



SHOALS MARINE LAB
**IMPACT
REPORT**
2022



University of
New Hampshire



Cornell University

We Couldn't Do This Without You

Dear SML Supporters and Friends,

Every page in this report is evidence of what you have created in partnership with us. I hope you enjoy reading highlights and stories from the last two seasons at Shoals Marine Lab. Summer 2022 will be remembered as a wonderful reunion and resuming of the full suite of our activities. Together, we achieved **SML's mission to provide outstanding experiential, place-based education and to support innovative research programs focused on understanding and sustaining the marine environment.**

There are four significant conclusions from Shoals' 56th season:

First, we are realizing the SML Strategic Plan that many of you helped create to guide our growth from 2018 to 2028 (available on our website, shoalsmarinelaboratory.org). A few highlights: Our amazing donors have driven the growth of the SML diversity scholarship, enabling us to create a richer and more inclusive experience for all. During Covid, we created a Shoals Scholars program at UNH that helps students with their decision to attend the university and provides two summers of support. We are expanding into new research fronts in a partnership with UNH's Center for Acoustics Research and Education to increase acoustic monitoring in the Gulf of Maine. Many of our community members are actively publishing work conducted on-island on such topics as subtidal ecology, parasites, and seabirds.

Second, SML students are transforming into amazing scientists and stewards of the environment. From the Regional Association for Research on the Gulf of Maine to the Waterbird Society's annual meeting in Texas, many undergraduates from our Shoals Undergraduate Research Group presented their research. From the National Ocean Protection Coalition to Howard University, our alumni are making positive impacts in marine education, science, and conservation. Our students take what they learn at SML into the world with amazing effect.

Third, we are leading the way with our sustainability infrastructure and practices. We are incredibly proud of the awards we've received for our sustainability work (see page 9). We replaced our 12-year-old wind turbine that failed in 2019 with a state-of-the-art model that increased energy output from 7.5 to 10kW, while still sporting the one black blade that has been shown to reduce negative impacts to birds. We are also expanding our interdisciplinary work to address energy transitions to solar and wind through our partnership with the Atlantic Marine Energy Center (one of four National Marine Renewable Energy Centers funded by the U.S. Department of Energy).

Fourth, the SML team is stronger than ever. We have expanded our team over the last year and have welcomed new staff. We recently hired a permanent lead engineer and are currently hiring a permanent boat captain to ensure that our waterfront and facilities are operating safely and effectively. The SML team was honored with recognition from the Organization of Biological Field Stations for our Belonging Plan, aimed at increasing equity and inclusion at SML. We also received recognition from the US Coast Guard for the amazing, life-saving rescue of a capsized mariner by SML staff members in the summer of 2021.

As we plan for the 2023 season, we are excited for more progress towards the “beacons” of our strategic plan. We are grateful to have you in our community, and we look forward to working with you to further understand and protect the ocean.

With gratitude,



Jennifer Seavey, Ph.D.
John M. Kingsbury Executive Director



Cornell University

2022 Education Highlights

14 undergraduate courses offered, including a new course, Marine Invasive Species

4 High School courses (including 1 online course)

222 total enrollments, our highest ever

191 total students took a Shoals course

\$543,153 total awarded in donor-funded scholarships

Five Artists-in-Residence spent 2 weeks each on the island engaging students

Education

immersive learning

Shoals Scholars

The Shoals Scholars program is a relatively new scholarship endeavor at SML. The scholarship began in 2020 and is open to incoming UNH freshmen interested in majoring in the STEM-related fields. It provides up to 2 courses per season during the summers following their freshman and sophomore years. Our 2020-2021 cohort of Shoals Scholars is now looking at internship opportunities while this year's cohort has started their second semester on the UNH campus and are starting to inquire about all of SML's summer academic offerings. The program is made possible by a generous gift from a UNH alumni to our Annual Fund. Our goal is to develop a similar program in the coming years for our Cornell incoming freshmen as well.

Photos by Lan Nguyen



"The skills, experiences, and connections I made will last me a lifetime and have already had a positive impact on my career goals."
- Allison Fogg, University of Southern Maine '22

"Words can't express how grateful I am for this experience. I still don't think I've grasped the ways in which my experience has changed my life and shaped my future."
- Lily Knudsen, University of New Haven '25

Photo by Carrie Keogh



Photo by SML Staff



Photo by Cora Day



"My Shoals experience confirmed that I want to orient my career trajectory towards marine biology. It also persuaded me to search for more collaborative research experiences in the future. Shoals is life-changing. If you have the opportunity to enroll in a course, jump on it; it will change the trajectory of your life for the better."

- Emily Christian, Cornell University '25



Photo by SML Staff

Shoals Artist-in-Residence Program

Artists have been inspired by Appledore Island's remote and beautiful landscape since the nineteenth century. Nature is an overlapping aspect of the work of artists and scientists alike, and this observation led to the development of the Shoals Artist-in-Residence Program (Shoals AIR) in 2018. The Shoals AIR Program offers artists the opportunity to pursue their work immersed in Appledore's beautiful landscapes, free from everyday distractions. Artists-in-Residence work with course faculty to develop the details of art programming that will tie together with course topics.

This is the only artist in residence program that we are aware of that focuses on the value that artists bring to science education. While the focus was initially on the benefits to our undergraduate students, over time we have witnessed the transformation of the artists themselves. Artists are immersed in the scientific community and research activities, which will deepen their understanding of the natural world, spark original ideas, forge collaborations, and encourage exploration of methods to engage non-artists in the creative process. We are grateful to Tara and Morgan Rutman and the late Edmund Tarbell for their support of this extraordinary program.

New Marine Invasive Species course

Summer 2022 brought a brand new course to SML's undergraduate curriculum – Marine Invasive Species. The Gulf of Maine is experiencing rapid changes that include new and introduced species, many of which have become established in the intertidal and subtidal zones of the Isles of Shoals. The course is taught by three long-time Shoalers – April Blakeslee, Amy Fowler, and Carolyn Keogh – and takes advantage of the unique setting that SML offers for an immersive, field-based learning experience that addresses new and emerging concerns impacting the Gulf of Maine. Students learn the fundamental principles and theories of invasion biology and gain hands-on experience conducting field work on the topic, specifically learning to employ rapid assessment techniques used to detect new marine invaders and track trends in distribution of both new and established invasive species. Data collected in the class contributes to our understanding of changes being observed both locally and regionally.

Diversity Scholarship

In 2022, SML distributed over \$94,000 in Diversity Scholarship funds, supporting the enrollment of 20 different students from a broad range of racial, ethnic, and gender backgrounds. These funds continue to help SML increase opportunities for historically underrepresented students in the marine sciences. These funds are also coupled with SML's existing need-based and merit scholarship funds, ultimately helping to broaden the overall impact of the financial aid that SML is able to offer our student body.

Photo by SML Staff



2022 Research Highlights

20 students in our Shoals Undergraduate Research program

10 different research programs (including 2 new programs)

1 SIRF (Scientist in Residence) conducted research and mentored students

4 Sustainable Engineering Interns plus 1 Sustainable Communications Intern spent a month on the island

6 non-SML research programs took place on the island with scientists from a variety of colleges and universities

Research

cutting-edge

Photos by Tamara Kamis



SML's Seabird Ecology and Conservation Program

This project, overseen by Shoals' Director of Seabird Research Dr. Elizabeth Craig, promotes the conservation of aquatic birds on the Isles of Shoals through student-driven monitoring, management, and research. As top predators, seabirds are sensitive to conditions throughout marine food webs. They are threatened by environmental contamination, coastal habitat destruction, overharvesting of resources, and climate change. The Seabird Ecology and Conservation Program aims to better understand how these birds interact with their environment to address conservation and management challenges in the Gulf of Maine. We are grateful to our many partners for their ongoing support and collaboration in this important and impactful work.

Shoals Research Presented At:

- Association of Field Ornithologists Alaska Marine Science Symposium
- RARGOM 2022
- International Waterbird Society
- Cornell Undergraduate Research Board Symposium
- University of Montana Senior Symposium
- Virtual World Seabird Conference 2021
- NH Sea Grant Biennial Research Virtual Symposium 2021
- The Waterbird Society virtual meeting 2021
- Virtual UNH Undergraduate Research Conference 2021
- World Seabird Union Twitter Conference 2021
- Rosesate Tern Recovery Team meeting 2021
- UNH COLSA Undergraduate Research Conference 2022
- Waterbird Society meeting 2022
- Atlantic Marine Bird Cooperative Meeting 2022



Photo by Liz Craig

Research by Dr. Easton White

Summer 2022 brought an entirely new research program to the Shoals Undergraduate Research Group focusing on the population and community ecology of fishes around the Isles of Shoals. Easton White, Assistant Professor of Biological Sciences at UNH, is the principle investigator on the project. Field work during the first summer of the project utilized remote underwater video footage to monitor fish and invertebrate populations and animal behavior without SCUBA. Undergraduate researcher Melanie Carolan from Vassar College led the field work during summer 2022 and continues working with Dr. White and his lab to analyze the data collected. Their work helped to develop research plans for summer 2023 and fostered collaborations between the SML research team working on seal monitoring at Duck Island and the team of subtidal researchers who are monitoring long-term change in the waters around Appledore.

Photos by SML Staff



Return of our Signature SURG Program

Among the students who have the opportunity to explore marine science and sustainability at Shoals Marine Lab is a selected group of undergraduates who spend the entire summer on Appledore Island. The Shoals Undergraduate Research Group (SURG) is specifically designed for undergraduate college students to conduct research experiments and projects with the guidance of a mentorship team. SURG provides invaluable experience and helps students develop skills that will increase marketability when it's time to apply to graduate school or pursue career aspirations. This program was put on hold in 2020 and 2021 as we grappled with how to offer place-based programs in the COVID-19 era. Summer 2022 saw the happy return of the SURG program to Appledore Island, reviving our history of original discovery and long-term monitoring. Seventeen students engaged in research and monitoring of the intertidal system, marine mammals, seabirds, fisheries, and sustainable engineering and presented their findings at our on-island symposia on Sustainable Engineering and Undergraduate Research. Since the end of the 2022 summer season, many of these undergraduate researchers have continued on the trajectory of their summer research with further independent study and science communication. We are proud to be part of the scientific training of these rising stars in STEM.

"I'm further committed to a career in field research, and my SURG experience has given me good material to draw upon as I'm considering graduate school opportunities."

- Kayla Cannon, 2022 SURG

Acoustics Array Project

UNH's Center for Acoustics Research and Education (CARE), received a \$6.2 million dollar grant from the Office of Naval Research to design, build, and deploy a cabled acoustic array in the Gulf of Maine, 10 miles east of the Isles of Shoals. SML is collaborating with CARE on the project and will serve as the land-based terminus for the cabled array. SML will be providing the green electricity that services the acoustic, oceanographic, and biogeochemical sensors that will be collecting data. The project will bring an entirely new field of research to the lab and will provide new opportunities for faculty and students to explore the soundscape of the Gulf of Maine.

2022 Outreach Highlights

Appledore Walking Tours brought 312 guests to the island while Celia Thaxter's Garden Tours attracted 336 garden enthusiasts

5 different overnight programs brought 83 guests to Appledore Island

SML hosted 5 different conferences and workshops with 120 total participants

The lab hosted hundreds of visitors including local high schoolers, donors, media crews, and more

Outreach

nurturing our community

Navigator Circle Appreciation Event

The Navigator Circle at Shoals Marine Lab is made up of a special group of donors who help sustain our mission and provide opportunities to promote wise use of marine ecosystems, science, and sustainability. Members have the opportunity to engage with SML leaders, faculty, staff, students, and other donors, through exclusive content and programs that highlight the impact of philanthropic support to SML.

Last summer, we had the honor of hosting 25 Navigator Circle members on Appledore for an appreciation luncheon. Members took a casual stroll of the island, engaged with student researchers, and enjoyed an eco-culinary lunch that included several items foraged from the island. Lunch was skillfully prepared by multi award-winning chef and former SML chef, Sam Hayward, who educated the group about each course and how it was connected to the island. Members left feeling inspired about their impact and deeply connected to our special community.

Photos by SML Staff

"I enjoyed the beauty of Appledore, the rich history of the island, wonderful hospitality, the great and educational walks, and the experience of learning about bird banding."

- 2022 Public Program Participant



Shoals & Audubon Partnership Program

Shoals continued its longtime successful partnership with the New Hampshire Audubon Society by hosting two birding trips on Appledore Island. Both trips sold out in record time and brought a diverse group of enthusiastic birders to the island, binoculars in hand. The tours were led by the knowledgeable and passionate Pam Hunt, the Audubon's Senior Biologist for Avian Conservation. A rare occurrence, a snowy owl on the island, was a real treat.

Shoals' partnership with the NH Audubon continues to strengthen both organizations through research and education programs. Efforts such as the tern colony restoration project and the Appledore Island Migration Station give Shoals tight ties to the NH Audubon, and the mutual support broadens our collective positive impact on the natural world. Shoals looks forward to continuing this partnership in 2023 with two more Appledore birding trips, and in the years beyond.

"I've learned more about sustainability in these five days than I ever have in all my education and never as in-depth as we've seen here."

- Evalyn Davis,
Manchester
Memorial High
School Student

Photo by Casey Snook



Manchester and Codman Programs

In an effort to increase diversity and belonging in marine science and sustainable engineering, Manchester and Codman schools pilot programs were launched in 2022 at Shoals. Codman Academy, a public charter school in Dorchester, MA that primarily serves minority students in the inner city, was the first to reach the island. They spent an exciting week exploring topics in marine science and sustainable engineering. A number of Codman students are returning in 2023 for Shoals courses. All of this was made possible by the Lewis Family Foundation.

The following week, students from the public high schools in Manchester, New Hampshire arrived on Appledore. This program was generously supported by Morgan Rutman who was instrumental in making it happen. Similar to the Codman program, the Manchester program hosted the students for a week on the island at no cost to them. At the end of the week, a group that included the mayor of Manchester and the president of UNH visited the island to hear directly from the students about their experience. This visit received extensive press coverage. Following the success of the Manchester program, Shoals is looking forward to a second run in the summer of 2023.

Thank You 2022 Partners

Shoals Marine Lab was fortunate to work with dozens of partners and collaborators to deliver on our mission in 2022. We are grateful for their support and collaboration which allows SML to continue providing world-class, immersive marine education and research.

Appledore Island Migration Station	National Oceanic and Atmospheric Administration	Sea Education Association
Atlantic Offshore Lobstermen's Association	National Science Foundation	Seacoast Science Center
Atlantic White Shark Conservancy	New England Fishery Management Council	SML Volunteer Weekend Participants
Black Trumpet	New Hampshire Audubon	Society for the Preservation of NH Forests
Blue Ocean Society	New Hampshire Charitable Foundation	Star Island Corporation
Canisius College	New Hampshire Coastal Adaptation Workgroup	State of Maine Department of Health and Human Services
CARPE	New Hampshire Department of Business and Economic Affairs	Three River Farmers Alliance
City of Portsmouth	New Hampshire Department of Natural and Cultural Resources	U.S. Fish & Wildlife Service
Clean Energy NH	New Hampshire Fish and Game Department	UNH Advancement and Alumni Relations
Codman Academy	New Hampshire General Court	UNH College of Engineering and Physical Science
Community Development Finance Authority	New Hampshire Sea Grant	UNH College of Life Sciences and Agriculture
Community Loan Fund	Northeast Fisheries Science Center	UNH Cooperative Extension
Cornell Alumni Affairs and Development	Northeastern Coastal Stations Alliance	UNH Facilities
Cornell Agriculture and Life Sciences	Northeastern University	UNH Institute for the Study of Earth, Oceans, and Space
Cornell School of Continuing Education and Summer Sessions	Organization of Biological Field Stations	UNH Marine Docent Program
Cornell Lab of Ornithology	Paleontological Research Institution	UNH Master Gardener Program
Dartmouth College	PEASE Development Authority	UNH School of Marine Science and Ocean Engineering
Federal Economic Development Administration	Phillips Exeter Academy	UNH Sponsored Programs Administration
Island Institute	Portsmouth Economic Development Department	University of Central Oklahoma Forensic Science Institute
Kittery Land Trust	Princeton University	University of Massachusetts Boston
Kittery Point Yacht Yard	Revision Energy	University of New Haven
Knox College	Revolution Energy	United States Coast Guard
Lewis Family Foundation	Rolling Green Nursery	Unitil Corporation
Maine Coastal Islands National Wildlife Refuge	Rosamond Thaxter Foundation	
Maine Department of Marine Resources		
Manchester NH Public Schools		
Marine Mammals of Maine		
National Marine Educators Association		

Distinguished Awards in Sustainability

UNH's Sustainability Awards celebrate and spotlight individuals and teams doing important sustainability research, curriculum development and teaching, campus initiatives and culture development, and external engagement work across and beyond the university. The program raises the visibility of these achievements to help build a deep culture of sustainability that permeates all facets of our institution, community, and work.

SML is proud to have won two awards in recognition of our progressive sustainability programs and infrastructure. We received a Platinum UNH Sustainability Award in 2021 for our Sustainability Engineering Internship program because it demonstrates exemplary work that explicitly addresses the concept of sustainability. Environmental stewardship is a core value at SML, and the unique, hands-on training this internship offers helps to advance our sustainability initiatives and prepare the next generation of engineers. We are grateful to receive this award, and we look forward to the innovation that lies ahead. Thank you to our hard-working engineers, mentors, interns, and Unitil Corporation who helped us meet the needs of our living laboratory island campus.

In 2022, Ross Hansen, SML's Director of Facilities and Planning, won a lifetime achievement award. Ross has been a champion of sustainability for well over a decade, having both led the development of the sustainable infrastructure on the island campus and the engineering training programs. Under his leadership, the lab has reduced diesel use by 90%, decreased propane use by 60%, increased recycling, and reduced energy use through dozens of power-saving projects across the center.



New Wind Turbine

In case you didn't notice, the SML wind turbine, a distinct feature of the Appledore Island profile, is new! The former 7.5kW Bergey wind turbine failed in 2019, and during Covid the main tower remained without a wind turbine until 2021 when a new 10kW system with an upgraded battery charge controller was installed. As the SML Sustainable Engineering Interns (SEI) explain it: "Wind power contributes significantly to SML's green energy grid because it has the capability of providing power at night, and during stormy weather when the island's photovoltaic systems are less effective." Of course, wind on Appledore is not an abundant resource in the calmer summer months when solar energy abounds, and thus, SML's green power grid focuses (about 80% of total power) on solar generation.

When the new turbine was installed, the intrepid SEI interns set out to make sure the turbine was operating as efficiently as possible. They found that the wind turbine is producing more than enough power to feed its expected 10kW capacity and contributes around 10-12% to the island's over-all power generation. They also found that the turbine contributes when the wind velocity is at least 5.6mph and mostly at night. These results confirm that wind power compliments SML's solar energy grid because it has the capability of providing power at night, and during stormy weather when the island's photovoltaic systems are less effective.

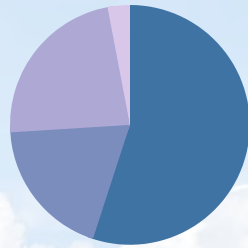
New Lead Engineer Position at Shoals

A new position of Lead Engineer was created in 2022 for Shoals Marine Lab. The lab welcomed Zachary Charewicz as the first in this role. As the lead engineer, Zach will be overseeing the day-to-day operations on the island and will be helping our Director of Facilities with various sustainability projects such as solar energy, our wind turbine, water conservation, and more. He will also be our go-to person for sustainability tours on the island.

Financials

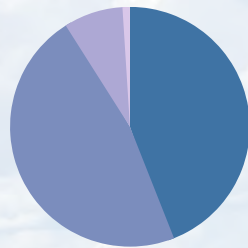
the numbers

Expenses



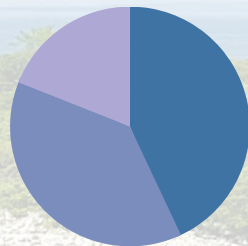
Total	\$2,379,611	100%
Programs	\$1,307,607	55%
Operations and Facilities	\$455,078	19%
Student Scholarships	\$543,153	23%
University Services	\$73,773	3%

Revenue



Total	\$2,817,213	100%
Gifts, Grants, and Endowments	\$1,251,312	44%
Academic Course Fees	\$1,318,253	47%
Public Program and User Fees	\$224,841	8%
SML Store	\$22,807	1%

Gifts, Grants, and Endowments Allocations



Total	\$1,215,312	100%
Student Scholarships	\$518,051	43%
Programs & Research	\$464,823	38%
Staff and Operations	\$232,438	19%

Dive in!

be part of it all

Visit Us

Visit our website at shoalsmarinelaboratory.org to learn about our day trips, overnight programs, and other opportunities to visit the island and learn about Shoals.

Reach Out

Shoals Marine Laboratory
Morse Hall, Suite 113
8 College Road
Durham, NH 03824
shoals.lab@unh.edu
(603) 862-5346

Donate

SML relies on donor generosity to provide world-class, immersive education and research opportunities to students. Every dollar you invest in an SML student makes a difference. Visit shoalsmarinelaboratory.org/give to make your tax deductible donation. To discuss gift planning, please contact amy.fish@unh.edu.

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Photos by SML Staff



2022 SML Staff

David Buck, Ph.D.
Associate Director

Zachary Charewicz
Lead Engineer

Samantha Claussen
Program Support Assistant

Eva Clews
Assistant Island Coordinator

Terry Cook
Celia Thaxter Garden Steward

Jim Coyer
Programs Coordinator

Elizabeth Craig, Ph.D.
Academic Coordinator and
Director of Seabird Science

Danielle Danis
Laboratory Coordinator

Ben Duffy
Boat Captain/Island Engineer

Amy Fish
Director of Community Relations

Peder Franson
Island Engineer

Tyler Garzo
Technical Services

Wendy Goldstein
Program Support Assistant

Anna Golub
Island Coordinator

Ross Hansen
Director of Facilities and Planning

Mac Heins
Head Chef

Duane Keohane
Island Engineer

Kate Kolbjornsen
Chef

Ken Lannaman
Boat Captain

Kelly Anne Morgan
Programs Coordinator

Theresa Rizza
Seabird Technician

Michael Rosen
Director of Operations

Jennifer Seavey, Ph.D.
Kingsbury Executive Director

Olivia Smith
Seabird Technician

Casey Snook
Communications Coordinator

Eli Thompson
Chef

Rebecca Toppin
Diving Safety Officer

Roger Trudeau
Boat Captain

Katiemae White
Program Support Assistant

Eugene Won, Ph.D.
Academic Coordinator (Cornell)