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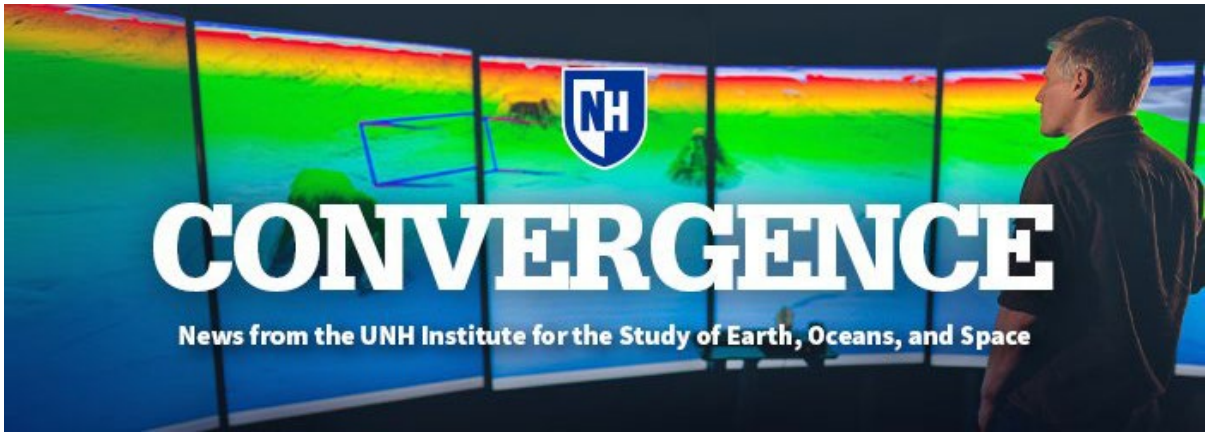


EOS IN THE NEWS

How Low Can You Mow

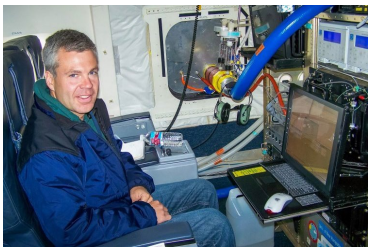
Alix Contosta shares tips on how to embrace the “low mow” technique for improved backyard ecosystems

Forest Impacts

Matt Vadeboncoeur has received a grant from the Northeastern States Research Cooperative to study the regenerative capacity of red oaks

Building Momentum for the Blue Economy

UNH researchers are at the nexus of conserving and leveraging the power of the sea



Passings: Eric Scheuer

UNH remembers life of hardworking and humorous atmospheric chemist

Differentiating Dolphin Dialects

Mahdi Al Badrawi has improved acoustic technologies to help track dolphins' habitat shift due to climate change

Flood Risks Expected to Grow in New Hampshire as Temperatures Rise

Cameron Wake discusses importance of adaptation strategies to prevent repetitive flood losses

Beach Grass Could Be Key to Protecting the Aquinnah Wampanoag Homeland

Alyson Eberhardt weighs in on the importance of beach grass to restore dunes and improve coastal resilience

KUDOS AND CONGRATS

Congratulations to Scott Ollinger, who has been selected for the 2022 UNH Faculty Excellence in Research Award. Well done, Scott!

After training from September through April, a new class of UNH Marine Docents officially graduated last month during a long-awaited, in-person gathering on April 28, 2022. The UNH Marine Docent Program is a volunteer-based marine science education effort managed jointly by N.H. Sea Grant and UNH Extension. Congratulations to the eight members of the newest class of UNH Marine Docents!

ARCHIVED SEMINARS

The 2022 UNH Research Communications Academy has concluded, but the presentations have been archived on its website.

WELCOME AND FAREWELL

We offer a warm welcome to Jody Crotty, Administrative Assistant for SMSOE and Ocean Engineering. Welcome aboard, Jody!

We bid farewell to Katiemae White, whose last day with SMSOE and SML is on June 10. Best wishes in your next adventure, Katiemae!

Please send any news items or suggestions for future Convergence content to Rebecca Irelan at rebecca.irelan@unh.edu.

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How Low Can You Mow?

Lazy lawnmowing can be better for the environment

Wednesday, June 1, 2022

Not a fan of mowing the lawn? Good news: Cutting the grass less may be better for the environment. Trimming the number of times you run the mower around the yard, known as “low mow”, can help reduce carbon emissions, build soil organic matter and even enhance pollinating habitats for bees.

“Taking important small steps, like not mowing as often,

“People may not think the small ecosystem in their own yard — the grass, soil and vegetation — is that important to the health of the whole

can have a big impact on things like carbon storage and carbon emissions which can influence climate change.”

planet,” says Alexandra Contosta, research assistant professor at UNH’s Earth Systems Research Center. “But taking important small steps, like not mowing as often, can have a big impact on things like carbon storage and carbon emissions which can influence climate change.”

Want to be a “lazy lawnmower”? Contosta, who has done research on low mow options as well as carbon storage in the backyards of New England cities, offers these tips:

- **Mow every two weeks.** Mowing less allows for spontaneous lawn flowers, like clover and dandelions, that provide important nectar for bees, which are in decline and perform vital ecosystem services such as the pollination of food crops.
- **Try a “no mow” area.** For larger yards, consider creating a zone that is cut less, or not at all, providing time savings as well as a beneficial habitat for butterflies. This can be useful for hard-to-mow areas or parts of the property that are not utilized.
- **Give the rake a break.** Skip raking grass clippings; returning them to the soil provides high-quality, carbon-rich leaf litter that organisms can break down and store in soil organic matter. This keeps the carbon out of the atmosphere, where it contributes to warming temperatures.
- **Reach for the shears, not the chainsaw.** Pruning trees rather than cutting them down helps store carbon rather than release it into the atmosphere. If you need to cut down a tree, try to replace it with another one.
- **Get the neighborhood involved**. Propose no and low mow months on your block (in the early spring or late fall), create

a community garden and in the fall transform leaves into valuable mulch.

Mowing less also means less emissions, decreasing a household's carbon footprint. The low mow approach can be economical, practical and a timesaving alternative to replacing a lawn or even planting pollinating flower gardens. Researchers say if low mow became more socially accepted, it could be a great way to do more for the environment by doing less.

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University of New Hampshire
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Forest Impacts

UNH Forestry Researchers Receive Grants to Study Issues Impacting Northern Forest Region

Friday, May 20, 2022

UNH FORESTRY RESEARCHERS JEFF GARNAS (LEFT) AND MATTHEW VADEBONCOEUR ARE BOTH LEADING PROJECTS RECENTLY FUNDED BY GRANTS FROM THE NORTHEASTERN STATES RESEARCH COOPERATIVE.

What impact do nonnative pests and diseases have on the vegetation of the Northern Forest? How will climate change impact the range of the northern red oak, especially within the Northern Forest?

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2022 NSRC Awards Announcement

Jeff Garnas' lab webpage

Matthew Vadeboncoeur & Heidi Asbjornsen's lab webpage

These are two questions that University of New Hampshire scientists hope to answer with support from the U.S. Forest Service-funded **Northeastern States Research Cooperative** (NSRC) competitive grants program. Recently, the NRSC announced $2 million of federal funding and nearly $1.1 million in matching funds for 12 research projects focused on the Northern Forest , which refers to the 26-plus million acres of forested land stretching across Maine, New Hampshire, Vermont and into New York.

“Our forests play an important role in our local economy, in the overall health of our environment, and as a major resource in combating the effects of climate change,” noted Senator Jeanne Shaheen (D-NH). “Our policies to address these critical issues depend on sound science, which is built on this type of research. I applaud the NSRC, their member institutions and all the researchers who do the hard work on these critical studies.”

Invasive Pest Effects on Tree Demographics Across the Northeastern US

In this latest round of competitive grants, NRSC awarded funds to researchers from the **UNH College of Life Sciences and Agriculture** (COLSA) and the **UNH Institute for the Study of Earth, Oceans, and Space** (EOS). One project, led by **Jeff Garnas**, associate professor of natural resources and the environment and a researcher with the **NH Agricultural Experiment Station** (NHAES), will look at the impact of invasive insects and pathogens on tree demographics, in particular their effects on carbon storage capacity and sequestration rates, which is a key factor in climate models and climate change mitigation efforts.

Garnas and his co-principal investigators, including Andrew Liebhold and Randy Morin from the U.S. Forest Service and Songlin Fei of Purdue University, are looking at how insect pests

and diseases effect key ecological traits like tree growth, size-specific mortality, and reproduction of impacted trees and stands, and in turn, how such changes influence the forest's ability to capture and store carbon in the long term.

> "Forests worldwide are increasingly under threat from nonnative insect pests and pathogens, some of which have resulted in devastating, ongoing losses. An important question in the face of these invasive threats is how and whether impacted forests will recover, and when and to what degree they will regain their ability to maximally store carbon."

"Forests worldwide are increasingly under threat from nonnative insect pests and pathogens, some of which have resulted in devastating, ongoing losses," said Garnas. "An important question in the face of these invasive threats is how and whether impacted forests will recover, and when and to what degree they will regain their ability to maximally store carbon."

COLSA associate professor and NHAES scientist Jeff Garnas during a recent outing looking for beetles to use as biological controls for the invasive Purple loosestrife.

“The answer to these questions depends not only on the degree of damage caused by each new invasive insect or pathogen but also on how they change key vital rates, like growth and ability to reproduce,” he added. “The NSRC funding will help us to answer these fundamental questions using analytical and simulation models using data drawn from the US Forest Service’s Forest Inventory and Analysis program.”

The Northeastern United States is an epicenter of biological invasions of non-native forest insects and pathogens, added **Andrew "Sandy" Liebhold**, an entomologist with the U.S. Forest Service.

"This research will yield important new information on the impacts of some of these non-native species," said Liebhold, "not only on the magnitude of their impacts, but also on the long-term demographic trends of impacted tree species."

This work builds upon Garnas’ research with the NHEAS, which looks at the impact of beech bark disease (affecting American beech trees) on New Hampshire’s forests. Partial support for Garnas’ NHEAS research at UNH has been provided through joint funding of the **National Institute of Food and Agriculture**, **U.S. Department of Agriculture** (award number 1023443) and the state of New Hampshire.

Fire as a Tool in Northern Red Oak Regeneration and Management

Matthew Vadeboncoeur, a research scientist with the **Earth Systems Research Center** at EOS, will study the regenerative capacity and management of northern red oak in the Northern Forest and what role fire plays in growing the red oak range.

Vadeboncoeur and his co-principal investigators and collaborators, including Natalie Cleavitt of Cornell University; **Andrew Fast** and **Rebecca DiGirolomo** of the **UNH Extension**; **Heidi Asbjornsen**, professor of natural resources and the environment in COLSA and NH Agricultural Experiment Station researcher; **Stephen Eisenhaure**, COLSA land-use coordinator; and Mariko Yamasaki of the U.S. Forest Service, will study the silviculture of red oaks through controlled burns, tree-ring analyses, seedling experiments, and other methods. Their goal: to provide information on oak regeneration and how prescribed fires can serve as tools to creating more resilient, climate-ready forests.

Matthew Vadeboncoeur works on a research project at UNH's Thompson Farm for the UNH Ecohydrology Lab

“The wildfires that have occurred in northern New Hampshire already in 2022 show that fire is happening within the Northern Forest, regardless of whether it’s used intentionally as a management tool,” said Vadeboncoeur. “And climate projections suggest that there’s a strong potential for the red oak to expand its range within the Northern Forest.”

> “Our goal will be to understand the effects of

> wildlife on forest composition and to help land managers determine whether prescribed burning can help add red oak to their forests. Ultimately, we want to provide the tools to manage more diverse, resilient, and climate-ready forests."

"Our goal will be to understand the effects of wildlife on forest composition and to help land managers determine whether prescribed burning can help add red oak to their forests," he added. "Ultimately, we want to provide the tools to manage more diverse, resilient, and climate-ready forests."

The partnership between the UNH Extension and university researchers builds upon a long tradition of collaborating to identify community needs – in this case within the forest community – and bringing research-based information directly to practitioners through outreach and education, said DiGirolomo, a natural resources field specialist with UNH Extension.

"Northern red oak is one of our most valuable species from both a timber and wildlife perspective, and there has been significant concern within the forestry community related to the challenges of establishing adequate oak regeneration throughout the eastern U.S., including in New Hampshire," added DiGirolomo. "This research will contribute to and expand an existing body of research that demonstrates the importance of prescribed fire as a management tool in eastern forests."

You can find additional information about the Northeastern States Research Cooperative online. To learn more about Jeff Garnas' research, visit his lab webpage. For information about Matthew Vadeboncoeur's research, visit the UNH Ecohydrology Lab webpage.

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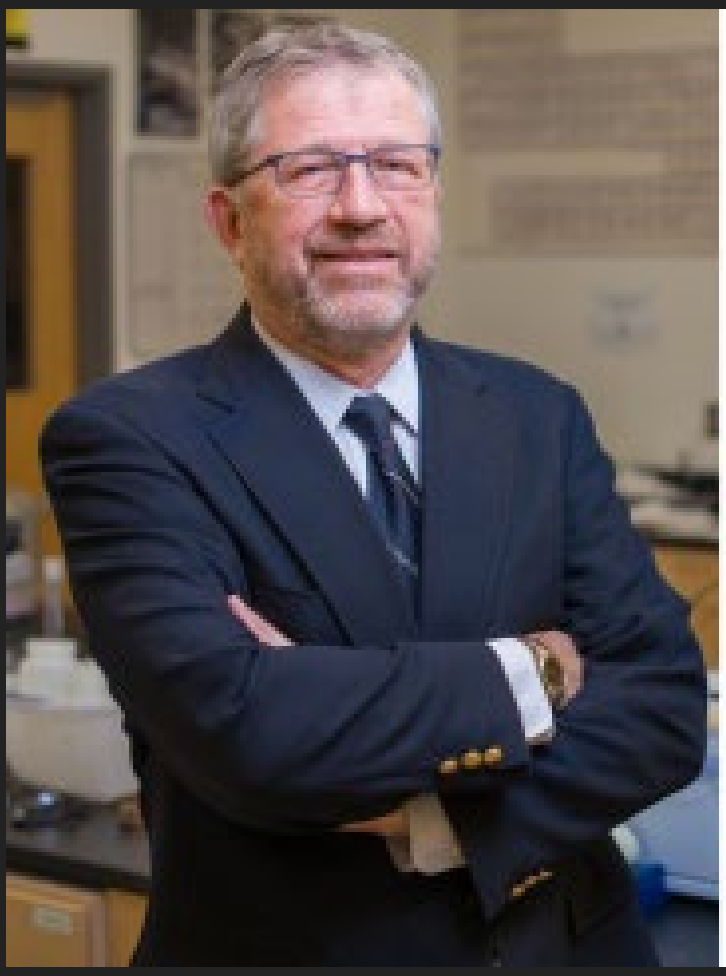

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Building Momentum for the Blue Economy

UNH is at the nexus of conserving and leveraging the power of the sea

SERIES: SPARK 2022

Friday, May 20, 2022

When it comes to the economy, the ocean is a major player — from tourism to energy, seafood to shipping, the world's marine-related assets tally up to trillions of dollars. But our oceans and coastlines are facing unprecedented pressures. Confronted with this reality, a new concept has emerged that considers both the economic benefits and the long-term sustainability of marine resources across all sectors: The blue economy.

The term is more than just a buzzword; it's helping researchers

think more broadly about how they can connect their work to new partners. From ocean acoustics to environmental DNA analyses, the breadth of blue economy research at UNH is wide-ranging and its momentum is building.

DIANE FOSTER, DIRECTOR OF UNH'S SCHOOL OF MARINE SCIENCE AND OCEAN ENGINEERING.

“The blue economy characterizes the critical nexus between ocean conservation and economics, because we can’t continue to draw from the ocean’s resources if we don’t conserve them,” says Diane Foster, director for the UNH School of Marine Science and Ocean Engineering (SMSOE). She is deeply involved in building partnerships between UNH and leaders in industry, federal government and nongovernmental organizations under this blue economy umbrella.

Industry-science partnerships are a critical component of the blue economy, and nowhere is that more evident than at the UNH Center for Coastal and Ocean Mapping (CCOM), a hub of innovative software and hardware development and cutting-edge expertise in seafloor mapping. CCOM researchers have cultivated those collaborations since the center’s inception in 2000 via its industry consortium, which regularly brings together scientists and developers who learn from one another and work together to test and improve the next generation of ocean mapping technology.

“Our industrial consortium has been one of the highlights of the program,” says CCOM director Larry Mayer, who is also a professor of Earth sciences. “Our researchers and students are exposed to real-world problems while gaining a better

understanding of how the commercial sector works, and hopefully our partners have benefited from the tools we have developed and from our interactions with them."

UNH'S TEST TIDAL TURBINE BENEATH THE MEMORIAL BRIDGE IN PORTSMOUTH, N.H.

Powering the Blue Economy

The tidal currents that flow beneath the Memorial Bridge in Portsmouth, N.H., are deceptively fast — peak flows can reach almost six knots, or three meters per second. The fact that those conditions can be found not far from UNH's Durham campus is a stroke of luck for researchers like Martin Wosnik, UNH professor of ocean engineering and director for the new Atlantic Marine Energy Center (AMEC) — a $9.7 million project funded by the Department of Energy (DOE) that partners with several other East Coast universities and DOE National Laboratories.

"We're out there testing tidal energy converters in a highly energetic environment and freezing cold conditions, and then a hot tea or coffee is just a quick boat ride away," he says, smiling.

Wosnik and his colleagues are quite literally powering the blue economy — they've been developing and testing tidal and wave energy devices in UNH's facilities and N.H. waters for many years. In partnership with industry and National Laboratories collaborators, they're currently testing the performance of cutting-edge marine energy devices, developing a wave-energy-powered water pump, and designing, building and testing a reference

model of a tidal turbine. This publicly available, open-source design will allow them to better evaluate the turbine's performance and provide a benchmark to help turbine developers evolve their designs. In between, they're conducting environmental impact studies to ensure their marine energy technologies do the least harm possible to their surroundings.

In his role as AMEC Director, Wosnik plans to expand upon these projects and delve into new technologies related to renewable energy. He's upbeat about the potential for progress, but also quick to point out that it won't be an easy path.

"The energy transition away from fossil fuels and toward more sustainable solutions is a massive undertaking and will require all hands on deck," he says. "But this is our chance to help harness the abundant energy in the ocean and find solutions that are better for future generations."

Sustainable Seafood, Sustaining the Sea

Michael Chambers, research professor with SMSOE, knows a thing or two about growing fish —his aquaculture collaborations with local fishers and chefs have put New Hampshire on the culinary map for oysters, steelhead trout and kelp. Chambers and his colleagues across New England now find themselves pivoting hard toward whale-friendly aquaculture gear to decrease potential entanglement of highly endangered right whales that travel through the Gulf of Maine.

His team is working with a new type of line made from fiberglass rebar that's currently being evaluated at a kelp farm in Maine. "It's like dry spaghetti, so when it bends, it eventually breaks," Chambers says, "so that means if a whale swims through the farm, there would be less opportunity for the whale to entangle in the stiff lines. Sure, it would break the farm up, but it wouldn't affect the whale — it would just keep swimming."

Chambers is part of the new UNH Sustainable Seafood Center, a

joint venture between SMSOE and the College of Engineering and Physical Sciences that operates at the intersection of food security, climate change adaptation and ecological protection. Education will be a major component for the new center, and Chambers is working directly with communities throughout the U.S. to help them build and sustain their own version of UNH's AquaFort — a floating platform that grows fish, kelp and shellfish alongside one another, providing food with virtually no impact to the marine environment.

ELIZABETH FAIRCHILD CONDUCTS AQUACULTURE RESEARCH WITH LUMPFISH.

Also at the Sustainable Seafood Center, Elizabeth Fairchild, a research associate professor of biological sciences, conducts research with lumpfish. These charismatic creatures serve as a cleaner fish in Europe and Canada, where they eat sea lice off the salmon-like steelhead trout raised in aquaculture pens — a practice widely considered to be more environmentally friendly than treating fish with chemicals to fend off the pests. She has been working with regional colleagues to establish a lumpfish industry in the U.S. and help aquaculturists navigate the onerous permitting process that will enable them to utilize the cleaner fish species in their pens.

"I'm excited for the Sustainable Seafood Center to grow here at UNH," says Fairchild. "We have a long history of cutting-edge

applied research in the marine environment — we're good at uniting various groups, like engineers, aquaculturists and fisheries biologists who are working toward a common goal."

Resilient Coastlines and the Assets they Protect

Despite New Hampshire's modest length of coastline, it boasts a thriving ocean-based tourism and recreation sector. However, more intense storms, rising sea levels and frequent flooding are threatening the businesses and infrastructure that underpin those parts of the economy.

Alyson Eberhardt, a coastal ecosystem specialist with New Hampshire Sea Grant and UNH Cooperative Extension, has been working to improve the resilience of the New Hampshire seacoast and offer better ecosystem-based protection in the face of those threats.

Along with her colleagues at the UNH Coastal Habitat Restoration Team, she regularly engages with volunteers, coastal homeowners and students to plant native grasses that trap sand and build up natural dunes that serve as the frontline of protection from storms that ravage the coast. She's involved in a new $3 million project funded by the National Fish and Wildlife Foundation that is aimed at additional protection and restoration for dunes and salt marshes.

Eberhardt has also spent the past six years working with volunteers to learn about height changes on the state's beaches as the sand moves with the tides. The beach profile data they've collected is forming a clearer picture of which beaches would benefit from additional sand nourishment and which ones are doing just fine on their own; this information is critical for local decision-makers who want to ensure there's space for beachgoers to enjoy the water's edge.

"The stressors on our coastal and marine systems are increasing, and it's scary to think about the loss of our marshes and dune

systems," Eberhardt says, "but there's more awareness and a growing interest in protecting those ecosystems, coupled with a wave of financial support and resources coming in. Ultimately, I'm hopeful that there's some awesome potential to make really big, positive changes going forward."

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Passings: Eric Scheuer

UNH remembers life of hardworking and humorous atmospheric chemist

Thursday, May 12, 2022

Eric Scheuer, a long-time research project engineer in UNH's Earth Systems Research Center (ESRC), passed away on May 6, 2022, in Durham, New Hampshire. He was 51 years old.

Scheuer earned two degrees at UNH: his Bachelor of Science in water resources management in 1992, and a Master's Degree in Earth sciences in 2009. Scheuer stayed on at UNH after graduating in 1992, where he conducted research on atmospheric chemistry alongside Jack Dibb, a research associate professor, and Bob Talbot, previous director of the ESRC when it was

formerly known as the UNH Climate Change Center. Scheuer's research took him around the globe, mostly flying on NASA's DC-8 airborne laboratory while ensuring that UNH's air sampling instrumentation was working properly. He participated in numerous NASA campaigns, including various Pacific Exploratory Missions and ATom searching for the world's cleanest air, and more recently, sampling extreme local and transported pollution over Korea during KORUS-AQ and wildfire smoke for FIREX-AQ.

ERIC SCHEUER TOOK PART IN NUMEROUS NASA AIRBORNE SAMPLING CAMPAIGNS.

Dibb fondly recalls traveling all over the world with Scheuer on these campaigns. They would often have a few days in between flights, so they would spend time enjoying new sites and cuisines. Dibb notes that they had both seen the Northern Lights in Greenland and Churchill, Manitoba, the Moai statues on Easter Island and massive green sea turtles on Ascension Island during the course of their careers. Then it was back to the long flights focused on data collection, where Scheuer was by all accounts a hardworking and positive member of the research team.

"Eric would help anyone out if he could, either on the research campaigns or back at UNH," Dibb says. "He had the attitude that we're all in this together, and he was really recognized as being the go-to guy for assisting with almost anything when someone was in need."

Sheuer's colleagues from NASA spent many years working —

and laughing — alongside him. Here are memories from several of them:

Carolyn Jordan, associate research fellow at the National Institute of Aerospace and member of the NASA Langley Aerosol Research Group says, “Eric was highly skilled with building the in-flight instrument systems and the logistics required for assembling a temporary lab on the ground anywhere in the world where the DC-8 deployed. Further, he made them simple to use for students and colleagues that deployed with the group who did not have his expertise. But perhaps his most astonishing gift for airborne research is he never suffered from motion sickness. Eric was suited to airborne measurements like a duck to water. I will always remember his ready smile and laughter, his great sense of humor, his gift for telling stories from his field adventures. He will be truly missed.”

James Crawford, senior scientist for atmospheric chemistry at NASA Langley Research Center, says, “Eric and I both went to the field for the first time in 1993, and he became part of my family away from home for almost 30 years across numerous NASA airborne sampling campaigns. There isn't much time for rest in the field, and Eric's tireless efforts and passion for our work documenting the state of the atmosphere made it feel easy. Even his complaints came with a smile and a wink that acknowledged he was right where he wanted to be, and we were glad he came along for the ride.”

Barry Lefer, program scientist for the Earth Science Division and tropospheric composition program manager at NASA, notes, "Back when I was a graduate student at UNH in the early 1990s, I was looking for a couple of undergraduate students to help me collect and analyze trace gas and aerosol samples from a tower at Harvard Forest. I was fortunate that Eric applied, and I was excited to get him on the Talbot and Dibb team as he already had

laboratory sample analysis experience and it was clear he knew much more about engineering and electronics than I ever would. Before too long he was improving and rebuilding our ion chromatography system. It was so much fun to catch up and hang out with Eric on the various NSF and NASA airborne field campaigns over the past 20 some years. And I was always amazed to see how he continued to update and improve the instruments and analytical systems. But most memorable is Eric's loud laugh and big heart."

Matt Berry, chief of Code 430 Operations Engineering Branch at NASA's Armstrong Flight Research Center (AFRC), says, "Eric was a great guy and a pleasure to work with during my time on DC-8. [He was] one of the many reasons the team has been one of the most consistent, dependable and long-time residents on the DC-8 platform. I will always remember the dedication to work, great attitude and willingness to work with everyone to get the job done that Eric always brought when he assisted the payload integration, flights and de-integration efforts both at AFRC and on the deployments. He will truly be missed."

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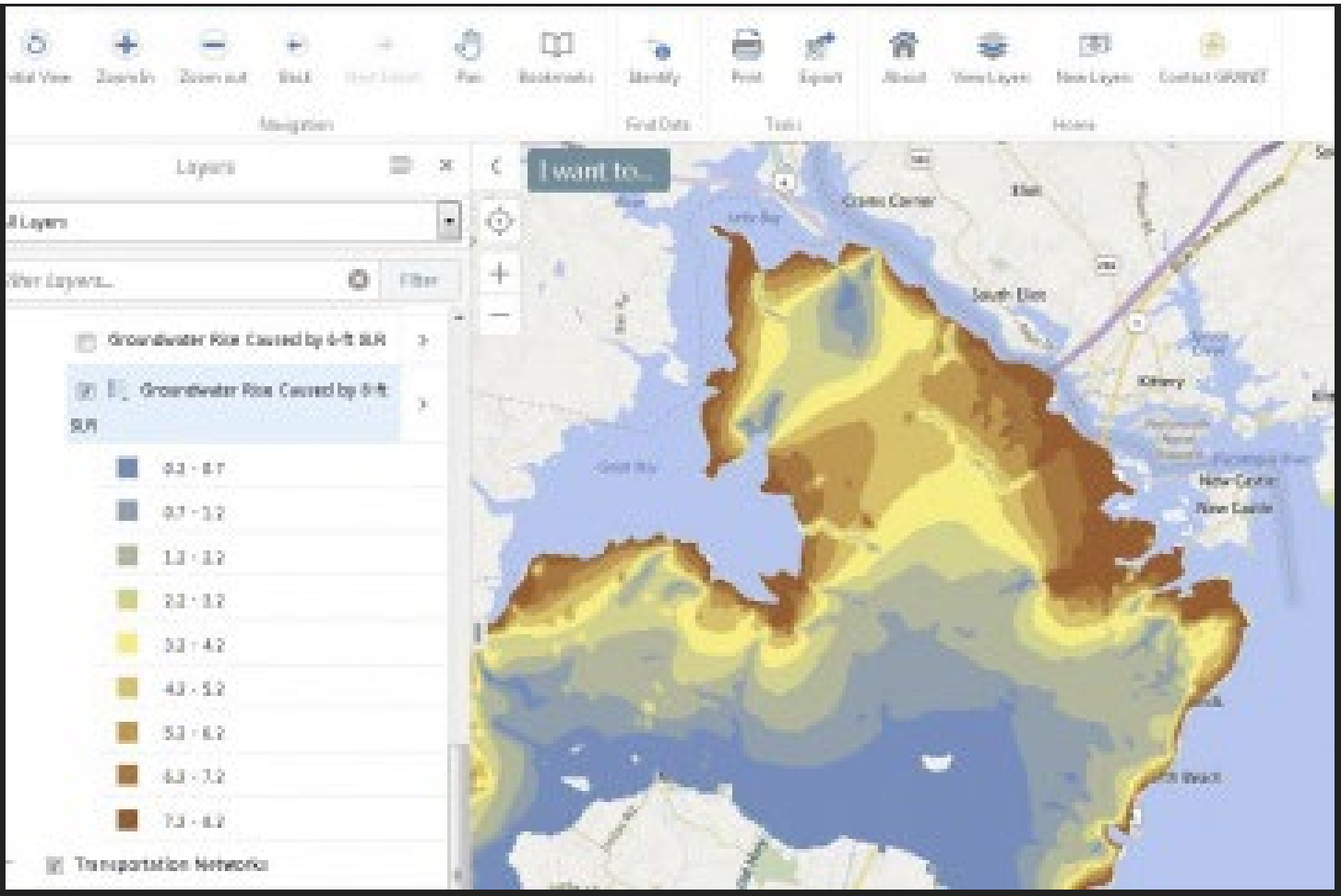

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Differentiating Dolphin Dialects

Improved acoustic technology tracks habitat shift to colder waters

Monday, May 9, 2022

PACIFIC WHITE-SIDED DOLPHINS (ABOVE) HAVE A CALL THAT SOUNDS ALMOST IDENTICAL TO THAT OF THE RISSO'S DOLPHINS. PHOTO CREDIT: NOAA FISHERIES

Dolphins, like many ocean-going creatures, are on the move — warming ocean temperatures are pushing many of these marine mammals far north of their historic ranges. Now, a UNH-led breakthrough in underwater acoustic technology will help scientists to distinguish between similar-sounding cetacean calls as they expand their habitat due to climate change.

A recent study published in Nature focuses on two species of dolphins — the Pacific white-sided dolphin and the Risso's dolphin — that have been heard in Alaska's Bering and Chukchi seas in recent years, signifying their northward habitat expansion past the Aleutian archipelago. The vocalizations of these two species are nearly identical, making it difficult for both scientists and computer algorithms to tell them apart from one another and thus differentiate their movements.

A RISSO'S DOLPHIN. PHOTO CREDIT: NOAA FISHERIES/J. COTTON

Mahdi Al Badrawi, a research assistant professor in the UNH Center for Acoustics Research and Education and first author on the study, saw an opportunity to improve on the previous technologies. By pairing a detector (which filters out noise and identifies animal sounds) and an improved type of classifier (which matches the newly recorded vocalizations to a database of known animal sounds), researchers can now distinguish a Pacific white-sided dolphin from a Risso's dolphin with just a single clicking sound made by the dolphins and recorded underwater — a crucial upgrade, Al Badrawi notes, because there may be only a few vocalizations recorded as the dolphins move into new territory.

"Monitoring marine mammals is vital for conservation efforts and climate change tracking," he explains. "In addition, it's likely that these two dolphin species will have an impact on the Arctic food web, and because they eat the same types of fish that humans do, fisheries managers will need more information about dolphin populations and habitat expansion to set sustainable limits on fish harvests."

Al Badrawi's interest in underwater acoustics began while he was a post-doctoral researcher at UNH in 2017, when he first started to explore this topic with colleagues. As part of this study, he developed a tool called the Variational Mode Decomposition (VMD), which enables the classifier to break down sound signals into more highly defined pieces to see all the fine-scale characteristics. The new technology he helped develop can be used to differentiate animals of similar acoustic characteristics, whether they live underwater or on land, he notes.

"Monitoring marine mammals is vital for conservation efforts and climate change tracking."

"I find it fascinating how the classification of these animals — being able to tell them apart from one another — can play an important role in our understanding of climate change and our efforts to mitigate those changes," he adds.

This research was funded by the U.S. Office of Naval Research's Marine Mammal and Biology Program.

The UNH Institute for the Study of Earth, Oceans, and Space (EOS) is UNH's largest research enterprise, comprising six centers with a focus on interdisciplinary, high-impact research on Earth and climate systems, space science, the marine environment, seafloor mapping and environmental acoustics. With approximately 100 principal investigators managing more than 400 individual grant awards, and with annual expenditures exceeding $45 million, EOS fosters an intellectual and scientific environment that advances visionary scholarship and leadership in world-class and graduate education.

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