tropical Pacific. He was also interested in determining what processes are vital to creating our climates.

"The atmosphere and the ocean interact with each other by means of exchanging heat. But they also exchange momentum, so the atmosphere can push on the ocean," Vimont says. "So, one thing you might do is say, 'Well, I'm not going to let the atmosphere push on the ocean.' " By using models to toggle different processes on and off, climate scientists can get a sense for which processes influence climate. In this case, they found that the atmosphere and ocean pushing on each other is important in creating the climate on the tropical Pacific.

"That's important because as we look back in the past, this new finding suggests we should revisit model simulations and paleoclimatic data that we use to infer past behavior of the tropical Pacific," Vimont says.

Since the Earth's orbit is elliptical and changes through time, that means in the past this second seasonal cycle driven by the Earth's distance from the sun could have been timed differently from the cycle driven by the Earth's tilt.

These results provide a chance to test global climate model simulations of past changes to climate. While natural climate cycles caused by Earth's orbit and tilt have long existed and influenced the planet, the changes driven by human influences since the start of the industrial era cannot be explained by these natural cycles.



The Earth's orbit around the sun (marked S) is elliptical with the sun at one focal point and with the closest approach at perihelion (at a distance rp) and furthest at aphelion (ra). Image courtesy of Daniel Vimont

Understanding how these human influences alter the Earth's climate in the future is another focus of climate scientists. They use models of past climates to project and plan for the future, so improving scientific understanding of these models of the past is particularly important. "This study is a great opportunity to push our understanding of the tropical Pacific, which we know affects the rest of the world," Vimont says.

You can read more about the research in this story from UC–Berkeley.

This story was originally published by UW–Madison news.

STEM, Sustainability, and Scholarship

An S-STEM grant from the NSF will help the Nelson Institute train the next community of interdisciplinary sustainability scholars.

By Chelsea Rademacher

"I believe the Nelson Institute is the only part of campus that has ever successfully won a National Science Foundation S-STEM grant," says Rob Beattie, his voice tinged with excitement and pride. Beattie is the codirector of the Nelson Institute's Community Environmental Scholars Program (CESP) and one of the co-principal investigators who helped secure the grant: an impressive $1.5 million with $900,000 going directly to student support.

The National Science Foundation (NSF) provides S-STEM grants — or "scholarships in science, technology, engineering, and mathematics" — to help institutions attract, fund, and support low-income students interested in STEM fields. "Our proposal was to support at least 20 low-income STEM students from freshman year to graduation with scholarships of up to $10,000 per year, and at least six STEM transfer students," explains Beattie.

The grant (award # 2221468) is led by an impressive collection of Nelson Institute faculty: Andrea Hicks, Hanson Family Fellow in Sustainability and director of sustainability education and research; Paul Robbins, dean and Nelson-Hanson Chair in Environmental Studies; Beattie; Carol Barford, director of the Center for Sustainability and the Global Environment; and Becky Larson, associate professor of environmental studies.

What sets this S-STEM grant apart is its sustainability focus. In addition to choosing a STEM major, recipients will complete the sustainability certificate. Officially called "Challenging Problems and Sustainable Solutions: Training a Community of Interdisciplinary Sustainability Scholars," the scholarship combines aspects of CESP and the Office of Sustainability's internship program.

Like CESP, it will follow a cohort model: students will take a special first-year seminar that introduces them to sustainability on campus and shows them how their STEM major links with sustainability. In their junior and senior years, students will automatically be admitted to CESP. In the summer following their first year, students will have the opportunity for a paid internship through the Office of Sustainability.

"This grant gives us an opportunity to reach out to students who might not otherwise consider UW–Madison or programs within the Nelson Institute," says Beattie, "and offer them the kind of financial help that they need to come to UW–Madison."

Applications will open early next year on the Wisconsin Scholarship Hub, and the first cohort will be admitted for Fall 2023. For more information, contact Rob Beattie.

"I believe the Nelson Institute is the only part of campus that has ever successfully won a National Science Foundation S-STEM grant."

— Rob Beattie

From the Desk of Andrea Hicks

A monthly column from Andrea Hicks, director of sustainability education and research, an associate professor in the Department of Civil and Environmental Engineering, and the Hanson Family Fellow in Sustainability

In January, I will be headed out on sabbatical to Ireland supported by the Fulbright program. I was invited by the University of Limerick and their Department of Electronic and Computer Engineering to spend the spring semester there. I will be working on battery sustainability, and in particular, looking at new synthesis routes and cascading use cycles for batteries related to electric vehicles. I am also slated to teach a course on life cycle assessment in their program. As part of this new adventure, I will be temporarily stepping away from my directorship at the Office of Sustainability.

Happily, I will have an excellent replacement during my sabbatical. I would like to introduce the interim director of sustainability education and research, Dr. Matthew Ginder-Vogel. Dr. Ginder-Vogel is an associate professor in the Department of Civil and Environmental Engineering and an affiliate with the Nelson Institute for Environmental Studies. He was formerly involved with Water@UW and also spearheaded the effort for a Justice, Equity, Diversity, and Inclusion (JEDI) Committee in the Department of Civil and Environmental Engineering. Please give Dr. Ginder-Vogel a warm sustainability welcome.

While I am away, this column will take on a new flavor. Instead of the alternating formats each month, we will rotate the column through different staff members at the Office of Sustainability, starting with Professor Ginder-Vogel in January. This will allow you to hear about the critical and interesting areas that our staff are working in. And, it will provide some additional insight into what is yet to come at the Office of Sustainability.

With the end of semester and calendar year upon us, I would like to take a moment to reflect on what we've been able to accomplish. In particular, we held our first annual campus Sustainability Symposium in October. We held a series of lightning talks on a diverse set of sustainability topics, given by faculty, students, and staff. Chancellor Mnookin stopped by to transition the symposium from lightning talks to the poster session, and she stopped and chatted with many of the poster presenters. I look forward to holding this symposium again in October 2023.

I would like to wish everyone a happy new year as we seek to create a better and more sustainable tomorrow.

Bennett Artman. Images courtesy of Bennett Artman (4)

Championing Campus Sustainability

Nelson undergrad promotes sustainability around campus.

By Rachel Carrier

In his four short years at the university, Bennett Artman has taken on a full plate of activities and responsibilities to give back to the environment. Initially declared with international studies and psychology majors when starting his undergraduate studies, Artman had a change of heart after reading Aldo Leopold and reflecting on the future of his education.

"It was almost like a flashpoint moment where I realized I wanted to change my major," Artman recalled. "I was walking through the Lakeshore Nature Preserve and something clicked where I really appreciated how amazing all of this natural beauty is that we have on campus."

This prompted Artman, now a senior, to swap his international studies major with environmental studies.

"College is really important in my family, and if I can at all give back to Oneida who has helped pay for my college, I think that would be a really great thing to do."

— Bennett Artman

"I realized I didn't know much about the species around me or what it took to preserve and maintain nature for future generations," Artman said. "I knew it was important to me, and I was aware that I could do more to make sure other people can share our beautiful environment in the future."

It was a major epiphany. Artman reflected about his opportunity to study something that he deeply cares about and decided to tie his interest in psychology with environmental studies to one day hopefully work in environmental psychology.

In his first semester after declaring environmental studies, Artman took a class with Tim Lindstrom, instructor for the Nelson Institute and student intern program manager at the Office of Sustainability. Knowing he wanted to make a difference on campus outside of the classroom, Artman applied and was hired for an internship position with the Office of Sustainability — a position he learned about in class. Through his internship, he is now a part of several initiatives including the podcast team, Green Events team, and the Green Greeks team. Both teams aim to reduce the environmental impact groups have on campus.

"With Green Events, we are trying to certify campus events to help use more

sustainable options, when possible," Artman said. "And Green Greeks is a newer initiative, but we are trying to outreach to different Greek organizations to offer recommendations and increase green event involvement."

"I knew I wanted to be more involved on campus and make a positive change while doing so, but I really didn't know where to start," Artman said. "I knew working with [UW–Madison] at the Office of Sustainability would be a good place to start."

He also holds a role as a student outreach coordinator with the Wisconsin Master Naturalists, a program coordinated by the UW–Madison Division of Extension that focuses on volunteer work and training in stewardship, education, and citizen science.

"I got involved with [Wisconsin Master Naturalists] because it seemed like a good way to meet like-minded people on campus, and that naturally led having a job with them," Artman said. "I started making videos for them and that led to my role. It's been such a cool experience."

While Artman has enjoyed learning and giving back in his work with the Office of Sustainability and the Wisconsin Master Naturalists, he hopes to find a more hands-on career in environmental psychology and sustainability.

A member of the Oneida tribe, Artman has found his Indigenous identity plays an integral role in his values for the environment. His father is a Native American natural resources lawyer, which has also fueled his passion for the environment.

Top: Artman showing his love for nature and trees. Middle: Artman with his role model, his grandmother. Bottom: Artman pausing for a picture on a ride with the UW Triathlon team.

One of Artman's biggest role models is his grandmother, who was an educator born and raised on the Oneida reservation. Despite coming from a family of 13 and facing adversity, each of his grandmother's siblings attended college, herself included.

"College is really important in my family, and if I can at all give back to Oneida who has helped pay for my college, I think that would be a really great thing to do," Artman said.

Artman is also a member of Wunk Sheek, an Indigenous student group on campus where he has enjoyed meeting other Native American students. Though he only joined this year, Artman has made great connections with his peers in the club.

"I'm very appreciative of everything that UW–Madison and the Nelson Institute has offered me, especially the professors I've been fortunate enough to learn from," Artman said.

When reflecting on professors who have made a profound impact on his academic trajectory, one name came to Artman's mind right away for her insightful course materials and dedicated approach to teaching.

"I've taken every single one of Heather Swan's classes," Artman stated. "Her classes and readings have directed my academic, extracurricular, and philosophical life frameworks. She's one of the best teachers I'll ever have."

Learn more about the environmental studies major and how you can support the program.

In Their Words: UW Undergrads on Environmental Issues

At the annual Sustain-a-Bash, current students shared which environmental issues they care most about — and why.

By Chelsea Rademacher

The first weeks of each UW–Madison fall semester are alive with activities, fairs, and events. Since 2013, one of those gatherings has been Sustain-a-Bash, a celebration in the heart of campus that brings together the UW's sustainability community. Hosted by University Housing with support from the Office of Sustainability, the event is geared toward new students living in the residence hall — but all students are welcome.

"Sustain-a-Bash gives a well-rounded, holistic look at sustainability," said Breana Nehls, then-UW Housing sustainability and communications coordinator and Nelson Institute graduate. "It showcases a variety of ways that students can get involved on campus and by volunteering in the greater Madison community."

This year's Sustain-a-Bash was held on September 16 on the lawn of the Gordon Dining and Event Center. Attendees learned about UW Housing's sustainability efforts — including the new Electric Eats food truck — networked with sustainability focused student groups like Slow Food UW and CLEAN, and even made smoothies with a bike-powered blender.

The Nelson Institute was also represented, networking with undergraduates interested in Nelson's major and certificate programs. At the Nelson table, environmental studies senior Madeline Zwergel connected with students by posing a question: What environmental issue are you most passionate about, and why?

Here's what current undergrads are thinking about when it comes to environmental and sustainability issues: →

ewable energy
ccess for all!

Deforestation - big problem in my family's hometown.

te change
vironmental
acism!

I am most passionate about climate change because it determines our whole future & how livable our world is.

Endangered species protection and cutting back on single-use plastics!

Fresh water crisis!

The need to reduce wasted resources. It doesn't matter how efficiently we produce food or distribute water if we keep losing a fraction of those resources.

Farm-to-Table, UW-to-Community

Nelson capstone course partners with local cidery to learn about food system resilience.

Class photo from their September trip to Brix Cider in Mount Horeb, Wisconsin, for a meal and meet-and-greet with the staff. Photos by Jules Reynolds (5)

By Rachel Carrier

Students in Nelson Institute PhD candidate Jules Reynolds' capstone course have had the unique opportunity to make a difference in their local community. The course — Exploring Food System Resilience in Wisconsin Communities — takes a deep dive into local food systems while working with Brix Cider, a local farm-to-table cidery and restaurant in Mount Horeb, Wisconsin. Brix Cider sources ingredients locally to create artisanal ciders and a made-from-scratch menu.

Reynolds is currently pursuing a joint doctorate degree in geography and environmental studies with research in local food systems. Her partnership with Brix originally began as a part of her research.

Reynolds was awarded a Community-Based Learning Course Development Grant through the Morgridge Center for Public Service to help enrich the student experience in her course. The grant supports the class as a community-based learning experience while exploring topics related to Wisconsin's food systems.

"I'm so grateful for this grant because it has allowed me to extend and deepen the content of the course for the students in ways I would not have been able to otherwise," Reynolds recalled.

The partnership and financial support from the Morgridge Center provided honoraria for guest lectures, payment to community partners for their time working with students on their capstone projects, and funding for supplies to help students create professional-grade projects to implement their work in the community.

> ***"We are trying to connect Brix with the history of the land and agriculture in an artistic way."***
>
> — Cammi Ganshert

The grant also helped fund a trip to Brix Cider for all 15 students to see the facilities and enjoy a meal with some of the staff.

"My goal when designing the course was really twofold," Reynolds said. "First, to ground students in a theoretical understanding of local food systems and to have nuanced

Jules Reynolds

conversations about opportunities and challenges of them. The second goal is for students to apply that knowledge to what is actually going on in communities and how we can reach for better, more resilient, and more just food systems."

The course splits the semester in half. The first half was spent developing an academic understanding of food systems. The class then shifts focus to working on group capstone projects that further Brix's mission and support local food systems.

Students worked in small groups and were given the flexibility to identify project topics with Brix staff. The professional projects included deliverables for Brix and enriched understanding of the course content for the students.

Cammi Ganshert, a senior studying environmental studies and biology with an entrepreneurship certificate, discussed her group's project: a digital timeline of the land and agriculture surrounding Brix to be embedded on their website.

"Our project tries to orient Brix into a historical time narrative of the land and agriculture history of Wisconsin and the timeline of the land," Ganshert said. "We are trying to connect Brix with the history of the land and agriculture in an artistic way."

The student project connecting Brix with the history of the land and agriculture aligns with a recent grant the restaurant received.

Brix Cider was awarded a local food promotion grant through the USDA in the winter of 2020, that initiated a three-year project focused on investing in community outreach, education, and developing conversations around supporting local foods and farmers.

"[Brix] asked me to be part of that partnership, where I now work with them to create outreach tools, activities, and events that invite people into the conversations with local food systems," Reynolds said. "And now I'm taking that project and looking at it through an academic lens for my dissertation."

Though this is Reynolds' first semester instructing the course, she has been a teaching assistant for

Guest speaker Jonnah Perkins from Brix Cider discusses media creation and storytelling with Reynolds' class.

eight semesters in courses surrounding food systems and environmental issues.

"I love teaching and I love co-learning with my students," Reynolds said. "I've found that students really enjoy thinking through food systems because it's a really personal topic and hits close to home for them."

Ganshert echoed her appreciation for Reynolds' teaching style and enthusiasm for teaching students in a way that best fits the course content.

"[Reynolds] builds off of the space of knowledge she knows we already have from prior lectures or classes and transforms it into something new, interesting, and applicable." Ganshert said. "She's building off of our core knowledge about food systems, climate change, and disparities while illuminating Brix and showing us how that applies in a real space."

While Reynolds does not rely heavily on a typical exam structure in her class to measure core learning, she has implemented a weekly "reflection journal" assignment that asks students to think deeply about concepts they learn about and share their thoughts and experiences with the material.

"Reflection and reflexivity are really cornerstone pieces of community-based learning," Reynolds said. "It's really asking students to reflect on concepts like privilege and power in relation to their community partner."

Students enjoy a meal at Brix in September before learning about how Brix crafts their seasonal menu.

Senior student Delaney Dykman is a journalism and environmental studies major who hopes to pursue a marketing career in the outdoor industry. "Being able to work with a local group and see an impact from our projects in class is an amazing feeling," Dykman said, reflecting on the class structure. "I also feel so much more connected to the class and content because of our reflection journals. [The reflection journal] helps me to reflect on what I have learned and really understand why we talk about these topics."

Students who couldn't attend the original trip to Brix get to enjoy a meal and meet-and-greet with Brix employees.

Reynolds said she has also felt tremendous support from the Nelson Institute throughout her program and especially through teaching this course. She is thankful for the entire Nelson Institute team, and especially for Tara Mohan's attentiveness to her questions and inquiries. She also expressed her appreciation to the Morgridge Center for making this experience possible for her students, and to Brix for providing a great basis for her students to learn from.

"I've felt very supported by the Morgridge Center, not just financially but in many other ways," she said. "And Brix has been nothing short of an amazing community partner for the students to work with. The experience, in my opinion, has been truly awesome."

Learn more about the Nelson Institute for Environmental Studies and how you can support our programs.

Congrats, Grads!

This weekend, 57 Nelson students enter alumnihood.

This Sunday, Dec. 28, nearly 60 Nelson students will turn their tassels to become UW alumni at the 2022 winter commencement ceremony. The Nelson Institute started the festivities early with a Science Hall celebration on Thursday, Dec. 15, where Dean Paul Robbins, proud Nelson faculty, and Bucky Badger himself raised mugs of hot cocoa to toast the soon-to-be graduates. It's not too late to share in the celebrations — head to any of our social media accounts to leave a message of congratulations to the winter Class of 2022!

NELSON

UNDERGRADUATES

Zachary Ausavich
Chlo Baumbach
Brittany Bertram
Dejah Broaster
Amanda Burger
Julia Buskirk
Amy Cho
Ashley Cornwell
Katarina Derse
Parker Dietzel
Emily Domnick
Jacob Duchac
Kaylee Ebner
Olivia Evans
Alice Farr
Searra Funch
Emily Gaare
Soumika Gaddameedi
Sarah Gilmore
Zebulon Grove
Owen Hallmark
Olivia Haseley
Anna Heinen
Kaylin Hewitt
Jessica Keller
Leigh Keller-Chicoine
Jack Kiiskila
Caitlyn Kizer
Jaycie Korth
Kayla Lange
Katie Lehman
Payton Mason
Anna Merten
Hannah Miller
Josh Mitchell
Devin Mulrooney
Jake Nation
Riley Nelson
Elizabeth Ng
Aaron Pham
Trevor Powers
Julia Radomski
Nicholas Rasmussen
Miranda Rasumussen
Karly Rebman
Mia Rogers
Stephanie Salgado
Alyssandra Scanlon
Elle Schraufnagel
Charles Sifferlen
Arthur Sommer
William Walsh
Sophia Ziehr

GRADUATES

Amintas Brandao (E&R PhD)
Ryan Hellenbrand (E&R MS)
Nick Hoffman (E&R MS)
Kathryn Smith (WRM MS)

The Next Chapter

Ford Freyberg starts a new life for himself after graduating from the environmental observation and informatics program.

Freyberg in the mountains near Crested Butte, Colorado. Photo by Natalie Bowman

"There are a million good reasons for why to enroll. Have a plan for what you want to do with what you're going to learn, and put that to practice in your summer capstone."

— Ford Freyberg

By Anica Graney

Ford Freyberg is starting a new chapter of his life. Recently married, he began a new job in October and will be moving out west early next year to live in the mountains that he and his wife love being around. "We're big mountain people," Freyberg said.

This all comes after graduating in August from the environmental observation and informatics (EOI) graduate program, a 15-month master of science degree. This professional-focused program offers students an education in environmental conservation, remote sensing, geographic information systems, and informatics.

Originally from Madison, Freyberg stayed in his hometown to attend the UW where he graduated with a double major in biochemistry and Spanish. He then spent the next six years working at Epic, a medical software company located in Verona, Wisconsin, but found himself wanting to work in another field. He liked certain aspects of working in the software industry but wasn't a fan of the medical setting. He didn't want to give up the fast pace or the ability to develop helpful products and tools. That's when he found the Nelson Institute's EOI program.

"I randomly stumbled across this semi-new offering from UW–Madison called environmental observation and informatics, which really lured me in with some of the pretty pictures. They showed these aerial views of Lake Mendota, which is what drew me in," Freyberg said. "I started looking into

what the purpose of these beautiful images was, and it was this cool confluence of capturing the images and the computer algorithms that go into making the images useful, in addition to being pretty."

Freyberg enrolled in the program and began an in-depth curriculum that allowed him to focus on his own interests. Two professors stood out: Annemarie Schneider and Mutlu Özdoğan, whose flexibility and openness allowed Freyberg to create end-of-semester projects on topics that he was passionate about. This included a literature review paper that looked at the computer algorithms used to monitor wildfire risk.

"I was the only one in the class that wrote that particular paper, because that's what was particularly interesting to me," Freyberg said. "On top of that, both [Schneider and Özdoğan] are just really interesting, fast-paced, and smart professors."

Freyberg encourages prospective EOI students to envision themselves in the EOI career of their dreams. "There are a million good reasons for why to enroll, but try to have a plan for what you want to do with the information you're going to learn in EOI, and then put that to practice in your summer capstone project."

EOI students spend their final summer semester working on a hands-on project they develop in collaboration with a partner organization. Freyberg praises the hard work of the Nelson Institute professional program staff, Sarah Graves, Nathan Schulfer, and Meghan Kautzer, who helped shape his own capstone project. "Nobody could do the program without them," Freyberg said. "They put together an excellent program and continue to run it really well."

Freyberg's final EOI summer term led him to Pocatello, Idaho, where he interned with NASA DEVELOP, a program that cultivates Earth observation users and leaders by working with communities and organizations to address environmental and policy concerns. There, Freyberg worked on a project using geospatial research to assess wildfire risk in Idaho.

Freyberg led the project with three other interns from various backgrounds. The team conducted research then downloaded, transformed, and incorporated the information into a model that predicts drought-intensified wildfires. "That was a fun and interesting project — to be able to present something like that to folks who are the experts in the field," Freyberg said.

After the project ended, Freyberg returned to Madison, graduated from the EOI program, and got married. In October, he began working for the Vexcel Data Program, a subsidiary of Vexcel Imaging, a high-quality camera manufacturer for drones and airplanes. The company is rolling out a new program that offers high-quality imagery for an annual subscription. "It's like the Netflix of remotely sensed imagery," Freyberg explained.

He works as a product manager where he assesses the market and communicates with Vexcel's development team to make sure the company is developing the right type of product. "It's similar in many ways to the role I had at Epic, but in a new industry, which I like a lot better," he said.

Freyberg and his wife will be moving to Denver early next year, closer to the mountains that they love, where he will be able to continue his work with the beautiful pictures that brought him into his new industry.

Learn more about the environmental observation and informatics MS and how you can support the program.

Freyberg and his wife, Natalie, visit Horseshoe Mountain, Colorado. They will soon call the mountains home as they move to Colorado in the new year. Photo by Ford Freyberg

A Decorated AOS Alumna

UW graduate and former CCR scientist was recently honored with an alumni award.

The previous winner of the AOS Distinguished Alumni Award was the late John Kutzbach. In April 2022, Bette Otto-Bliesner (center) attended the event where Professor Emerita Gisela Kutzbach (right) accepted the award on her late husband's behalf. Photo courtesy of Bette Otto-Bliesner

On November 14, the Department of Atmospheric and Oceanic Sciences (AOS) announced that Bette Otto-Bliesner was selected to receive the department's Distinguished Alumni Award for Outstanding Achievement. With her extensive scientific accomplishments and international leadership in the field of paleoclimate, she is one of the most distinguished alumni in the history of the AOS department. Her outstanding work on a broad range of paleoclimate questions has crossed traditional disciplinary boundaries and shaped our understanding of past climates from hundreds of millions of years ago to the Holocene and into the projected future. The range of climate problems that she has worked on is exceedingly broad, incorporating multiple distinct components of the climate system, including the ocean, vegetation, the atmosphere, and cryosphere.

Born in Chicago, Otto-Bliesner first became interested in meteorology as a child while watching famous Chicago weatherman P. J. Hoff. She received her bachelor's (1972), master's (1974), and PhD (1980), all in meteorology, at the University of Wisconsin–Madison. She stayed on campus from 1980–86 as an associate scientist in the Nelson Institute's Center for Climatic Research (CCR). There, she focused on modeling past climates, including her groundbreaking work on orbital forcing of the African-Asian monsoon during the Holocene, conducted with former CCR director John Kutzbach.

"With over four decades of countless achievements in Earth system paleoclimate modeling, Dr. Bette Otto-Bliesner has proven to be a true international leader in the field," said current CCR director Michael Notaro. "We are very proud of her Wisconsin ties: a UW–Madison AOS alumna, former CCR scientist, COHMAP (Cooperative Holocene Mapping Project) participant, and long-term collaborator with Professors John Kutzbach, Zhengyu Liu, and Feng He. Her early work with Professor Kutzbach on the influence of Earth's orbital forcing on the African and Asian monsoons was truly groundbreaking."

Today, Otto-Bliesner works as a senior scientist at the National Center for Atmospheric Research and leads their paleoclimate modeling program. She has been recognized with numerous prestigious awards, most notably the American Geophysical Union's (AGU) Emiliani Lecture, and she was elected fellow of both the AGU and the American Meteorological Society. Because of her many achievements, she was selected as a lead author of the Paleoclimate chapter in the Fourth and Fifth IPCC Assessment Reports.

Otto-Bliesner has also made unselfish contributions in service to the paleoclimate community. She has organized or contributed to many international modeling or model-data comparison projects, and she has served as mentor for graduate students, postdocs, and early career scientists, including four UW–Madison alumni. She has also maintained active scientific ties with the department and with the Center for Climate Research, co-authoring 43 publications with UW–Madison scientists since 1982.

This story was originally published by the AOS department.

New for 2023: Alumni Awards Process

Each year, the Nelson Institute shines a spotlight on alumni who are truly living the Wisconsin Idea and making a difference in the world.

Take note! The nomination process for next year's awards will be different: nominations will be accepted starting January 18 through February 28, 2023.

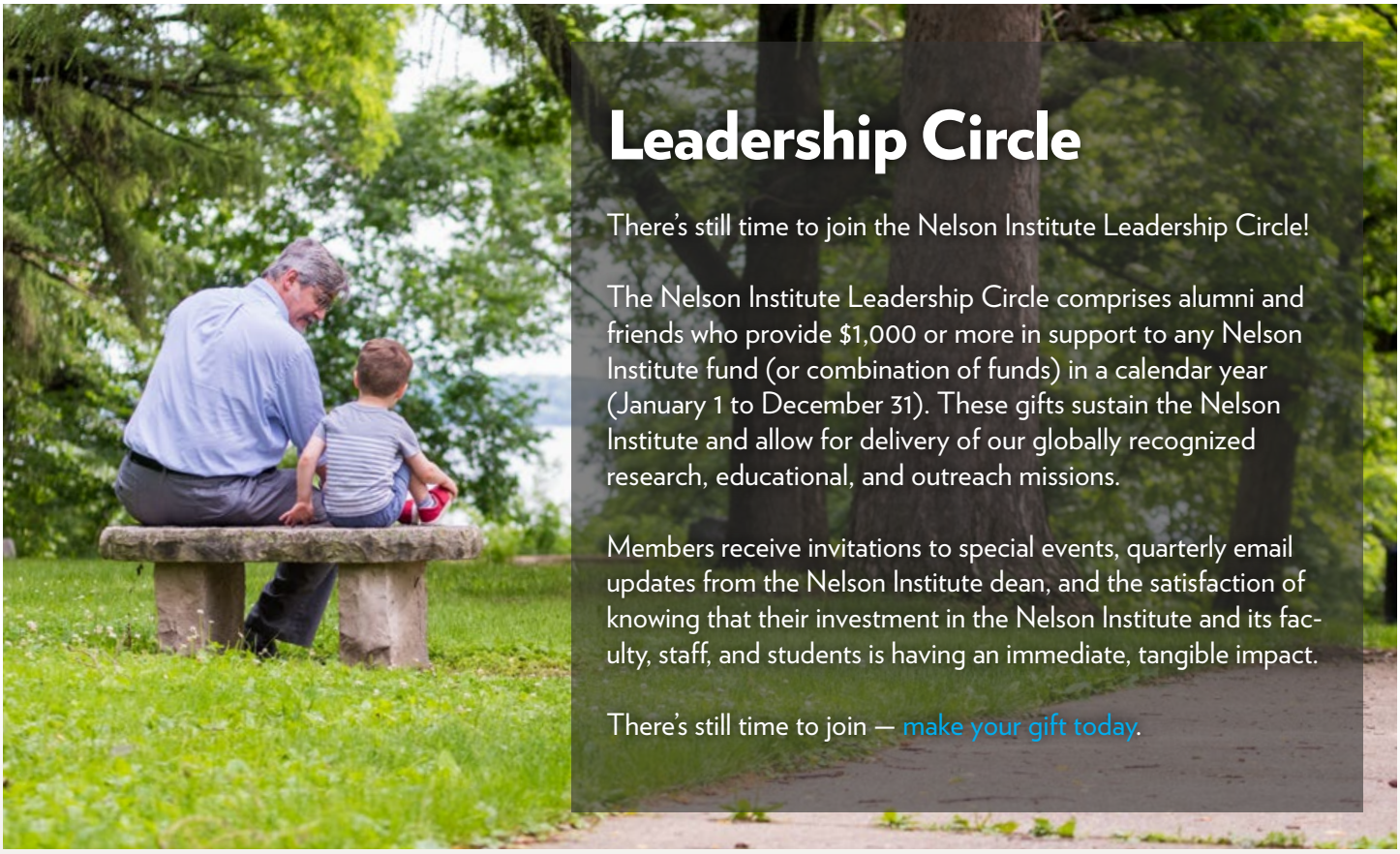
Award winners are selected by members of the Nelson Institute alumni awards committee and approved by the Nelson Institute senior leadership team. Awards are presented at the Nelson Institute's annual Rendezvous on the Terrace gathering for alumni and friends.

ALUMNI AWARD WINNERS
RISING STAR ALUMNI AWARD

ALUMNI AWARD WINNERS
DISTINGUISHED ALUMNI AWARD

Learn more about the process and read about past awardees.

2022 Rising Star award recipient Breana Nehls. Photo by Ingrid Laas



Leadership Circle

There's still time to join the Nelson Institute Leadership Circle!

The Nelson Institute Leadership Circle comprises alumni and friends who provide $1,000 or more in support to any Nelson Institute fund (or combination of funds) in a calendar year (January 1 to December 31). These gifts sustain the Nelson Institute and allow for delivery of our globally recognized research, educational, and outreach missions.

Members receive invitations to special events, quarterly email updates from the Nelson Institute dean, and the satisfaction of knowing that their investment in the Nelson Institute and its faculty, staff, and students is having an immediate, tangible impact.

There's still time to join — make your gift today.

Happy Holidays, Nelson!

This year's holiday card celebrates the environmental conservation (EC) professional MS program, which enters its 10th year in 2023. Through the EC program, the Nelson Institute has developed strong partnerships across North America, Central and South America, Asia, and Africa. Representative of our reach, in spring 2022, the Nelson Institute was honored to host some of our African partners here on campus for a Tales from Planet Earth screening of *Into the Okavango*, pictured here (top center image, L-R: Steve Boyes, Koketso Mookodi, Nyambe Nyambe, and Nathan Schulfer).

Support NELSON

Interested in supporting the Nelson Institute? There are many ways to contribute to the Nelson Institute — participating in our events, mentoring our students, providing connections to your personal networks, and making financial gifts.

All of these are necessary and important to us, and we invite you to invest in our community in the way that makes the most sense to you. Learn more about all of the great academic programs, research centers, and public programs we offer.

Gifts in any amount are needed and appreciated!

RED ENVELOPE
CAMPAIGN

It's On! Red Envelope Campaign

The Red Envelope Campaign is a semi-annual student fundraising effort to boost community-building experiences for Nelson students. Past campaigns have helped pay for ice cream socials, movie nights, "Spooky Science Hall" nights, study brunches, and much more! Gifts in any amount (even $1!) are gratefully welcomed, and 100 percent of donations will go directly to supporting the Nelson students' experience. Consider making a gift today to celebrate the Nelson Institute's winter 2022 graduates!

SAVE THE DATE!

NELSON INSTITUTE
FOR ENVIRONMENTAL STUDIES
EARTH DAY
2023

Species on the Move

April 18–19, 2023

Join the Nelson Institute for Environmental Studies for Earth Day 2023: Species on the Move. You won't want to miss these in-person and virtual opportunities to reconnect with fellow environmentally conscious Badgers.

PERFECT PRESENTS FOR THE BEST BADGERS

The UW Alumni Store has everything you need for everyone on your holiday list. With The Red Shirt™ and other red-and-white gifts, this online shop makes gift giving a breeze. A spirited season of celebration for alumni and friends starts here.

LEARN MORE

Join us

in celebrating the Nelson Institute year-round by purchasing branded merchandise, shirts, sweatshirts, jackets, bags, and more!