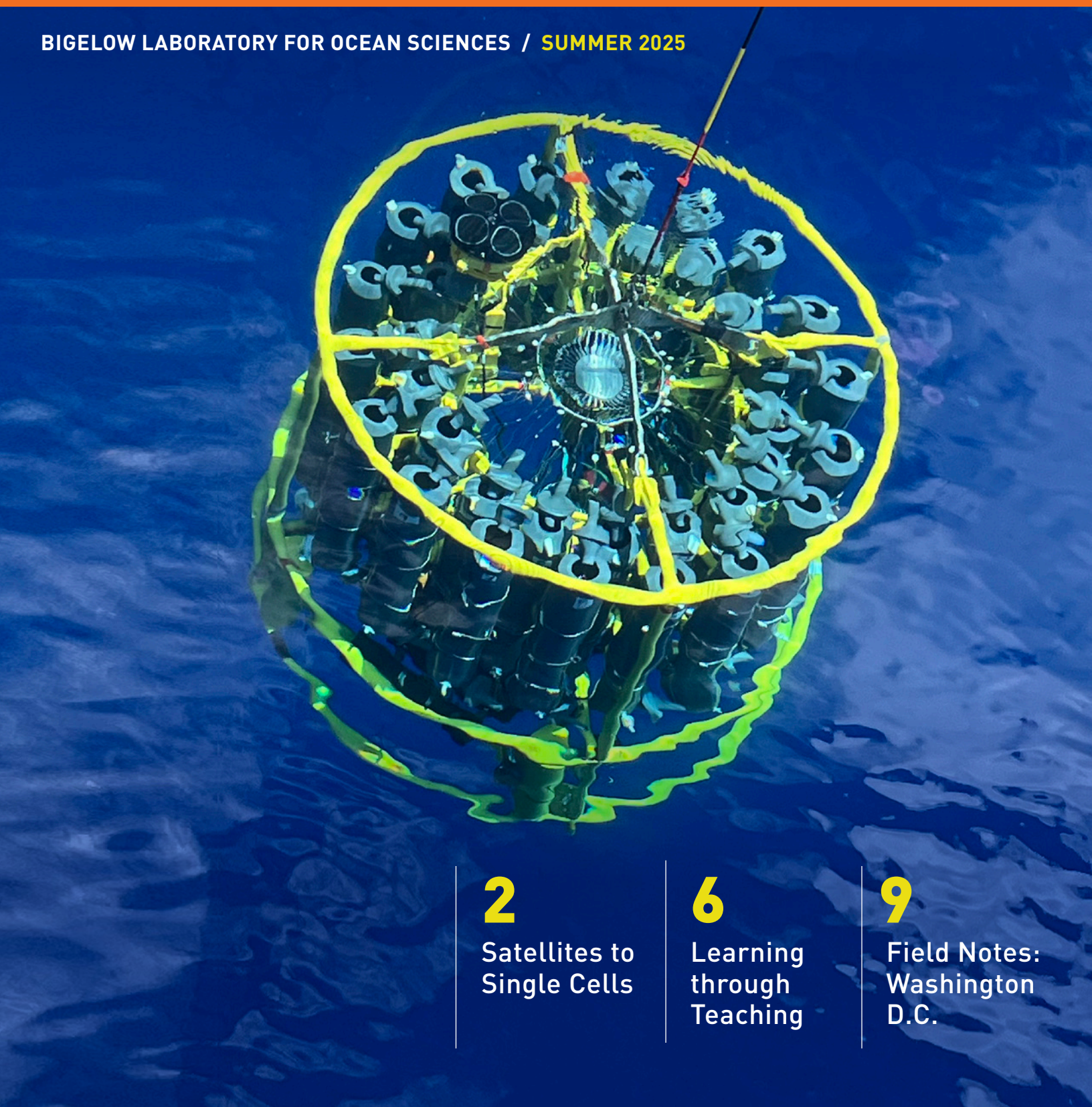
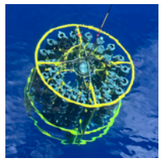
TRANSECT

BIGELOW LABORATORY FOR OCEAN SCIENCES / SUMMER 2025





ON THE COVER

This spring, Research Associate Laura Lubelczyk spent almost six weeks in the Indian Ocean as part of Bio-GO-SHIP, a collaborative effort that aims to improve understanding of the ocean's biology. On board the R/V *Thomas G. Thompson*, the researchers used CTDs, like the one pictured, and other oceanographic equipment to get data to illuminate the role of plankton in global biogeochemistry and to help quantify marine biodiversity.

Photo: Laura Lubelczyk

DESIGN Springtide Studio
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Message from the President

I've had the privilege of writing 15 of these letters since becoming Bigelow Laboratory's president. Whether we're celebrating recent breakthroughs, welcoming fresh-faced students to our lab, or talking about promising new advancements, it's usually hard to know where to start. This year, however, it's hard to avoid the elephant in the room (or laboratory) as I write this.

The recent upheaval in federal funding means the scientific community is facing unprecedented uncertainty. Our lab is no exception. With so much of it swirling around it can be tempting to glaze over or (worse) give in to it. That's why I choose to focus on its opposite — certainty — to stay focused and motivated.

These days, what I am certain about is the quality of our people and impact of Bigelow Laboratory's science. I am reminded of the former every time I walk through the halls of our lab. A good example of the latter can be found on page 10. There, you'll see our latest Impact Report, which is a sampling of how our scientists are pushing boundaries, illuminating the unknown, and creating new ways to unlock the ocean's potential.

As we wrap up our 50th anniversary this summer, I'm certain that the discoveries and innovations that have defined our lab's legacy will also inform our future. A perfect example of this is in our story on page 2 that highlights new research that combines fields pioneered by our founders in entirely new ways.

I'm also certain that it is more important than ever to give the next generation of ocean leaders the knowledge, tools, and skills it will take to tackle tomorrow's challenges. Our story on page 6 highlights how our education programs are inspiring and beneficial to students and researchers alike. And with the Harold Alfond Center for Ocean Education and Innovation opening its doors as I write this, I'm ecstatic at the potential of this new space to enhance our education program even further.

You'll find the names of every individual and entity who supported Bigelow Laboratory in the last year on page 14. The list represents the emotional and financial foundation of what we do, and when I see those names, many of whom I know personally, I'm filled with hope — and certainty — for our future!

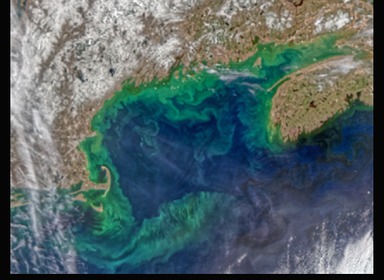
Deborah A. Bronk

DEBORAH A. BRONK, Ph.D.

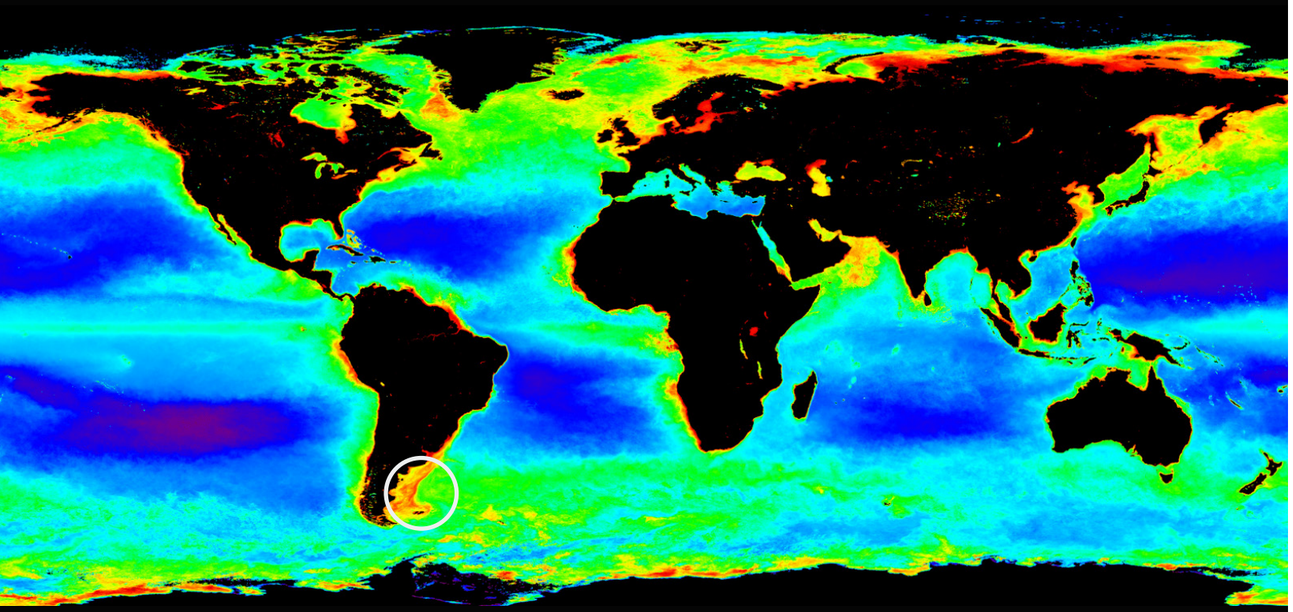
CONTENTS

THE HAROLD ALFOND CENTER for Ocean Education and Innovation is officially opening! The significant expansion to Bigelow Laboratory's campus will revolutionize the institute's education and solutions-focused work with dedicated teaching spaces, high-tech laboratory facilities, and a versatile forum that encourages scientific and community collaboration.

FROM SATELLITES TO SINGLE CELLS



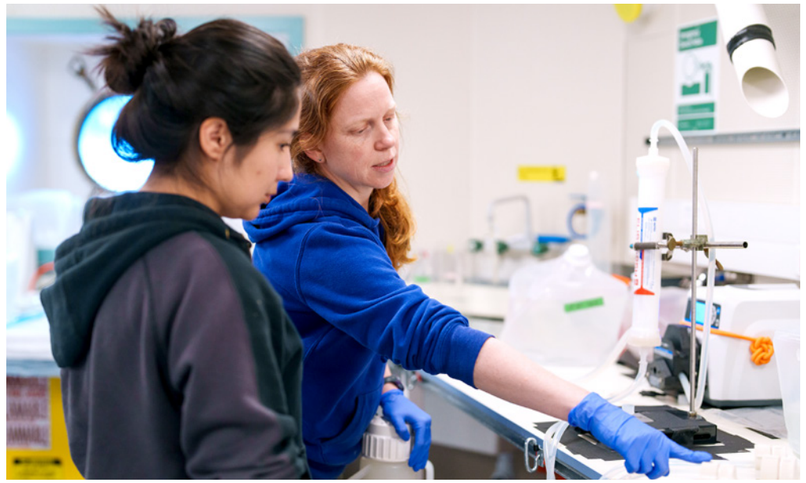
A NASA-funded project, born out of Bigelow Laboratory seed funding, marries two of the institute's long-standing areas of expertise. Researchers are creatively using satellites in space to understand the diversity and function of some of the smallest microbes in the ocean. Their work will advance data science while helping reveal the past and future of the dynamic Gulf of Maine.



NASA SATELLITE IMAGERY shows how the presence of phytoplankton and other organic matter alters the color of seawater. Bigelow Laboratory scientists were recently funded to explore how satellite data and remote sensing approaches may be used to understand, even predict, the structure and function of microbial communities in coastal shelf environments like the Gulf of Maine (top). The work evolved from a seed project that identified interesting patterns in the potential relationship between ocean color and microbes in the dynamic Patagonian Shelf off the coast of Argentina (circled above).

Photos, top to bottom: NASA Plankton, Aerosol, Cloud, ocean Ecosystem; NASA Ocean Biology Processing Group

'We'll be able to use satellites to look into the past, and even project into the future, to see how those essential microbial communities, and the services they provide, are changing.'



LEFT Senior Research Associate Tim D'Angelo collects water samples during a GNATS research cruise while other scientists on board gather ocean color data.
RIGHT Senior Research Scientist Julia Brown (right) begins to sequence the genetic information of microbial samples.

Early on a mid-April morning, a group of scientists headed down the dock at Bigelow Laboratory onto the institute's research vessel, loaded to the gills with equipment. It was that time of year in Maine when it could still be cold and blustery or balmy with bright skies. Fortunately, this day was the latter — and not just because it would make the long day on the boat more pleasant.

The team was out on the water for the Gulf of Maine North Atlantic Time Series, which provides an unparalleled view of changing conditions and biological communities in the Gulf of Maine. Funded by NASA, GNATS is used by the agency to validate its satellite observations of ocean color with on-the-water measurements (hence, the need for a clear day to ensure an unobstructed satellite overpass!).

After several years of uncertainty, GNATS is back this year under the leadership of Senior Research Scientist Catherine Mitchell, using the R/V *Bowditch* to collect data on the Gulf's optical properties, temperature, nutrient levels, and more. Timed with last year's launch of PACE, NASA's newest and most advanced ocean color satellite, the next era of GNATS will enable significant advances in scientists' understanding of how the Gulf of Maine is changing and how satellites can be used to study the ocean.

Mitchell has partnered with Senior Research Scientist Julia Brown to make sure of that.

A collaborative project proposed by Brown and Mitchell was recently funded by NASA. They aim to link remote sensing, and satellite-based measurements of ocean color, with in-situ measurements of the diversity and activity of microbes. It's the perfect marriage of two of Bigelow Laboratory's most established areas of expertise.

The ultimate goal is to develop oceanographic models that incorporate information on what microbes live in the Gulf of Maine and what they're actively doing. With that information, researchers could use satellites to better understand — and potentially even predict — how those communities, and the biogeochemical processes they drive, are changing. In the process, the team will advance computational tools to link data collected at wildly different temporal and spatial scales, creating new ways of studying even the most dynamic and remote parts of the ocean.

"Microbes drive ocean biogeochemistry," Brown says. "With this project, we'll be able to use satellites to look into the past, and even project into the future, to see how those essential microbial communities and the services they provide are changing."

"I think this reflects one of the best parts of being at Bigelow," Mitchell adds. "My background is in physics, and Julia is a microbial biologist. There are not many institutions where we'd be able to find each other and do this kind of work together."

Photos, left to right: Catherine Mitchell, Schmidt Ocean Institute

THE SCHOONER TARA is pictured after completing its epic, multi-year journey across the global ocean, providing scientists with unprecedented data combining measurements on seawater optics and microbes.

AN INTERDISCIPLINARY LEADER

Since its earliest days, Bigelow Laboratory has been a leader in the field of satellite oceanography, using satellite-observable qualities like color to understand the abundance and type of organic matter in the ocean. Likewise, the institute has been a leader in advancing genetic sequencing tools to characterize microbial communities down to the level of DNA within a single cell. And interdisciplinarity is even baked into the institute's guiding principles. But combining those areas of research has remained a challenge.

So, scientists got together for regular "Café Code" sessions to brainstorm how to leverage their similar computational approaches to bring together different areas of expertise. Out of those discussions, Brown and Mitchell wrote a white paper on how remotely-sensed satellite information could potentially be used to predict the diversity of microbial communities at a global scale.

Then, everything fell into place.

Just as the researchers finished their white paper, the institute began offering kickstarter funds to support early-stage projects. At the same time, data began pouring in from the revolutionary Tara Oceans Expedition — an almost-three-year, 125,000-kilometer sailing trip around the world in the early 2010s where an international team collected both optics data and microbial samples.

"It's become more common, but at the time, it was really rare for people to be measuring both those things on the same ship," Mitchell says. "It's opened up the door for all sorts of possibilities."

Using the seed money, Brown and Mitchell began digging into how to pair ocean color and microbial information from Tara Oceans, asking whether that unique combination revealed any interesting patterns. For the most part, the answer was no.

"But there was this one sample on the Patagonian Shelf off South America that looked completely different from everything else," Brown says. "It made us think that, maybe, in these dynamic shelf environments where everything is heterogenous and constantly changing, we might be able to see something. It was the seed of an idea within the seed of a project."

A BOLD PROPOSAL

Late last year, leveraging those preliminary findings, Mitchell and Brown secured NASA funding to undertake their own sampling and continue exploring ways to link these different data sources.

Senior Research Associate Tim D'Angelo joined Mitchell and her team aboard the first GNATS cruise in April to kick off the sampling component of the project, and he and Brown will continue to join the expeditions for the rest of the year. At each stop along the transect, they'll gather water samples to sequence for microbial DNA, which will tell them what microbes are there, and RNA, which will suggest what those microbes are doing. They'll use a database of around 7,000 microbial genomes from the Gulf of Maine, already sequenced by researchers at Bigelow Laboratory, as reference to map out which microbes are present and active.

The next step will be to combine that biological information with optical data collected by instruments on the *Bowditch* that measure how much, and at what wavelength, light is reflected and absorbed by different kinds of organic matter. That will enable the researchers to understand the relationship between the microbial community and the abundance and type of organic matter in the water. Using those direct measurements from the boat will also help the team develop methods to accurately match the datasets, which can then be scaled up to use color data from satellites.

The final step will be to build models that use this relationship to understand and predict how the diversity and function of the microbial community is changing over time and space.

"We're trying to match something collected from a satellite on a kilometer scale to an in-situ measurement from a single point in the ocean so, even with our modeling experience, there's lots of exciting challenges we need to work through," Mitchell says. "It's definitely going to push our teams to learn new things."

That bold approach is exactly what Bigelow Laboratory aimed to foster with its kickstarter projects, and that preliminary work was invaluable for getting this larger effort funded. Otherwise, Mitchell says, their plans may have seemed "impossible." Brown adds that being able to leverage the GNATS cruises that were already planned and funded was another huge bonus for their proposal.

But both say that the real key to making this work happen is the institution itself.

"At Bigelow Laboratory, we're all on the same team," Brown says. "The expertise and reputation we have in these two separate areas helped. But really it's the collaborative environment that allowed this project to come together."

Photo: Yohann Cordelle

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Whales in the Forecast
Using 21st Century Tools to Understand an Endangered Species
Dr. Nick Record, Dr. Rebekah Shunmugapandi, and Dr. Jonathan Syme

JULY 23
Water Health and Humans
Leveraging Community Partnerships to Protect Maine's Waterways
Dr. Rachel Sipler and Dr. Robin Sleith

JULY 30
PFAS in Casco Bay
Tracking the Fate of Forever Chemicals on Maine's Coast
Dr. Christoph Aeppli and Hannah Sterling

AUGUST 6
Ocean Epidemiology
Tracking Marine Diseases to Protect Fisheries and Ocean Health
Dr. Maya Groner, Dr. Melissa Rocker, and Dr. Reyn Yoshioka

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Learning through Teaching

A longstanding relationship with Colby College gives Bigelow Laboratory scientists the chance to teach on-campus classes for Colby undergraduates. These courses have immense benefits for the institute and for students, often providing them their first taste of ocean science. And for the researchers who seek it out, classroom teaching is a fulfilling experience, exposing them to new ideas, new fields, and the perspectives of a new generation.

ELIAS PORTER, a Colby College senior, collects samples during Sea Change Semester, which he applied to after taking an on-campus class with a Bigelow Laboratory researcher.

Photo: David Fields

Bigelow Laboratory's East Boothbay campus is often packed with undergraduates. Through internships, the Sea Change Semester program, and field trips, students from universities and community colleges across the country have several, hands-on opportunities to engage with the institute's research.

But sometimes the relationship goes the other way. During the academic year, several Bigelow Laboratory scientists venture to Colby College, 60 miles up the road, to teach regular classes in multiple departments in support of a new, Bigelow-driven marine science minor. This upcoming year, in fact, scientists will be teaching more on-campus classes at Colby than ever, in everything from science communication to introductory ocean science.

These on-campus courses enhance Colby's offerings, exposing a broader swath of students to ocean science, including those who may never step foot in East Boothbay. They increase the visibility of the institute at a leading liberal arts college, which can aid recruitment for Sea Change and other programs. And, for scientists who have otherwise dedicated their life to research, they're a valuable opportunity to develop new skills and nurture fulfilling mentorship relationships.

"For me, teaching adds breadth to my intellectual life," says Vice President for Education Ben Twining. "Teaching a subject really enhances your understanding of it, and it confronts you with the bigger picture. I'm a better scientist because of it."

RELATIONSHIPS TO ADVANCE OCEAN SCIENCE

Colby College and Bigelow Laboratory formed a strategic partnership in 2010 to leverage their combined resources to advance both education and research. The Sea Change program, which is the centerpiece of the relationship, began shortly after. It enables undergraduates to live at Bigelow Laboratory for a semester while they undertake ocean science courses, independent research, and fieldwork. The program is accredited through Colby, though it has been open to students from other institutions for several years.

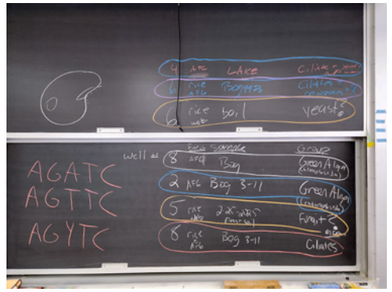
But from the earliest days of the partnership, Bigelow Laboratory scientists also taught at Colby.

Twining developed an introduction to ocean science course during Colby's month-long exploratory January term in 2010. Researchers have continued to teach those special "Jan Plan" courses almost every year since. The semester-long classes began in 2018 when Senior Research Scientist Peter Countway taught a special, research-based capstone for environmental science majors, which he has also continued to teach every year since.

Bigelow Laboratory scientists have taught a range of subjects at Colby — from foundational topics like evolutionary biology and marine microbiology to applied ones like ocean forecasting and geoengineering. The diversity of offerings reflects the variety of scientists' interests, but classes are also developed in close consultation with Colby to fit within the school's curriculum and needs.

For Bigelow Laboratory, there are countless benefits. The institute gets library access and academic discounts through the partnership, and senior scientists get salary support to supplement their grants. They also get access to an intellectual community and resources on Colby's campus.

"The relationship with Colby puts us in the academic world, which is useful," Twining says. "It connects us with a breadth of disciplines we don't have here, exposing us to new ideas and giving us colleagues from different fields."



COLBY COLLEGE STUDENTS participate in field trips and classroom lectures for "Evolutionary Cell Biology," a 200-level class offered in Colby's biology department and taught by Senior Research Scientist John Burns, about the principles of molecular biology and evolutionary diversity.

Photos: John Burns

'Teaching adds breadth to my intellectual life… I'm a better scientist because of it.'

Though most on-campus teaching is done by senior researchers, postdoctoral scientists can also get involved. That provides them essential skills training before they go on the job market, says Director of Education Aislyn Keyes.

Keyes was hired in 2023 as the inaugural marine educator. She provides logistical support for would-be teachers, especially for Jan Plan courses that may spend significant time at Bigelow Laboratory, and helps them implement the most up-to-date, evidence-based teaching practices in their classrooms.

"Postdocs have the opportunity to really develop their science portfolio while they're here, but if they're interested — or think they may be interested — in university positions, that will require showing that they can teach and that they've developed their own teaching approach and style," she says.

EDUCATION'S INTANGIBLE BENEFITS

Keyes herself came from a science background, transitioning after her PhD into education because of how energizing she found teaching.

"Being around students, it just fills your cup, and I have the best feeling every time I walk out of a class-

UNDERGRADUATE STUDENTS learn to do fieldwork with Bigelow Laboratory researchers, an opportunity that is available to participants in many of the institute's educational programs, including the Jan Plan introductory ocean science class (above) and Sea Change Semester (below), both part of Colby College's new marine science minor.

room," Keyes says. "But it's also about paying it forward. Most of us got where we are because of mentors, and having the opportunity to be that for someone just starting their career is hugely impactful."

Teaching can also be a learning experience for the scientists themselves.

Senior Research Scientist John Burns just wrapped up his second iteration of "Evolutionary Cell Biology," which applies concepts from molecular and cell biology to understand the diversity and evolution of life. He describes teaching as a "conversation."

"It helps me ensure I have a good breadth of knowledge in my field, and students always come up with surprising ideas," he says. "It's fun to work through those ideas with them, and sometimes it gets me to think about things in a new way."

Senior Research Scientist Doug Rasher adds that teaching is also a chance to explore new areas of research.

'Most of us got where we are because of mentors, and having the opportunity to be that for someone just starting their career is hugely impactful.'

Rasher has taught "Seafood Forensics," which digs into real-world issues around illegal fishing and seafood mislabeling, five times.

"The students love the framing because it is timely and relevant, and it's definitely made us all more empowered consumers of seafood," Rasher says. "But it's also allowed me to broaden and deepen my understanding of our oceans, opening up new collaborations for research proposals and papers."

That face time with students, he adds, is also handy for recruiting them to the institute's more intensive programs.

One such student is Elias Porter, a current Colby senior studying environmental science. Porter, who says he was familiar with Bigelow Laboratory growing up on the Maine coast, took Rasher's class as a sophomore.

"I think courses with Bigelow staff at Colby are great ways to meet researchers and start to find out what marine research is actually like," he says. "Doug's class was my first serious, literature-heavy course and a great way to dip my toes into the world of research."

It inspired Porter to enroll in the Sea Change Semester the next fall where he did independent research with Rasher. He even stuck around for the January term after as an intern. It's a perfect example of the "multiple points of contact" that Twining and the education team strive to create with students.

"I think it would be really hard to experience the community, resources, and expertise at Bigelow and decide that you don't like the lab environment," Porter says.

There's growing interest, both at Colby and among scientists at Bigelow Laboratory, for these Bigelow-led courses. Investments — like Keyes's new role, the marine science minor, and the recent laboratory expansion — are helping fill that need. The goal, the education team says, is to offer more classes, create more regularity, and facilitate more opportunities for students to get their hands wet (literally!).

"That will not only benefit students and the college, but also guarantee demand for our courses and create these teaching opportunities for those who want them," Twining says. "One of the things I love about Bigelow is that no one has to teach that doesn't want to. The people who do it are committed to it, and they're seeking it out, so we're committed to making it happen for them."

Photos, top to bottom: Aislyn Keyes, Yoon Byun

FIELD NOTES

Washington, D.C.

NICHOLE PRICE, Senior Research Scientist

"In early April, I had the good fortune to travel to Washington, D.C. It was my second trip since the inauguration, but one of dozens of interactions I've had with policymakers in the District in the past two years in my capacity as the director of Bigelow Laboratory's Center for Seafood Solutions.

I was there with Dana O'Brien and Kevin Kelley of BioHarbor Strategies, a public affairs consulting partner. We just missed the cherry blossoms, but trees were leafed out, and spring was in full bloom. As is the case when doing any kind of fieldwork, there's usually not much spare time on these "expeditions" to Washington. But on this particular trip, while traipsing the "Hill" between meetings, we visited the balcony atop the Capitol to look down across the National Mall. Within the Rotunda, I found the sculpture of Lucretia Mott, Elizabeth Cady Stanton, and Susan B. Anthony — with an untouched portion rumored to be awaiting the visage of the first female president — particularly inspiring!

Quickly, though, it was back to work. Our schedule was packed with meetings with staffers from Maine's delegation and various congressional committees and with partners in the U.S. Department of Agriculture and other federal agencies.

As with prior trips, my itinerary was designed to educate and advocate with decision makers on issues beleaguering the shellfish and seaweed aquaculture industries — and to demonstrate how Bigelow Laboratory's cutting-edge science can relieve those bottlenecks. Over the last several years, I've been working on a report with the USDA Agricultural Research Service showing how R&D around farmed seaweeds and seagrasses is driving new economic activity on the working waterfront. Part of our goal during the latest trip was to showcase this report, which came out last fall, and explain how pending bipartisan bills, like the Innovative Feed Enhancement and Economic Development (IFEED) Act and Plant Biostimulant Act, can open new markets. These bills create a cleaner regulatory path to market for novel algal-based livestock feed additives and row crop agricultural fertilizers. They'll also enhance U.S. industry in the rapidly growing global seaweed sector. More immediately, these policies will enable our Coast-Cow-Consumer research program to safely test novel products on experimental herds and farm plots as part of our work developing algae-based products for the dairy industry.

I may spend more time meeting with agricultural policy experts than most, but many of my colleagues at Bigelow Laboratory make similar treks each year to D.C. We're bringing our science directly to policymakers by meeting with staffers, presenting in hearings, and expanding our networks within federal funding agencies.

I've spent plenty of time in the field as a scientist, diving coral reefs from the Central Pacific to Bermuda. But these days, my idea of the "field" is broader than ever, stretching from dairy farms in upstate New York to the halls of the Capitol. I may return to those remote reefs some day! But in the meantime, I've traded in my wetsuit for a blazer, and I'm finding these D.C. trips just as satisfying. It is truly science in action!

Photos, top to bottom: Dana O'Brien, Nichole Price

2024 IMPACT REPORT

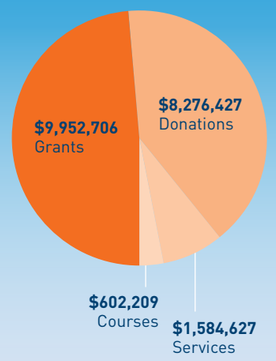
The great mysteries of ocean science are everywhere. You'll find them in sulphur-breathing microbes deep in the Earth's crust, in Maine's shifting kelp forests, and in the estimated nonillion (that's a trillion billion billion) viruses in the ocean.

Our scientists push the boundaries in each of these areas, illuminating the unknown, tackling global challenges, and creating new ways to unlock the ocean's potential. Your support makes it all possible — and is as important as ever.

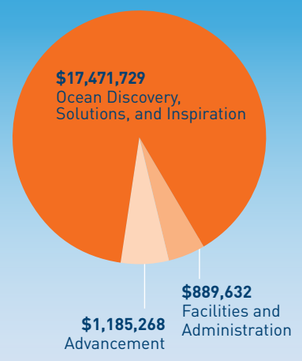
2024 FINANCIALS

JULY 1, 2023 - JUNE 30, 2024

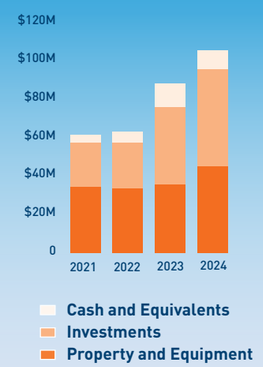
REVENUE $ 20,415,969 Total



EXPENSES $19,546,629 Total



ASSETS **2021 – 2024**

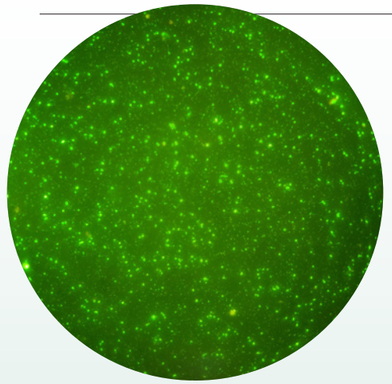


View our audited financial report at bigelow.org/financials.

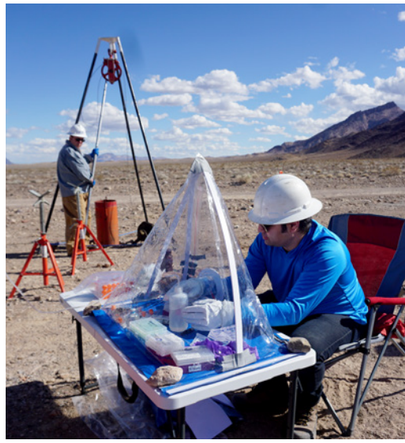
Ocean Health and Function

We reveal how the ocean works and how to better care for our planet.

Our scientists began intensive monitoring efforts around Casco Bay last year to understand the prevalence and impact of PFAS on Maine's coastal environment. They're relying on our newly established PFAS facility, which has significantly increased testing and research capacity for our state, to understand this family of pollutants that are of growing public and environmental health concern, known as the "forever chemicals." **bigelow.org/2024-PFAS**



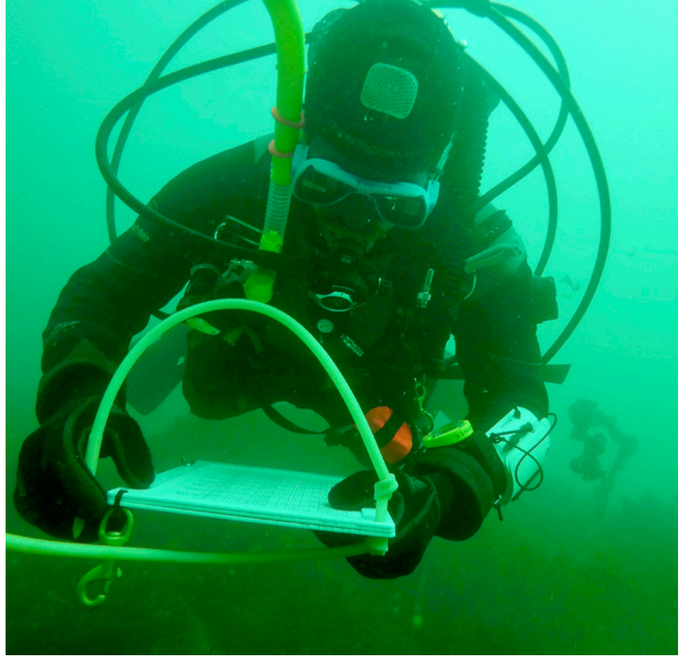
There are more viruses in the ocean than stars in the observable universe. Collectively, they have a profound influence on both microbial evolution and nutrient cycling in the ocean. Our scientists are making significant strides to illuminate the mysteries of marine viruses and develop the tools needed to study these tiny and diverse entities. **bigelow.org/2024-marine-viruses**



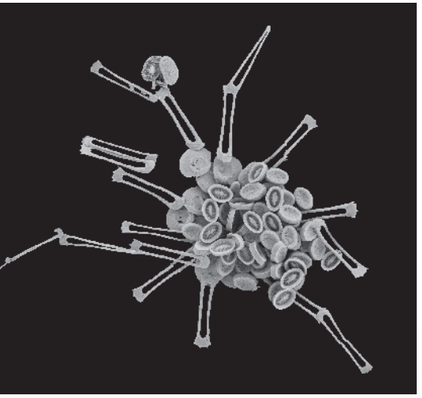
Our scientists have been working on an innovative method to link the genetics and function of individual cells living in low-oxygen environments, and last year, they refined their method with samples from an aquifer deep below Death Valley. Their approach is advancing research on the form and function of microbial communities living in extreme environments from the deep sea to space. **bigelow.org/2024-subsurface-life**

Our Quantitative Marine Disease Ecology Lab works to understand the prevalence, spread, and causes of marine pathogens — and uncover the economic and health impacts of those diseases across the ocean ecosystem. The lab hosted three interns last summer to address those questions for emerging diseases affecting the crabs and lobsters on which New England communities depend. **bigelow.org/2024-marine-disease**

Photos, clockwise from top left: Meghan Vigeant, Duane Moser, Reyn Yoshioka, Julia Brown



Kelp forests are a foundational — and essential — feature of Maine's rich coastal ecosystem. But they're vulnerable to overfishing and, increasingly, rapid ocean warming. Last year, our scientists put together the first in-depth census of Maine's kelp forests in almost 20 years, showing widespread collapse along parts of the coast, as well as significant regional differences that could inform management and resilience efforts. **bigelow.org/2024-shifting-kelp**



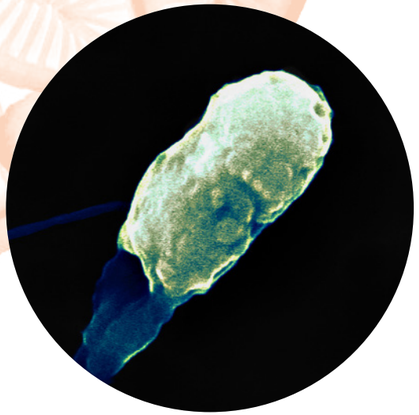
Our scientists recently examined decades of data on plankton communities to find out how the proportion of mixotrophs — microbes that can shift how they feed in response to their environment — is changing over time. Their findings provide insight into both the role of mixotrophs in marine ecosystems and how those systems may respond to changing ocean conditions. **bigelow.org/2024-flexible-feeders**

Our Changing Planet

We focus on key species to predict, combat, and adapt to environmental change.

For 25 years, the Gulf of Maine North Atlantic Time Series has been an invaluable tool to document the rapid changes underway in this vital body of water. Last year, our scientists secured new funding that, coupled with Bigelow laboratory's new research vessel, will enable them to continue GNATS and revamp it with the latest advances in satellite oceanography. **bigelow.org/2024-GNATS**

Zooplankton may be the smallest animals in the ocean, but they have an outsized role in the marine ecosystem. Our scientists have been studying zooplankton like copepods to understand how these microscopic, abundant, and vitally important animals will respond to a warming ocean — and what that could mean for the marine food web that depends on them. **bigelow.org/2024-zooplankton**



Last year, our scientists published research showing how a group of single-celled algae called glaucophytes use chemical cues to communicate stress information, an ability once thought unique to plants. The discovery sheds light on the evolutionary history of microalgae and their role in aquatic ecosystems. It could also open the door to new research on algae-based products leveraging glaucophytes' unique characteristics. **bigelow.org/2024-cell-communication**

Our scientists have partnered with the USDA Agricultural Research Service and a federal interagency working group for the past three years on a comprehensive evaluation of U.S. farmed seaweeds and seagrasses. Their new report, unveiled last year, highlights the needs and opportunities to responsibly leverage the emerging seaweed industry to enhance ocean health and drive economic activity on the working waterfront. **bigelow.org/2024-seaweeds**

The Ocean's Potential

We develop the tools needed to unlock the opportunity of the ocean.

Many researchers have begun looking more seriously at the possibilities of leveraging natural ocean processes to remove excess carbon dioxide from the atmosphere with techniques like ocean iron fertilization. Our scientists have continued to engage in difficult discussions on the potential benefits and consequences of these different strategies, including publishing a high-profile op-ed last year on the urgent need and priority questions for this strain of research. **bigelow.org/2024-iron-fertilization**

Last year, our scientists received a significant award from the National Science Foundation to fund the new Maine Algal Research Infrastructure and Accelerator project. MARIA will strengthen biological research infrastructure, create education and workforce development opportunities, and bring together interdisciplinary teams to tap into the endless possibilities of algae and get algae-based solutions to market. **bigelow.org/2024-algae-solutions**

Photos, clockwise from top right: Cath Mitchell, David Fields, Colin Fischer

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Bigelow Laboratory is an independent, nonprofit institute. Our impact is only possible with the help of our community of supporters. Their generosity fuels our discoveries, powers our solutions, and enables us to inspire the next generation of ocean leaders.

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