Sea Grant
NEW HAMPSHIRE

New Hampshire Sea Grant
STRATEGIC PLAN

To enhance our relationship with the coastal environment to sustain healthy ecosystems, economies, and resilient and inclusive communities.

2024-2027

A Federal-University Partnership

Empowering Communities with Informed Science for Impactful Action

New Hampshire Sea Grant works to support a coastal environment that sustains healthy ecosystems, economies, and people through integrated research, extension, education, and communications efforts. Based at the University of New Hampshire since 1980 (individual college program status since 2003), New Hampshire Sea Grant is one of 34 Sea Grant programs in the U.S. under the umbrella of the National Oceanic and Atmospheric Administration (NOAA)'s National Sea Grant College Program.

The implementation of New Hampshire Sea Grant's 2024-2027 Strategic Plan is supported by NOAA Award No. NA24OARX417C0037-T1-01.

Photography: Tim Briggs Design: Claudia Kaerner Design

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2024-2027

New Hampshire Sea Grant STRATEGIC PLAN

New Hampshire Sea Grant funds, connects, and collaborates on coastal science to drive informed decision-making, guide sustainable actions, and foster resilience in our Seacoast communities with a reliable and trusted approach.

New Hampshire Sea Grant works to enhance our relationship with the coastal environment to sustain healthy ecosystems, economies, and resilient and inclusive communities.

PREAMBLE

THE STRATEGIC PLANNING PROCESS

New Hampshire Sea Grant envisions diverse, thriving coastal communities and ecosystems where people live, work, and play in a manner that sustains healthy ecosystems, economies, and people.

The 2024-2027 New Hampshire Sea Grant (NHSG) Strategic Plan was developed in 2022 as an iterative evolution of NHSG's 2018-2023 Strategic Plan that aligns with the National Sea Grant College Program 2024-2027 Strategic Plan.

In January 2022, the NHSG Executive Committee met to develop a strategic planning schedule that included a detailed timeline with milestones. Overall, the process focused on revising NHSG's four Focus Area sections of the Strategic Plan: Healthy Coastal Ecosystems - HCE, Resilient Communities and Economies - RCE, Environmental Literacy and Workforce Development - ELWD, and Sustainable Fisheries and Aquaculture - SFA). Using the NHSG 2018-2023 Strategic Plan as a starting point, Focus Area sections were developed by Focus Area teams and leaders composed of NHSG Staff. The strategic planning process was structured to allow for multiple opportunities for discussion and collaboration across Focus Area teams to promote interconnectedness and integration of NHSG's work.

Each Focus Area team conducted a needs assessment via review of relevant plans and reports and formal and/or informal interviews of thought-leaders and interested parties with perspectives, experience, and knowledge relevant to NHSG's work in their Focus Area. Needs assessments were also informed by national dialogs and strategic planning efforts around the blue economy, equity and environmental justice, and resilience including the NOAA Blue Economy Strategic Plan, the NOAA Fisheries Equity and Environmental Justice Strategy, and others. Needs assessments were completed by April 1, 2022, and findings were shared and discussed at a NHSG staff meeting. These findings were used to draft Situation Statements for each Focus Area. Situation Statements are critical to the Strategic Planning process because they contextualize NHSG Goals, Objectives, and Desired Outcomes, which motivate all NHSG-funded activities.

The needs assessments and Situations Statements were shared and discussed during a NHSG Policy Advisory Committee (PAC) meeting on April 11, 2022. An outside facilitator guided NHSG PAC and Staff in a discussion focused on identifying gaps or inaccuracies in the Situation Statements. Following the April PAC Meeting, Focus Area teams met during staff meetings on April 21 and May 18 to revise Situation Statements, collaborate across teams, and begin planning other elements of the Focus Area sections.

Following these meetings, several additional work sessions were held for Focus Area teams to develop complete versions of each Focus Area section by July 22, 2022. The NHSG Director worked closely with the NHSG Communications Team to integrate the Focus Area Sections and introductory text and to align

with the National Sea Grant College 2024-2027 Strategic Plan. A draft NHSG 2024-2027 Strategic Plan was submitted to the National Sea Grant Office on August 8, 2022. This draft strategic plan was reviewed during a second NHSG PAC meeting on September 8, 2022. Feedback from the PAC and the NSGO has been integrated into a final NHSG 2024-2027 Strategic Plan that was submitted to NSGO for approval on October 26, 2022.

*New Hampshire's two coastal shoreline counties are home to over **32%** of the state's population.*

Vision

New Hampshire Sea Grant envisions diverse, thriving coastal communities and ecosystems where people live, work, and play in a manner that sustains healthy ecosystems, economies, and people.

Mission

New Hampshire Sea Grant works to enhance our relationship with the coastal environment to sustain healthy ecosystems, economies, and resilient and inclusive communities.

Core Values

New Hampshire Sea Grant has identified seven core values that are used to guide program decisions, staff actions and behaviors, and our partnership efforts. These core values intersect with and inform the vision, mission, goals, activities, and performance measures of our organization. The New Hampshire Sea Grant core values that guide our behaviors and actions are:

> **Innovation:** NHSG staff and programs support creative solutions to emerging and chronic challenges through science and decision-making.

> **Engagement:** NHSG staff and programs are responsive, accessible, and facilitate the flow of information among staff, scientists, and interested parties to support decision-making that is mutually beneficial to a diverse range of constituents and ecosystems.

> **Collaboration:** NHSG staff coordinate, build partnerships, and seek out relationships that leverage our and our partners' strengths and promote efficiency.

> **Accountability**: NHSG staff operate with integrity and transparency while creating an environment where others feel supported in doing the same.

> **Diversity, Equity, Inclusion, Justice, and Accessibility:** NH Sea Grant staff proactively engage with the range of identities, cultures, communities, and capacities present throughout our areas of work with respect and sensitivity to each person's experiences, history, and systemic challenges.

> **Sustainability:** NHSG staff and programs advance practices and decision-making that support a synergistic relationship with the natural world and communicate the value of the benefits that the coastal, watershed, and ocean ecosystems provide to the state and region.

> **Non-Advocacy:** NHSG staff and programs serve as neutral brokers of science-based information.

Cross-cutting Principles

New Hampshire Sea Grant will strive to implement its Strategic Plan by applying the following five cross-cutting principles in order to enhance the program's capabilities to meet future needs:

> **Relevancy:** NHSG staff and programs address the needs of people and ecosystems in the state and region, both along the coast and inland.

> **Partnership:** NHSG assembles the expertise and capabilities of our partners from the international, federal, tribal, and state communities and academic and non-governmental organizations.

> **Organizational Excellence:** NHSG establishes a framework of standards and processes that engage and motivate our network of partners to deliver products and services that fulfill our mission and vision in a manner that is respectful of all those involved.

> **Diversity, Equity, Inclusion, Justice, and Accessibility:** NHSG seeks to incorporate diverse perspectives and inclusively collaborate across interested partner groups to foster more equitable, accessible, and sustainable natural resource management and strengthen Sea Grant's mission and vision.

> **Resiliency:** NHSG staff and programs are based around building resiliency, or the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events.

How We Work | Connecting, Integrating, Co-producing

NHSG offers unique contributions to its partnerships through its integrated functional capacities and networks in research, extension, education, and communications, and extension and its long-term community engagement. With primary structural relationships at the University of New Hampshire (UNH)'s Office of Research Economic Engagement and Outreach (UNH REEO), the UNH School of Marine Science and Ocean Engineering (SMSOE), UNH Extension, and with expanding connections to research and education institutions throughout the state, NHSG works to entrain and integrate university and other expertise across multiple disciplines. These partnerships enable NHSG's reach to extend up-watershed as needed to address issues relevant to coastal and marine ecosystems.

In New Hampshire, Federal-State partnerships and collaborations have been central to the state's efforts relevant to NHSG Focus Areas. Programs such as the Great Bay National Estuarine Research Reserve (GBNERR - NOAA, National Ocean Service, and NH Fish and Game Department), the Piscataqua Region Estuaries Partnership (PREP - Environmental Protection Agency and University of New Hampshire), New Hampshire Coastal Management Program (NH CZM - NOAA, National Ocean Service and NH Department of Environmental Services), the Northeast Region Association of Coastal Ocean Observing Systems (NERACOOS), and NH Sea Grant work in close partnership with each other and state-level organizations (UNH and other Educational and Research Institutions, NH Fish and Game, The Nature Conservancy, and the NH Department of Environmental Services) to address a broad range of issues related to NHSG Focus Areas. Depending on the topic and program, NHSG's role varies in these partnerships from leadership to financial or other programmatic support. A Collaborative Report produced by NH Federal-state partners around coastal resilience work in 2022 serves as an example of how these partnerships support collective action (NH Sea Grant 2022).

NH Sea Grant also participates in The Northeast Sea Grant Consortium (NESGC), a partnership of the seven Sea Grant programs extending from New York to Maine. This partnership fosters collaborative efforts, funding research projects and extension activities that address issues of regional importance.

It is a central function of NHSG to facilitate connections among these networks and to support innovative approaches that elevate community engagement. NHSG seeks to do this by supporting the long-term development of relationships, trust, knowledge, collaboration, respectful sharing of perspectives and ideas, and connections that engage and entrain relevant expertise in problem-solving. NH Sea Grant also works to connect to and develop programming relevant to broad audiences that are representative of socio-economic and cultural diversity in New Hampshire.

NH Sea Grant integrates efforts across several functional areas, which represent how Sea Grant generates, transmits, translates, and transitions knowledge to address critical issues with partners and other interested parties. The following NHSG functional areas do not exist in isolation from one another, but instead are integrated in different combinations within NHSG programs:

> **Research:** The generation of new knowledge is a core part of Sea Grant, providing answers to key questions about our ocean, coasts, and watersheds. Research may be conducted by Sea Grant staff or through extramural research that has been reviewed for merit and that is often competitively selected.

> **Education:** Transmitting knowledge through formal and nonformal mechanisms to allow learners to act is central to the transformational nature of Sea Grant's work.

> **Extension:** The exchange of knowledge and its application by communities, governments, NGOs, business, and industry—often accomplished through direct interaction, technical assistance, and demonstration projects—is at the heart of Sea Grant's operational model.

> **Communication:** The transmission of information to targeted audiences through a variety of media to create awareness and engagement that complements traditional extension and education activities.

> **Management:** Establishing and maintaining the infrastructure and partnerships needed to support the activities of a Sea Grant program is an essential task. This function allows programs to exist, grow, and serve the NH Sea Grant Mission.

How We Use the NHSG Strategic Plan

The NHSG Strategic Plan is intended, in part, to motivate and guide researchers, students, and others who wish to align with and/or form a partnership with NHSG (through a funding request or co-development or support of programs). The plan is also used to develop a complementary internal NHSG Action Plan (including the NHSG Omnibus and other internal work planning documents) that aligns NHSG research, extension, communications, and educational programming with Desired Outcomes and national and state Performance Measures. Altogether, the Strategic Plan, Action Plan, and Performance Measures comprise a system that places our work in a logical framework that helps NHSG and others understand:

> Where we are

> Where we would like to be

> How we plan to get there, and

> How we will know if we're making progress and being successful.

Setting the Scene

New Hampshire's coastal watershed is a highly desirable place to live, work, and recreate due to the diverse ecological, aesthetic, cultural, and economic benefits the NH Seacoast has to offer. New Hampshire is home to nearly 1.4 million people across 234 municipalities. New Hampshire's two coastal shoreline counties are home to over 32% of the state's population (2019 – pre-pandemic figures). Our watershed features 42 New Hampshire municipalities including rural towns, beach towns near the Hampton-Seabrook Estuary, and a few small cities around Great Bay. The watershed also includes an additional 11 municipalities within the neighboring states of Maine and Massachusetts. The Great Bay Estuary drains into the Gulf of Maine via the Piscataqua River, which serves as an important waterway for most of New Hampshire's water-dependent commerce and industry. Just to the south, the Hampton-Seabrook Estuary meets the Gulf of Maine as a shallow, barrier beach system dominated by salt marsh. New Hampshire is rich in Indigenous, early European settlement, and maritime history. It also hosts present-day arts, culture, recreational opportunities, and tourist attractions along with ecological and aesthetic treasures. The long-term survival of these natural resources; our tourism industry; Indigenous and other cultural connections; recreational and commercial activities including beachgoing, boating, fishing, shellfishing, and aquaculture; as well as the quality of life in New Hampshire all depend on balancing healthy ecosystems and resilient coastal communities with increasing human demands and a changing climate.

Climate change has increased the frequency and intensity of storm events, caused sea-level rise and sunny day flooding, and affected precipitation patterns. Warming temperatures have driven changes in species ranges, resulting in a mix of increases and declines in local abundance of species present in New Hampshire waters. Changes in climate and local conditions may have important implications for ecosystem structure and function. While the ecosystem effects of and vulnerabilities to ocean acidification are difficult to pinpoint, coastal and marine ecosystems are becoming more acidic, which could further disrupt important ecosystem processes and functions. Overall, the effects of climate change require significant adaptive responses from coastal communities as they face the challenges and opportunities created by current and projected climate-related coastal risks, hazards, and changing ecosystem conditions.

While it is one of the smaller states, New Hampshire regularly experiences significant influxes of visitors, many of whom visit for water-dependent activities. The state is highly reliant on nature-based tourism. The state is also experiencing a demographic shift toward more cultural diversity, particularly in the under-18 population, indicating changing interests and needs across the state in the coming years.

Potential development of offshore renewable energy in the Gulf of Maine presents a deeply complex set of benefits, costs, and unknowns that must be considered carefully by coastal communities as they engage in coastal and marine spatial planning. At the same time, a national dialogue and refocusing on racial, socio-economic, and environmental justice continue to transform our perspectives and how we approach our future. There is uncertainty as economic, cultural, and societal realities, perspectives, and knowledge shift and emerge. These conditions will certainly present new challenges, but there will also be opportunities to assess historical patterns and tendencies and to re-approach our relationships with each other and our environment with higher goals in mind.

We are a science-based organization and that extends to our understanding of the people, places, history, and traditions of where we live.

Land Acknowledgment

Our work takes place on N'dakinna, which is the traditional ancestral homeland of the Abenaki, Pennacook, and Wabanaki Peoples past and present. We acknowledge and honor with gratitude the land and waterways and the alnobak (people) who have stewarded N'dakinna throughout the generations. NHSG embraces the importance of collaborating with local indigenous partners to combine local and indigenous knowledge with scientific approaches to better manage our relationship with the ecosystems on which we depend. We are a science-based and fact-based organization and that extends to our understanding of the people, places, history, and traditions of where we live. This land acknowledgment is a reminder of elements of our setting that have been overlooked, ignored, excluded, or misrepresented by the pervasive or dominant stories and teachings of American history. We also acknowledge the hardships they continue to endure after the loss of unceded homelands and seek to foster relationships and opportunities that strengthen the well-being of the Indigenous People who carry forward the traditions of their ancestors. Indigenous people and cultures live on today here in New Hampshire, a fact that is not only important to acknowledge, but also to promote.

New Hampshire Sea Grant 2024-2027 Strategic Plan Overview

New Hampshire Sea Grant focuses its research, extension, education, and communications efforts among four Focus Areas outlined in the National Sea Grant College Program's Strategic Plan. Each Focus Area includes a Situation Statement, Identified Needs, Approach, Vision, Goals, NHSG Supported Objectives, Desired Outcomes, and Performance Measures. The following conceptual framework helps us structure and align our work strategically and allows us to measure progress and success as a program. This framework has been aligned with the National Sea Grant Strategic Plan and uses the following definitions and terms:

> **Goal:** A desired condition or state that would be an end-result and a major step in achieving NHSG's vision for the state.

> **NHSG Supported Objective:** Activities that NHSG supports through research, extension, communications, and educational programming.

> **Desired Outcome:** Specific results that NHSG targets as emerging from programming efforts that would demonstrate progress toward a Goal. Desired Outcomes are often related and can represent different stages of evolution toward a desired ultimate Goal (from Innovation to Consequence). Much of NHSG-supported work focuses on the earlier steps in this progression. To help understand the relationships between Outcomes and progress toward Goals, Outcomes have been categorized using the following definitions:

> **Innovation:** Innovation outcomes lead to the development of new tools, curricula, or methods that can be leveraged to achieve progress toward a goal.

> **Learning:** Learning outcomes lead to increased awareness; knowledge; skills; and changes in attitudes, opinions, aspirations, or motivations through research and/or constituent engagement.

> **Action:** Action outcomes lead to behavior change, social action, adoption of information, changes in practices, improved decision-making, or changes in policies.

> **Consequence:** Consequence outcomes may require focused efforts over multiple strategic planning cycles. Consequence outcomes in a strategic plan serve as reference points toward reaching Focus Area Goals between the current and future strategic plans.

> **Performance Measure:** A Performance Measure is an index that provides evidence of progress toward a Goal and represents a subset of information collected and reported annually by NHSG to track progress toward Goals. Performance Measures can be categorized using the same Innovation to Consequence sequence used for Desired Outcomes. Performance Measures selected by NHSG are constrained by practical considerations including measurability and staff and technical capacities. (The list of National Sea Grant Performance Measures is included in Appendix B, and NHSG Per to this Strategic Plan.)

A focus on Diversity, Equity, Inclusion, Justice, and Accessibility (DEIJA) is both a NHSG "Cross-cutting Principle" and a "Core Value," and thus, DEIJA considerations are included in each Focus Area Approach section.

New Hampshire's coastal watershed residents, communities, and professionals work together to share scientific, cultural, traditional, and experiential knowledge; contribute to research and monitoring; and implement management practices to ensure that coastal ecosystems are high functioning, safe for human use, and resilient to future changes for generations to come.

FOCUS AREA (HCE)

HEALTHY COASTAL ECOSYSTEMS

New Hampshire's healthy coastal ecosystems are critical contributors to the high quality of life that New Hampshire residents enjoy and primary drivers of tourism to the state. Ecosystems are dynamic and complex and, in turn, so are the solutions needed to enhance and restore healthy coastal ecosystems as stressors and habitat conditions change.

The New Hampshire coastline has been a rich source of food and resources for the Abenaki, Pennacook, and Wabanaki Peoples, who are the original caretakers of this land. However, since the early 1600s when European settlers arrived and human-ecosystem relationships began to change, the region has endured a legacy of human impacts that have degraded previously thriving and diverse terrestrial, coastal, and estuarine habitats and introduced pollutants to the ecosystem. Ongoing human development along with increasingly significant impacts from climate change have contributed to the degradation and loss of coastal and estuarine habitats, resources, and biodiversity in New Hampshire. Further habitat and land-use changes are expected with the development of emerging and evolving industries. The resulting impacts are not equally distributed among all communities, as historically excluded communities often experience greater hardship. Changing stressors and habitat conditions require acknowledging that previously successful approaches to enhance and restore healthy coastal ecosystems may not be what works now and into the future. New approaches will be needed – rooted in the specifics of place – to address the diversity of systems and peoples affected. Furthermore, consideration of restoration targets and the trade-offs inherent in selecting priorities is critical. Ecosystems are dynamic and complex and, in turn, so are the solutions.

Ecosystem Structure, Function, and Services | Environmental Situation

The New Hampshire coastline was historically characterized by extensive salt marshes, sand dunes and beaches, oyster and seagrass beds, and diadromous fish runs. However, stressors such as increasing sea-level rise, groundwater rise, and storm surge; impervious surfaces and shoreline hardening; stormwater runoff; nitrogen loading; invasive species; tidal restrictions; and dams have destroyed, degraded, or fragmented these systems. It is estimated that 18-50% of the state's historic salt marsh habitat has been lost to development or tidal restriction and 85% of the sand dunes of New

Hampshire's Hampton-Seabrook Estuary have been lost to development. Remaining dunes are further stressed by beachgrass die-off and invasive species. Furthermore, New Hampshire's oyster beds have declined over the decades due to disease (Dermo and MSX), sedimentation, and lack of available substrate for larvae. Eelgrass is also in decline, and the potential causes are many – including increased precipitation, rising seas, nutrient loading, sedimentation, wasting disease, and biological disturbance. Given the diverse single-species issues and evolving management strategies, it will be increasingly important to use a whole ecosystem approach to address issues that affect the structure, function, and services of ecosystems.

Restoration and Monitoring | Environmental Situation

Recent NH wetland regulatory changes create a greater focus on living shoreline approaches over hardening for shoreline stabilization. As such, local interest in the design and implementation of living shorelines and habitat restoration is growing as NH's coastal ecosystems continue to degrade and erode. Conversations about adaptation options such as retreat and the potential for landscapes to return to natural states and functions are also increasing. Furthermore, NH partners recognize the role that high-functioning rivers, salt marshes, dunes, and other coastal ecosystems play in supporting vibrant and resilient communities. Many have renewed interest in implementing both evidence-based and innovative restoration approaches. Demand among partners exists for more information to inform the design and evaluate the effectiveness of these efforts toward ecosystem improvement.

It is estimated that 18-50% of the state's historic salt marsh habitat has been lost to development or tidal restriction and 85% of the sand dunes of New Hampshire's Hampton-Seabrook Estuary have been lost to development.

Community and Citizen Science | Social Situation

Local municipalities, conservation organizations, state agencies, and researchers are challenged by a lack of capacity to adequately address research and restoration goals. Furthermore, these same groups seek to engage local community members in collaborative work toward achieving these goals, both to gain community input and to increase the capacity to get the work done. Community and citizen science approaches – defined here as "public participation in the scientific process" – are increasingly sought to meet this demand, viewing coastal residents as partners in research and stewardship. It's important to provide local community members with the tools and resources to confidently participate in decision-making that improves coastal ecosystem health.

Pollution and Water Quality | Environmental Situation

Pollution and a legacy of human-driven factors continue to cause deleterious impacts on NH's coastal ecosystems. Toxic chemicals, nutrients, and both sewage-borne and naturally occurring pathogens have long threatened ecosystem health, limited seafood consumption, and negatively impacted the use of coastal resources (NHDES 2022). Current management actions are improving some conditions, although human pathogens and harmful algal blooms driven by climate change and the emergence of new types of contaminants (e.g., PFAS, etc.) are increasingly significant concerns (Apeti et al. 2021; NHDES 2021). The increasing incidence of marine debris, especially microplastics, is directly harmful to marine ecosystems and can also concentrate toxic contaminants and allow for the transport and proliferation of invasive and otherwise unwanted species. Research to support more holistic management approaches that include mitigation and elimination of contaminant sources upstream of discharges can help partners responsible for managing point and nonpoint waste streams.

Identified Needs

The authors of this chapter reviewed over a dozen recent reports, analyses, plans, and other sources to identify needs that might be addressed by the researchers, communicators, educators, outreach, and extension professionals working with NHSG in the HCE focus area. Informal interviews and discussions with interested parties, partners, and current and potential audiences also informed this list. A broad summary of needs includes:

> Restoration of vulnerable coastal natural resources using established and innovative approaches.

> Conservation of uplands adjacent to coastal systems to increase buffer protection benefits and to allow for the migration of marsh and dune systems.

> Implementation and evaluation of projects to manage invasive species and other dimensions of habitat change to optimize ecosystem health.

> Community and citizen science approaches to achieve research and monitoring, and engagement goals.

> Research on estuarine stressors on coastal ecosystem health, including stressor impacts and mitigation approaches.

> Information to coastal residents on topics such as sea-level rise and storm surge impacts, coastal ecosystem health, and approaches they can take to restore ecosystem function on their own property.

> Marine debris research, prevention, and removal in collaboration with groups responsible for sources of debris.

> Strategies to reduce public health risks associated with fecal-borne and naturally occurring pathogenic and toxin-producing microorganisms associated with seafood consumption and production.

> A better understanding of the sources, fate, and impacts of contaminants of emerging concern on ecosystem health, including humans.

> Strengthen collaborations with non-federally recognized Indigenous tribes in NH such as the Cowasuck Band of the Pennacook-Abenaki People to build additional shared programming.

> Support for partner efforts for land and sea conservation, stewardship, and acquisition, including innovative approaches such as cultural easements (reconnecting Indigenous peoples to occupied land and accounting for multiple uses).

> Complex conversations about what ecosystems can/will/should look like in the future. (What are the trade-offs? How do we decide and what are the tools needed to get us there? How do we facilitate adaptation to new conditions?)

> Collaborations between researchers, government agencies, and entities responsible for the direct management of waste streams.

> Wildlife monitoring, including higher trophic levels, as indicators of ecosystem health.

> Improved understanding of social perspectives and priorities regarding coastal ecosystems.

> Evaluation of secondary effects of large-scale human activities like dam removal and likely release of sediment-borne contaminants.

COLLABORATE

NH SEA GRANT STORY: RESEARCH IN ACTION

The New Hampshire Volunteer Beach Profiling Program brings together experts from NH Sea Grant, UNH Extension, the University of New Hampshire, the NH Geologic Survey, and the NH Coastal Program to train and mobilize volunteers to collect measurements of beach surface elevations, also called contours or profiles, at six beaches along the NH coast year-round. Quantifying changes in beach profiles over time provides increased understanding of responses to storms, as well as seasonal and long-term trends of sand erosion and accretion. Data are needed on erosion and accretion dynamics of NH beaches to help guide beach management decisions.

Approach

NHSG recognizes that ecosystem issues in New Hampshire are linked to regional and global-scale factors and that humans play an integral role as part of the ecosystem. NHSG connects research, education, extension, and communications efforts to help mitigate human impacts on NH's coastal resources and prepare for future and emerging trends. The Coastal Research Volunteer (CRV) Program supports enhancing and restoring ecosystem functions critical to human and ecosystem health (such as providing safe/clean waters and seafood) by identifying information gaps and emerging issues and supporting scientific study by both university and community scientists.

Local non-governmental organizations, university colleagues, federally linked programs (e.g., GBNERR, NH Coastal Management Program, PREP), and state agencies (e.g., NH Departments of Environmental Services, Fish and Game, Natural and Cultural Resources, and Health and Human Services) continue to be important and valuable partners in our efforts to facilitate the exchange of information related to coastal ecosystem health. These productive and collaborative partnerships benefit NHSG extension programming as well as NHSG-funded research projects.

NHSG is committed to integrating principles of DEIJA in its research, extension, and volunteer engagement practices within this focus area. As we respond to the current and evolving needs of our coastal population by exploring new partnerships and opportunities to build community trust, we aim to incorporate diverse perspectives, amplify the voices of those who have been traditionally underrepresented, and enhance responsiveness to the needs of vulnerable populations. Working together with our coastal watershed partners in this way, NHSG will facilitate access to tools and knowledge for communities and resource managers in order to support decision-making that is designed to maintain and improve overall integrated ecosystem health and address new challenges as they emerge. As our community of partners grows, we will encourage diverse perspectives and—prioritizing inclusivity—work toward building coastal communities that are both healthy and equitable.

Vision

New Hampshire's coastal watershed residents, communities, and professionals work together to share scientific, cultural, traditional, and experiential knowledge; contribute to research and monitoring; and implement management practices to ensure that coastal ecosystems are high functioning, safe for human use, and resilient to future changes for generations to come.

Healthy Coastal Ecosystems | GOALS

GOAL 1

Healthy coastal ecosystem structures, functions, and services are protected, enhanced, and/or restored.

NHSG Supported Objective: *Develop, facilitate, and share scientific understanding of current and predicted ecosystem relationships and drivers, approaches to decision-making, and potential solutions that can protect and restore coastal and marine ecosystems.*

> **Desired Outcome | Innovation:** Scientific understanding and potential solutions are developed that can inform management and conservation of coastal and marine ecosystems in New Hampshire.

> **Desired Outcome | Innovation:** Ecosystem-based management approaches are developed through broad community engagement and consideration of varied perspectives.

> **Desired Outcome | Learning:** Resource managers are more aware of scientific knowledge and potential solutions that can be leveraged to develop, optimize, and evaluate methods for enhancing ecosystem services.

> **Desired Outcome | Action and Consequence:** Resource managers use ecosystem-based approaches to manage coastal ecosystems and preserve, enhance, or restore coastal habitats and ecosystem function.

Healthy Coastal Ecosystems | GOALS

GOAL 2

Coastal ecosystems are clean and safe for recreation and consumption of locally harvested seafood.

NHSG Supported Objective: *Researchers and other experts develop and share knowledge, tools, and techniques to identify and reduce sources, incidences, and impacts of pollution (including but not limited to pathogens, nutrients, marine debris, plastic, harmful algal blooms, and contaminants of emerging concern) in New Hampshire's coastal ecosystems and seafood.*

> **Desired Outcome | Innovation and Learning:** Knowledge, monitoring approaches, and technologies are developed and shared that can inform decisions that mitigate public health and ecosystem health risk conditions associated with pollution in New Hampshire's coastal waters.

> **Desired Outcome | Action and Consequence:** Municipalities and management agencies use improved or novel tools and information based on the best available data to reduce pollution and protect coastal habitats and ecosystems.

> **Desired Outcome | Action and Consequence:** Regulatory agencies work with the seafood industry and recreational harvesters to use new information and best management tools to reduce seafood consumer safety concerns.

GOAL 3

Community members use scientific knowledge to identify questions, develop assessment methods, draw conclusions, and/or make decisions regarding the health of New Hampshire's marine, coastal, and estuarine resources.

NHSG Supported Objective: *Community members participate in educational programming, citizen science initiatives, and volunteer opportunities related to New Hampshire's coastal ecosystems, gain increased knowledge of ecosystems including the interrelationships of a diversity of perspectives, and participate in decision-making that improves coastal ecosystem health.*

> **Desired Outcome | Learning:** Community members increase knowledge, motivation, skills, and confidence to participate in and support coastal research and stewardship activities, policies, and practices.

> **Desired Outcome | Learning:** Community members increase their knowledge of the functions and values of coastal ecosystems, the threats to these systems, and options for addressing these threats.

> **Desired Outcome | Learning:** Community members increase their knowledge of and skills for how to use the scientific process to understand the world around them (scientific literacy).

> **Desired Outcome | Action:** Community members take action on coastal issues by seeking out and/or sharing knowledge about a specific topic of interest, attending a meeting, providing comments on a proposed project or legislation, and/or volunteering for a town board or conservation group.

> **Desired Outcome | Action and Consequence:** Community members leverage and integrate multiple perspectives to make decisions on issues that affect coastal ecosystems.

NHSG Supported Objective: *Community and citizen science projects use best practices for data collection and volunteer management.*

> **Desired Outcome | Consequence:** Community and citizen science initiatives are utilized and contribute to improving our knowledge with respect to coastal communities and ecosystems.

> **Desired Outcome | Consequence:** Researchers, natural resource managers, and communities increase their capacity to collect data and implement best management strategies.

> **Desired Outcome | Learning:** Researchers, coastal managers, and communities increase awareness of the value of including community and citizen scientists in their projects.

> **Desired Outcome | Consequence:** Public involvement in research leads to informed decision-making that improves New Hampshire's coastal ecosystems.

New Hampshire's coastal communities are prepared for and successfully adapting to changing environmental, social, and economic conditions in ways that reduce risks to human and ecosystem health and advance community wellbeing. These communities are developing community-based solutions grounded in local knowledge and relevant science.

FOCUS AREA (RCE)

RESILIENT COMMUNITIES AND ECONOMIES

A broad understanding of resilience includes adaptability across scales from individual to community and across stressors from episodic or sudden onset to chronic or slow onset. The concept of resilience is evolving to not only reflect adapting to a disturbance, but also finding opportunities to improve on pre-disturbance baseline living conditions.

Every coastal community experiences environmental disturbances that affect social, environmental, and economic conditions. While change is inevitable, some communities navigate change more successfully than others, demonstrating resilience. NOAA defines "resilience" as the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events (National Academies of Science 2016), yet a single definition or simple understanding of community resilience is elusive (Patel, et al.). NHSG embraces a broad understanding of resilience to include adaptability across scales from individual to community and across stressors from episodic or sudden onset to chronic or slow onset. In addition, the concept of resilience is evolving to not only reflect adapting to a disturbance, but also finding opportunities to improve on pre-disturbance baseline living conditions. In its resilience work, NHSG must work with communities to consider the potential long-term consequences and equity implications of adaptation actions to avoid maladaptive strategies that only reduce risks for a limited amount of time or a limited group of people.

The RCE focus area considers coastal communities of both place and practice. The RCE focus broadly defines community leaders to be people in municipal administration or departments, on boards or commissions, within local nonprofit organizations, on grassroots committees, in indigenous collaboratives, as neighborhood champions, or with local businesses. Within this strategic plan, RCE includes NHSG's work with communities facing challenges such as unsustainable development and land use, nonpoint source pollution, marine debris, hazardous weather, changing climate, stressed

infrastructure, decisions about emerging energy infrastructure needs, and associated research, education, technical assistance, community engagement, and coordination efforts. Without effective preparation for and responses to these challenges, New Hampshire's coastal region risks degradation of its social, economic, and natural resources. This work focuses on helping coastal communities reduce risks while becoming the communities they envision – taking steps toward greater resilience. The RCE issues in New Hampshire fall broadly into two primary National Sea Grant categories: "Water Quality" and "Coastal Planning."

Water Quality | Environmental Situation

Water quality in New Hampshire's coastal waters and river tributaries is threatened or degraded by sediment, pathogens, toxic contaminants, debris, and excess nutrients. These pollutants are attributed to effluent from wastewater treatment facilities and stormwater outflows; faulty and inundated septic systems; increases in impervious cover; litter from personal, recreational, and commercial activities; atmospheric deposition; turf and agricultural fertilizer runoff; and insufficient buffers. In 2010, the Great Bay Estuary, New Hampshire's dominant estuarine system, was designated as nitrogen-impaired by the U.S. EPA. Bacterial impairments are located along New Hampshire's shoreline waters and the Piscataqua River. Most recently, communities in New Hampshire are increasingly concerned about the detection of Per- and Polyfluoroalkyl Substances (PFAS) compounds in the coastal environment. State agencies, academics, resource managers, community leaders, and others are trying to learn more about these compounds and their sources, fates, and effects.

The climate effects already experienced by New Hampshire communities are anticipated to intensify. For example, by 2100, annual precipitation is expected to increase by as much as 20% and sea-level is projected to rise between 1 and 2.9 feet and possibly as much as 6 feet or more.

Coastal Planning and Climate Effects | Environmental Situation

Changing climate conditions and their effects such as flooding, heat waves, drought, saltwater intrusions, inundated septic systems, and shifting groundwater tables are compounding threats to community resources such as municipal infrastructure, natural resources, residential and commercial buildings, transportation routes, public health, and cultural and historic sites. The climate effects already experienced by New Hampshire communities are anticipated to intensify. For example, by 2100, annual precipitation is expected to increase by as much as 20% and sea-level is projected to rise between 1 and 2.9 feet and possibly as much as 6 feet or more (Wake et al.). High development pressure in vulnerable areas exacerbates the threats from changing climate conditions.

Coastal Planning and the Blue Economy | Economic Situation

Coastal areas are critically important to the nation's economy, especially with growing attention to the needs and opportunities present within a blue economy framework. According to the World Bank, a blue economy refers to the "sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and ocean ecosystem health." It includes traditional sectors such as fisheries, tourism, working waterfronts, and maritime transport as well as growing industries such as aquaculture and ocean renewable energy. According to Conservation International, the blue economy also includes benefits that may not be currently market-based, such as carbon storage, coastal protection, cultural values, and biodiversity. Anticipated challenges to enhancing the blue economy include conflicts over coastal access, community priorities, land-use changes, habitat degradation, aging fleets and infrastructure, and existing versus proposed uses. Currently, coastal communities of place and practice in New Hampshire are facing decisions around ocean renewable energy development while experiencing uncertainty about its possible economic, ecological, and sociocultural impacts. These decisions surround the development of and upgrades to the regional supply chain, onshore energy transmission and distribution infrastructure, and activities around ports and waterways.

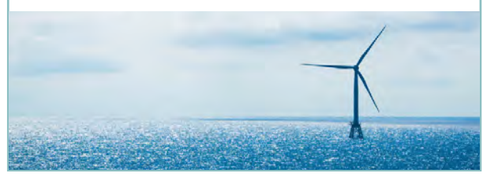
CONNECT

NH SEA GRANT STORY: RESEARCH IN ACTION

As offshore wind energy is sited and developed in the Gulf of Maine, there is a need for transparency in the federal development process, for a trusted source of science-based information, and for technical assistance in public engagement. Spatial overlap of prime wind energy area and fishing areas, incompatibilities between turbine mooring technology and fishing gear, and a changing regulatory landscape has created urgency for communication and connection between affected groups and federal agencies.

NHSG participates in the NH Offshore Wind Stakeholder Outreach Workgroup to encourage community conversation and engagement. As a result, NH communities, namely the NH fishing industry, are more connected to and engaged in offshore wind planning and have had their comments injected into the planning process.

To address additional gaps through research, the Northeast Sea Grant Consortium and NOAA's Northeast Fisheries Science Center partnered in 2024 to provide $1 million in social science research funding to improve understanding of fishing community interactions with offshore wind development in the U.S. Northeast and Gulf of Maine.



Our Communities | Social Situation

In NH coastal municipalities, community leaders tend to know their towns well, but often have limited access to technical, financial, and human resources to deal with complex regional and local challenges. People in many New Hampshire communities pride themselves on a tradition of direct participation in town meetings and small-town governance. Local boards and commissions are often composed of volunteers who report feeling under-resourced, disconnected from fellow decision-makers, and forced to operate reactively versus proactively.

Identified Needs

The authors of this chapter reviewed over a dozen recent regionally relevant reports, analyses, and plans to identify needs that might be addressed by the researchers, communicators, educators, and outreach and extension professionals working with NHSG in the RCE focus area. Informal interviews and discussions with interested parties, partners, and current and potential audiences also provided important local knowledge. A broad summary of community needs includes:

Sea Grant NEW HAMPSHIRE

High-quality information offered in ways that are accessible and relevant to a wide range of community members.

Data and Information

> Downscaled, tailored, customizable, actionable, and/or locally relevant data and information related to the challenges identified above.

> Access to data and information derived from regional or national sources that are locally relevant, applicable, or transferable for small coastal communities.

> Information that addresses community concerns across social, economic, and environmental dimensions (e.g., social interventions and natural resource impacts; green and gray infrastructure implementation; ocean renewable energy development and associated onshore infrastructure; weather and climate impacts on ecosystem services, critical infrastructure, and human population mobility; and the intersection of climate and housing, transportation, and health).

> High-quality information offered in ways that are accessible and relevant to a wide range of community members.

> Greater emphasis on inviting, incorporating, and responding to local knowledge.

Awareness

> Greater awareness of existing data sources and tools, plans, projects, policies, and practices among community leaders, especially across municipal departments or community sectors.

> Greater awareness of whole watershed issues inclusive of a broader range of community leaders and members, including up-watershed communities.

> Greater awareness of offshore energy resource issues and management processes among community leaders and community members.

Assistance

> Assistance, especially longer-term, to integrate data with plans, projects, policies, and practices. Longer-term assistance supports communities in new knowledge co-creation through the integration of new knowledge into coastal projects and management practices.

> Assistance engaging underserved, underrepresented, and/or disengaged community members in important community conversations with a focus on increasing co-learning and co-development of solutions.

> Assistance in accessing technical, human/capacity, and financial resources.

> Assistance centering relevant community conversations and resources on the needs of affected, yet underrepresented, community members.

Approach

The importance of NHSG's partnerships in its approach to complex challenges, particularly in its work with communities in the coastal watershed, cannot be overstated. Partnerships (e.g. with GBNERR, the NH Coastal Program, PREP) bring diverse expertise, perspectives, and resources together to help address community challenges. They also create institutional relationships with communities that can live beyond the lifespan of a committee appointment, election cycle, grant project, or career phase. NHSG's work to address nonpoint source pollution is often done in coordination with NH's Natural Resource Outreach Coalition (NROC). The members collaborate to build the capacity of municipal officials and community leaders to reduce nonpoint source pollution, primarily through better land-use planning and best management practices. NHSG's work to advance climate adaptation is often done in coordination with the NH Coastal Adaptation Workgroup (CAW), a coalition created to deliver education, facilitation, and technical assistance for climate adaptation in the Seacoast. CAW members collaborate to build the capability of communities to recognize climate-related risks and address them through planning, policy, engaged research, on-the-ground projects, outreach, and regulatory tools.

With its partners, NHSG can actively participate in and lead efforts tailored to small coastal communities of northern New England designed to strengthen community resilience. NHSG's work with communities is grounded in providing these entities with the best available data, soliciting local knowledge, and helping leaders apply the information to their own priorities with as much comfort and confidence as possible. NHSG's approach includes community strategies that focus on long-term engagement with community leaders (including municipal employees, volunteer board members, organizational leaders, influential residents, volunteers, and business leaders). NHSG's engagement methods are based upon tested theories of social change and best practices for engagement while also remaining open to innovation, centering communities, and embracing transdisciplinary approaches. As NHSG's resilience work more fully integrates social, economic, and cultural aspects with environmental ones, new partnerships will be necessary to make progress on resilience goals.

NHSG is committed to integrating principles of DEIJA in this focus area by considering the impact of its 'typical' practices and adjusting them when assessing needs, communicating information, identifying and convening interested parties, and implementing programs. Integrating DEIJA better with programs includes improving support for underserved community members, elevating underrepresented voices, encouraging diverse perspectives, fostering inclusive engagement processes, highlighting the needs of vulnerable populations, and identifying and working with new collaborators to address needs. Partners are encouraging NHSG to continue to spearhead DEIJA efforts that will bring all coalition members along in approaches that are more inclusive and equitable.

Vision

New Hampshire's coastal communities are prepared for and successfully adapting to changing environmental, social, and economic conditions in ways that reduce risks to human and ecosystem health and advance community wellbeing. These communities are engaging with NHSG and partners in co-learning and co-developing community-based solutions grounded in local knowledge and relevant science and using methods that are equitable, just, and inclusive.

GOAL 4

Resilient Communities and Economies | GOALS

Coastal communities in New Hampshire, from headwaters to oceanfront, gain the capability to protect water resources.

NHSG Supported Objective: *Community leaders increase knowledge about water resource protection, the impacts of different land care and land-use patterns on water resources, and approaches available to improve water resource management.*

> **Desired Outcome | Learning:** Community leaders are aware of watershed and coastal functions, understand threats to water resources, and consider approaches – especially through managing land use, land cover, and land care – to reduce threats and preserve or enhance functions.

> **Desired Outcome | Learning:** Community leaders are motivated to support and implement relevant water resource protection strategies from parcel to regional scales involving a broad range of constituents and interests.

NHSG Supported Objective: *Community leaders have the access, support, and capability to apply local knowledge, locally relevant data, tools, and techniques and implement strategies to reduce water resource threats.*

> **Desired Outcome | Learning:** Community leaders learn about data, tools, techniques, strategies, outreach materials, and funding and assistance programs for water resource protection.

> **Desired Outcome | Action and Consequence:** Community leaders consider, promote, and implement land-use patterns, development designs and techniques, and land care practices that protect water resources.

GOAL 5

Coastal communities in New Hampshire gain the capability to prepare for, recover from, adapt to, and evolve with the environmental, social, and economic effects of severe weather and climate change.

NHSG Supported Objective: *Community leaders increase their knowledge about current and projected weather and climate conditions, current and anticipated impacts, and strategies for reducing risks from harmful impacts.*

> **Desired Outcome | Learning:** Community leaders are aware of weather- and climate-related risks and consider approaches, including nature-based solutions, to reduce these risks.

> **Desired Outcome | Learning:** Community leaders are motivated to support and implement relevant risk reduction strategies from parcel to regional scales.

NHSG Supported Objective: *Community leaders have the access, support, and capability to apply local knowledge, locally relevant tools, and techniques and implement strategies to reduce weather- and climate-related risks in coastal communities.*

> **Desired Outcome | Learning:** Community leaders exchange local knowledge and learn about data, tools, techniques, strategies, and funding and assistance programs for reducing risks from weather and climate effects.

> **Desired Outcome | Action:** Coastal community leaders incorporate current climate conditions, projected trends, and current and potential impacts into planning processes and/or documents and develop or modify policies and regulations to account for them.

> **Desired Outcome | Action:** Community leaders implement climate adaptation projects considering vulnerability, risk tolerance, and community needs and priorities for environmental, social, and economic well-being.

GOAL 6

Resilient Communities and Economies | GOALS

Coastal communities gain the capability to participate in public discussions, make informed decisions, and implement steps for enhancing the blue economy (seafood, ocean renewable energy, tourism, working waterfronts, and maritime transport) equitably.

NHSG Supported Objective: *Community leaders and industry partners increase in their knowledge of environmental, social, and economic considerations related to blue economy goals.*

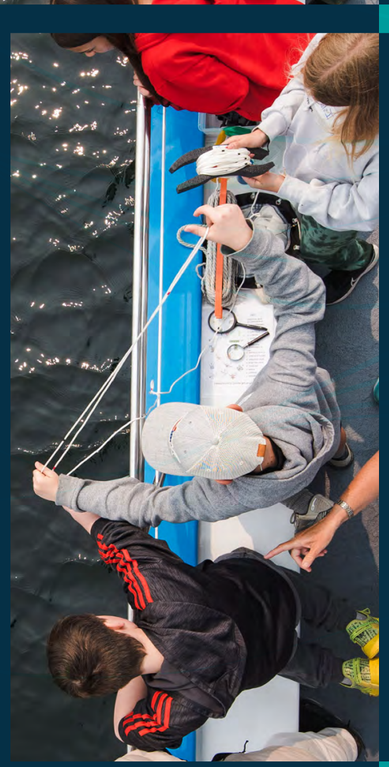
> **Desired Outcome | Learning:** Community leaders and industry partners will learn about data, tools, strategies, processes, and trade-offs related to blue economy opportunities.

> **Desired Outcome | Learning:** Community leaders and industry partners are motivated to engage in discussion and decision-making related to blue economy goals.

NHSG Supported Objective: *Community leaders and industry partners have the access, support, and capability to apply locally relevant knowledge, tools, and strategies to blue economy decision-making and implementation.*

> **Desired Outcome | Action:** Community leaders and industry partners will bring blue economy considerations into community decision-making and activities.

> **Desired Outcome | Action:** Community leaders and industry partners will bring community perspectives and priorities to blue economy decision-making and activities.



New Hampshire youth and adults from all backgrounds use environmental literacy to make informed decisions about ocean and coastal uses and impacts, have a range of opportunities to engage in coastal and marine science and engineering, and are aware of and have access to coastal and marine-based career opportunities.

FOCUS AREA (ELWD)

ENVIRONMENTAL LITERACY & WORKFORCE DEVELOPMENT

Whether through recreation, daily household activities, education, or professional responsibilities, NH residents and visitors make decisions every day that impact our environment. While every municipality is not in the immediate coastal watershed, the activities of our residents and those who visit the state have the potential to positively, or negatively, impact the coastal environment in New Hampshire and our neighboring states.

Ensuring that our residents have an education grounded in environmental literacy and that we are developing and supporting a diverse and inclusive coastal and marine workforce is key to the future health of our coastal communities and the environments upon which they depend. As we face environmental, social, economic, and cultural change over the coming years, New Hampshire residents will need to be prepared to be resilient in the face of change and confront and weigh difficult trade-off decisions at the individual, community, regional, and state levels.

New Hampshire is home to a wide range of educational institutions at all levels. Institutions include public and private elementary schools, career-technical and college preparatory high school programs (including dual enrollment options), adult learning programs, seven community colleges, six post-secondary institutions that make up the University System of New Hampshire, and 12 private post-secondary institutions. In addition to the spectrum of formal learning institutions, NHSG works in a range of non-formal learning environments (the term “non-formal” is used here to describe out-of-school learning that may also be referred to as informal or other related phrasings). While NHSG views environmental literacy and workforce development as a spectrum of related activities, the way we approach and deliver services in these areas differs. As such we further describe the Situation, Needs, and Approaches separately as “Environmental Science and Literacy” and “Integrated Workforce Development” (preparing skilled professionals across many levels).

Environmental Science and Literacy

In December 2015, the Every Student Succeeds Act (ESSA) was passed by the U.S. Congress and signed into law. The act reauthorizes the 50-year-old Elementary and Secondary Education Act (ESEA), the nation's law that serves as the foundation for national educational policy and funding. The ESSA replaces the No Child Left Behind Act and includes several provisions that have important implications for the Environmental Literacy and Workforce Development (ELWD) focus area. The ESSA requires "all students in America be taught to high academic standards that will prepare them to succeed in college and careers." This emphasis on career readiness in the ESSA supports Sea Grant's emphasis on increasing the number of marine-career-ready graduates and encourages the development of this capacity beginning at younger ages.

The ESSA also supports the adoption of the Next Generation Science Standards (NGSS) [2013] – a set of standards for science education that is based upon, among other things, the philosophy that students need to do science to learn science and that environmental literacy is a critical component of a literate citizenry. Ocean and climate science are specifically included in this set of national standards for the first time. The support for these standards in the ESSA improves the likelihood that states and school districts will add these content areas to their curricula.

Based on a recommendation from the NH Department of Education (NHDoE), New Hampshire school districts have adopted the NGSS as NH Science Standards. NHDoE also supports the state's Environmental Literacy Plan (NHELP) [2016] which aligns with the NGSS and recommends a significant increase in field-based science instruction. In addition, the NH state legislature has updated educational adequacy standards to include specific reference to environmental science as part of an adequate education (as defined in RSA 193-E:2).

There is a demand for skilled professionals in developing robust, diverse, and climate-ready coastal and ocean-based industries—including the seafood sector, ocean renewable energy, and coastal tourism and recreation.

Identified Needs | Environmental Science and Literacy

NHSG staff gathered environmental literacy-related needs through a review of reports, input from partners, and feedback from the NHSG Policy Advisory Committee. A summary of identified needs includes:

> Increased understanding of ecology, scientific approaches, coastal conservation, and responsible management decision-making among people who are and will be our country's voters, workforce, and political and community leaders. (This need exists across demographic groups, and educational settings.)

> The introduction of the NH Science Standards has brought about a need for professional development that builds on science content knowledge and integrates science practices into K-12 classes (Governor's Task Force, 2015).

> An estimated 14% of the population (or approximately 200,000 New Hampshire residents) are between the ages of 5 and 18 (Census, 2022), representing the K-12 demographic—a primary target audience for NHSG environmental literacy activities. The state is seeing a significant change in the demographics (markers of diversity) of this age group (Johnson, 2022), pointing to an identified and growing need to diversify outreach approaches and efforts.

> With each new generation, New Hampshire is seeing an increased belief that "climate change is happening now, caused mainly by human activities." In particular, Gen Z (born 1997-present) has seen both the highest overall acceptance and the sharpest increase over time (Hamilton, 2021). This generation needs a trusted, unbiased source of information in both formal and non-formal learning settings.

Integrated Workforce Development

A robust and diverse workforce is a critical component of addressing the challenges facing our coastal and ocean ecosystems and building resilient coastal communities and economies. Higher education institutions, including Sea Grant host institutions and their partners, play a critical role in building resilience as they train the workforce that will address marine and coastal issues across all sectors, provide research and multidisciplinary support, and help bring federal, state, and private funding into the system. Sea Grant programs have an important role to play in building connections across disciplines and sectors, supporting the workforce of today, and preparing the workforce of tomorrow.

In New Hampshire, there continues to be a demand for skilled professionals at all levels to participate in science, management, and conservation in the state. There is also demand for skilled professionals in developing robust, diverse, and climate-ready coastal and ocean-based industries—including the seafood sector (both wild capture and aquaculture), ocean renewable energy, and coastal tourism and recreation.

Identified Needs | Integrated Workforce Development

NHSG staff gathered workforce-related needs through a review of reports, input from partners, and feedback from the NHSG Policy Advisory Committee and the NH CoastWise Program Steering Committee. A summary of identified needs includes:

> Skills-based training with hands-on components that prepare undergraduate, graduate, post-graduate, and non-matriculating students and professionals to help solve coastal and marine issues for the state and the region.

> Training and educational opportunities that build more collaborative approaches to the scientific enterprise, center community needs, and build inter- and trans-disciplinary approaches to support science that informs action.

> Programming and educational resources to support recruiting and retaining personnel with diverse and complementary skill sets, technical expertise, and the ability to work on interdisciplinary teams.

> NHSG undergraduate and graduate educational opportunities that increase interdisciplinarity, foster experiential learning, and incorporate diversity, equity, and inclusion.

> Opportunities for real-world experiences and exposure to the range of possible marine careers as students and early-career professionals explore potential pathways for their own careers relevant to needs in marine resource management, research, and industry.

> Outreach and programming that builds more awareness of the range of careers related to ocean and coastal resources, including but not limited to research vessel captains, wage mariners, wastewater treatment plant operators, living shoreline construction, coastal restoration, contaminant clean up, and more.

> Quality mentorship as a key to student and early-career success.

Approach

This focus area recognizes our state's need for an environmentally literate public capable of informed decision-making in the areas of watershed, coastal, and marine ecosystems and resources. Likewise, our state—and nation—needs a workforce that is prepared for employment in these same areas. To deliver on our goals, NHSG uses a range of approaches that center on creating partnerships, building capacity, developing and strengthening networks, reducing barriers to access, and building inclusivity.

Through our environmental literacy and workforce development efforts, NHSG seeks to cultivate a more engaged, diverse, and impactful state-wide and regional research, extension, and education community that confronts challenges faced in the

INFORM

NH SEA GRANT STORY: RESEARCH IN ACTION

Engagement and training of graduate students in coastal resource research is a key component of building a workforce skilled in science, technology, engineering, and other disciplines critical to addressing ocean, coastal, and climate challenges. Increasing student engagement in research to address NHSG's strategic priorities simultaneously enhances research outcomes and workforce training.

The NHSG Graduate Research Fellowship was created to encourage graduate student participation in research relevant to the NHSG Strategic Plan and to enhance exposure to extension, education, and communication opportunities, with the goal of expanding Fellows' skillsets and career opportunities.

In recent years, NH graduate students have received fellowship funding to advance research projects such as studying the impact of invasive green crabs on NH's shellfish industry, understanding land conservation planning for flood resilience, quantifying the occurrence and fate of PFAS in Great Bay, and exploring the impact of heatwaves on oyster mortality.

NH Seacoast, Gulf of Maine, and beyond, for today and tomorrow. NHSG works through an extensive partnership network (including GBNERR, The Seacoast Science Center, The Gundalow Company, the Leitzel Center at UNH, UNH Extension, and UNH SMSOE) to implement our ELWD programming. NHSG is committed to integrating principles of DEIJA in all education, outreach, and workforce development efforts. This will be achieved by actively engaging underserved and historically excluded community members throughout New Hampshire in both formal and non-formal education programming and workforce development activities. By encouraging diverse perspectives and collaborating with traditionally underrepresented and historically excluded partners, we will work to build coalitions that are more inclusive and equitable.

While working to strengthen our existing partnerships with K-12 and post-secondary institutions, NHSG will also seek to build on lessons from existing efforts to explore ways to connect with and support other partners around the state – particularly around expanded programming to include a wider suite of career paths and educational settings such as high school career and technical education centers (CTEs), community colleges, and technical institutes. NHSG seeks to leverage our reach through new and expanded partnerships with workforce-focused groups (i.e., Chambers of Commerce, the State Workforce Investment Board, or Stay-Work-Play). There are opportunities across all NHSG focus areas to further expand technical training and career readiness, for example, our community and citizen science efforts. These efforts are all designed to continue to build academic and professional networks and partnerships to grow New Hampshire as a key contributor to the U.S. workforce as it relates to the full spectrum of marine- and coastal-related careers and industries.

While we break out our Approaches, Goals, and Objectives into two complementary categories of activities within ELWD, NHSG considers the continuum of activities and approaches that are

necessary for environmental literacy and workforce development as a collective whole, which also supports the implementation of our other focus area Goals and Objectives.

Environmental Science and Literacy

In collaboration with faculty, formal and non-formal education institutions, and regional organizational partners, NHSG will develop and provide environmental literacy programs to audiences in New Hampshire and New England through a variety of resources and instructional strategies. NHSG will continue to provide its nationally recognized marine education and professional development programs to volunteers who comprise the UNH Marine Docent Program. These opportunities include extensive in-class, field, experiential, and web-based methodologies and will tap the expertise of UNH and other environmental education individuals and organizations in the region. NHSG will develop professional development programs and pedagogical support materials in partnership with university-based researchers and educators for both formal and non-formal educators. We will also support the inclusion of environmental science standards in formal and non-formal learning settings. These programs will be collaborative and regional in nature and will often be offered in conjunction with other partner organizations.

Integrated Workforce Development

NHSG workforce development efforts fall into two broad categories: 1) support for undergraduate and graduate students through both coursework and fellowships and 2) professional development opportunities to recruit, support, and retain, skilled marine and coastal professionals in the state and region. NHSG will continue to provide post-secondary student resources with a focus on fellowships and career exploration – including undergraduate fellowships, graduate fellowships, external fellowships, undergraduate course support, curriculum development, career exploration resources for a range of audiences, and exploration of new programming areas with partners to address emerging needs associated with diversifying the coastal and marine-focused workforce. NHSG will also continue to support Professional Development and networking opportunities for coastal and marine resource management through immersive cohort-based opportunities and peer-to-peer networking support. To implement these efforts, NHSG collaborates with partners across the University of New Hampshire campus, as well as those at other institutions of higher education throughout the state (e.g., NH CoastWise). NHSG is also working actively with municipal, state, federal, and tribal partners and a range of non-profits throughout the state to build workforce development programming that is responsive to identified needs in the short and long terms.

Vision

New Hampshire youth and adults from all backgrounds use environmental literacy to make informed decisions about ocean and coastal uses and impacts, have a range of opportunities to engage in coastal and marine science and engineering, and are aware of and have access to coastal and marine-based career opportunities.

While working to strengthen our existing partnerships with K-12 and post-secondary institutions, NHSG will also seek to build on lessons from existing efforts to explore ways to connect with and support other partners around the state—particularly around expanded programming to include a wider suite of career paths and educational settings such as high school career and technical education centers, community colleges, and technical institutes.

GOAL 7

Environmental Literacy and Workforce Development | GOALS

New Hampshire community members' environmental literacy and engagement are enhanced through non-formal education and outreach opportunities in ocean, coastal, and climate sciences.

NHSG Supported Objective: *New Hampshire residents from a range of backgrounds are enthusiastic, curious, and prepared to make informed decisions relevant to coastal resources as a result of knowledge and/or skills gained through non-formal ocean, coastal, and climate education programs that utilize the latest scientific research and education best practices.*

> **Desired Outcome | Innovation and Action:** Non-formal ocean, coastal, and climate education programs that utilize the latest scientific research and educational best practices are developed and/or made available to New Hampshire residents.

> **Desired Outcome | Learning:** Engaged residents and visitors increase their literacy in ocean, coastal, and climate science through participation in programs that incorporate the latest scientific research.

> **Desired Outcome | Consequence:** Engaged residents participate in resource-related decision-making with a sound background in scientific and environmental literacy.

GOAL 8

Environmentally literate youth in New Hampshire are supported by formal and non-formal education and outreach opportunities in ocean, coastal, and climate sciences that are aligned with the Next Generation Science Standards (NGSS), NH Environmental Literacy Plan (NHELP), and culturally responsive teaching practices.

NHSG Supported Objective: *Formal Pre-K-12 and non-formal youth programming in ocean, coastal, and climate education is developed and supported using the latest scientific research, educational best practices, and cultural competencies.*

> **Desired Outcome | Learning:** New Hampshire Pre-K-12 students experience in-school education and outreach programs that incorporate current understanding of ocean, coastal, and climate science and are grounded in NGSS, NHELP, and culturally responsive teaching practices.

> **Desired Outcome | Learning:** New Hampshire youth experience out-of-school programs that incorporate current understanding of ocean, coastal, and climate science and are complementary to NGSS, NHELP, and culturally responsive teaching practices used in pre-K-12 schools.

GOAL 9

Environmental Literacy and Workforce Development | GOALS

Formal and non-formal educators in New Hampshire incorporate ocean, coastal, and climate topics and data into curricula and programming that is grounded in NGSS, NHELP, and culturally responsive teaching practices.

NHSG Supported Objective: *New Hampshire residents from a range of backgrounds are enthusiastic, curious, and prepared to make informed decisions relevant to coastal resources as a result of knowledge and/or skills gained through non-formal ocean, coastal, and climate education programs that utilize the latest scientific research and education best practices.*

> **Desired Outcome | Learning:** Formal and non-formal educators gain an increased understanding of ocean, coastal, and climate literacy principles and education standards as well as approaches to teaching the content.

> **Desired Outcome | Action:** Formal and non-formal educators incorporate ocean, coastal, and climate literacy principles and standards into their teaching.

GOAL 10

New Hampshire develops a diverse workforce prepared to address ocean, coastal, and climate issues through a range of learning approaches and environments, and with an increased awareness of and retention in related careers.

NHSG Supported Objective: *Undergraduate and graduate students enhance their course of study through enhanced coastal and marine-related curriculum and out-of-class experiences.*

> **Desired Outcome | Learning:** Undergraduate (including community college) and graduate students participate in courses that are informed and supported by NHSG resources and expertise.

> **Desired Outcome | Action:** Barriers to accessing training and learning opportunities are identified and removed so that New Hampshire's residents from all backgrounds and demographics are connected to and prepared for the range of career paths that support the needs of coastal communities.

> **Desired Outcome | Action:** Undergraduate (including community college) and graduate students expand their engagement with ocean, coastal, and climate science and engineering topics through participation in NHSG-supported research experiences, internships, and fellowships, along with other forms of mentorship by NHSG staff.

NHSG Supported Objective: *Targeted audiences have access to opportunities to explore career options and gain relevant skills across the range of ocean-, coastal-, and climate-related careers.*

> **Desired Outcome | Learning:** The public has access to general information on ocean-, coastal-, and climate-related careers available for their exploration.

> **Desired Outcome | Learning:** Students take part in programs that expand their understanding of marine- and climate-related careers and give them the opportunity to expand skills and knowledge relevant to those careers.

> **Desired Outcome | Consequence:** Individuals from all backgrounds and with diverse needs are thoughtfully and intentionally supported in and have access to formal and experiential learning, training, and research experiences

NHSG Supported Objective: *Targeted audiences have access to opportunities to explore career options and gain relevant skills across the range of ocean-, coastal-, and climate-related careers.*

> **Desired Outcome | Learning and Consequence:** Marine and coastal professionals gain skills and knowledge through NHSG programming and use them in their coastal and marine careers.

> **Desired Outcome | Learning and Consequence:** Marine and coastal professionals build stronger professional networks that advance research and management.

New Hampshire aquaculture and fishing communities and industries sustain our coastal cultural heritage and provide for a thriving local seafood economy that is affordable and accessible for residents state-wide while conserving and/or restoring coastal and marine ecosystems and cultural resources.

IMPACT

FOCUS AREA (SFA)

SUSTAINABLE FISHERIES & AQUACULTURE

Challenges due to the COVID-19 pandemic exposed NH seafood industry vulnerabilities – such as over-reliance on a single species, bait and fuel price and availability, and the dependence on traditional market outlets – but also created opportunities like increased direct-to-consumer sales and the creation of new businesses and partnerships in the local seafood economy.

Today, the NH Seafood industry continues to face challenges related to co-existence with other elements of the blue economy – such as conflicts with marine spatial planning in offshore wind development and permitting and required environmental protection – as well as increasing costs of operation and uncertain and variable revenue streams.

Despite the growing challenges, the local seafood industry continues to meaningfully contribute to the New Hampshire economy and cultural heritage. In fact, some sectors of the industry – particularly the recreational, lobster, and oyster aquaculture sectors – have recently had record years in terms of revenue. The capacity to innovate and adapt continues to be a central asset responsible for the resilience of NH local seafood harvesters and producers. NH Sea Grant and other partner organizations should continue to find ways to support this capacity. In addition to the commercial industry, active communities in recreational and non-commercial (subsistence and sustenance) fishing derive cultural and food value from local ecosystem services on the NH Seacoast.

Commercial Fisheries | Environmental, Economic, and Social Situation

New Hampshire's commercial fishing industry continues to be affected by the combined impacts of an ever-increasing number of challenges including continually changing fishing regulations, cuts to allowable catch for valuable stocks, severe reduction in groundfishing activity, attrition and "graying of the fleet," marine mammal protection measures, and a declining trained and available workforce. Ecosystem dynamics in response to rapidly warming waters of the Gulf of Maine, declining dockside infrastructure, disruption to seafood markets, and increased ocean usage conflicts continue to challenge the commercial fishing industry. As a result, New Hampshire's commercial industry is

becoming increasingly a single-species industry dominated by lobstering, which makes up 95% of all the landings in the state by value. This reliance on a single stock amplifies the vulnerability of NH fishing to environmental and socio-economic change.

Currently, the lobster fishery is reporting record catches and record profits amidst a constant barrage of issues (see above). Although the fishery is currently ecologically and economically stable, it is critical to continue monitoring and assessing factors affecting lobstering operations and to continue to engage with the industry to support industry adaptation and innovation.

In addition to the existing oyster aquaculture industry in the estuaries, new opportunities for blue mussel, seaweed, finfish, and multi-trophic aquaculture exist in New Hampshire's nearshore and offshore waters.

Recreational, Subsistence, and Sustenance Fisheries | Environmental, Economic, and Social Situation

Like the commercial fishing sector, the New Hampshire marine recreational/for-hire fishing industry continues to face challenges including bag limits, advertising/marketing, regulations, and increased fuel prices. Subsistence and sustenance fisheries have historically received less attention from NH Sea Grant programming, yet they are present on the NH Seacoast and should be engaged as community partners in the future.

Aquaculture | Environmental, Economic, and Social Situation

New Hampshire's aquaculture industry is predominated by oyster aquaculture, which has grown rapidly in the last ten years. Since 2012, the number of oyster aquaculture licenses in the state has grown from 7 to 28 and the number of acres being leased has grown from 21 to 80.4 acres. In 2021, there were 12 permitted commercial oyster aquaculture businesses actively harvesting market-sized oysters in New Hampshire's Great Bay Estuary (73.9 acres of oyster farm sites) and Seabrook-Hampton Estuary (6.9 acres of oyster farm sites). Since 2013, the value of the oyster aquaculture industry has grown over 900%, with a 113% annual growth rate of total harvest value between 2013-2021. As a result of the pandemic, the restaurant-dependent sector of the industry was hit especially hard, but by year's end, with federal and state aid and restoration projects funded by NHSG to support the industry as well as adaptive strategies to sell directly to consumers, the sector fared better than anticipated.

Aided by ongoing research and collaboration with NHSG-funded research projects, oyster farmers are continuing to refine and develop their approaches to reduce product grow-out time, human health consequences, and oyster mortality. Increased production through improved methods is possible, yet the potential for further development of oyster farming in New Hampshire is uncertain due to area closures related to water quality, limited available space, technological challenges, and potential conflicts with other interested parties in New Hampshire's estuaries. In recent years, the oyster industry has become increasingly concerned with the prevalence of PFAS and other emerging contaminants/pollutants (e.g., microplastics).

In addition to the existing oyster aquaculture industry in the estuaries, new opportunities for blue mussel, seaweed, finfish, and multi-trophic aquaculture exist in New Hampshire's nearshore and offshore waters. Inland opportunities are emerging, expanding, and showing potential for future land-based fish efforts. Regionally, the emerging aquaculture industry is limited by technical support; permitting requirements; public health risk management; resources in training and expertise in the growth and husbandry of shellfish, seaweed, and finfish; and socio-economic factors including Social License to Operate (SLO) (Whitmore 2022)

Seafood Industry Resilience | Economic and Social Situation

While the commercial fishing industry continues to face significant challenges, some attributable to the pandemic, most of the challenges are a continuation of over a decade of fishing regulations, increased impacts of changing climates and ecosystems, and other global trade and political factors. However, the COVID-19 pandemic highlighted the resilience and innovative capabilities of this small-but-tenacious industry. New direct-to-consumer businesses emerged, fishers were willing (and able) to try their hand at new marketing and sales strategies, and some formed partnerships with local farms and CSA's (community-supported agriculture). Consumers were also ready to try new ways to access fresh and local seafood, and social media had a bigger role in connecting seafood producers with a consumer base. Additionally, the formation of a New England Young Fishermen's Alliance to help recruit, train, and offer professional development opportunities to fishers aged 45 and younger is a step forward in helping to curb the consolidation and "graying of the fleet" that New Hampshire is experiencing.

In the coming years, New Hampshire's seafood, fishing, and aquaculture industries will continue to face some of the same challenges. A pressing issue that some perceive has significant potential to impact New Hampshire's fishing and seafood industries is the development of offshore wind and other ocean-based renewable energies. Currently, plans for offshore wind development are gaining traction in the Gulf of Maine, but their impact on New Hampshire's fishing industries remains largely unknown. Therefore, it is important for the fishing community to prioritize engagement in the current and future planning processes to leverage opportunities, remain informed, and mitigate potential impacts.

Identified Needs

After reviewing reports, analyses, landings data, action plans, and other sources as well as conducting informal interviews and conversations with interested parties and partners, we have been able to identify needs that may be prioritized and addressed by NHSG researchers, extension specialists, and other professionals working in the SFA focus area. The following is a summary of identified needs:

> Space and time for the fishing and aquaculture communities to have conversations on all emerging topics and challenges (e.g., bait shortages, navigating fishing regulations, offshore wind and ocean renewable energy, zoning of the ocean, interactions with whales, marine debris, permitting, global trade/market instability, emerging contaminants, infrastructure).

> Training and professional development opportunities for fishing industry members.

> Pathways for increased communication between industry and fisheries managers and regulators.

> Support and funding for collaborative research that has more immediate applicability to industry.

> Better promotion and marketing of New Hampshire seafood.

> Guidance, funding, and other resources to support research and development of value-added products and processes.

> For the aquaculture industry, best management practices for shoreline access sites and better communication channels with state managers for site-specific infrastructure improvements/maintenance.

> Assistance for the state of New Hampshire to keep pace with the expanding oyster industry's needs (e.g., testing capacity, infrastructure, market channels) through research and extension.

> Fishing education/exposure programming for younger audiences (K-12) in collaboration with industry members.

> Diversity, equity, inclusion, justice, and accessibility considerations and opportunities.

IMPACT

NH SEA GRANT STORY: RESEARCH IN ACTION

Offshore of New Castle, NH, researchers from NHSG and the University of New Hampshire have deployed AquaFort, a sustainable, small-scale, integrated multi-trophic aquaculture (IMTA) system. AquaFort enables multiple species – in this case steelhead trout, blue mussels, and sugar kelp – to grow together within a single floating structure. By collaborating with local fishers, seafood markets, and culinary professionals, AquaFort aims to diversify local seafood products and foster industry engagement, serving as a test-bed for innovative aquaculture practices.

Approach

NHSG's SFA team works through partnerships with fishers, aquaculturists, NOAA Fisheries, the New England Fisheries Management Council, NH Fish and Game, and non-governmental organizations that are invested in tracking and responding to emerging needs in fisheries and aquaculture. By facilitating and supporting workshops, meetings, research and extension programs, and collaboration among interested parties, NHSG works to improve effective development and resiliency of fisheries and aquaculture science, management, and policy. NHSG will continue to work alongside commercial and recreational fishers, aquaculturists, and seafood businesses to explore opportunities for growth, best management practices, collaboration, research, and emerging markets.

NHSG continues to facilitate the development and transfer of technologies and methods that reduce the environmental impact of fishing and aquaculture practices. We will also support improved, evidence-based information about topics of interest/concern such as climate change and warming waters, offshore wind energy development, and marine species interactions (e.g., North Atlantic right whale and lobster fishery interactions). NHSG will continue to pursue the development and demonstration of aquaculture systems that combine seaweed, shellfish, and finfish culture to create environmentally friendly, nutrient-neutral systems, as well as provide technical assistance to fishers, aquaculturists, entrepreneurs, and others interested in multi-trophic and other aquaculture ventures. NH Sea Grant will also promote an integration of socio-ecological, human-dimension-focused research and extension in its SFA program in order to ensure the greatest probability of success in addressing needs, barriers and opportunities in the local seafood economy.

NHSG is committed to integrating principles of diversity, equity, inclusion, justice, and accessibility (DEIJA) in this focus area by intentionally seeking out opportunities and synergistic partnerships that will increase the accessibility and affordability of local seafood to underserved communities in the state, elevate underrepresented voices in science, policy, and management decisions, encourage diverse perspectives in decision-making, foster inclusive engagement processes, and reach new and more diverse audiences with all programming. NHSG will work to align activities to support goals outlined in the NOAA National Marine Fisheries Service Equity and Environmental Justice Strategy (NMFS 2022). Additionally, NHSG will encourage more diverse and equitable access to training that prepares people to participate in fisheries and aquaculture industries, including the science and management careers that support them.

Vision

New Hampshire aquaculture and fishing communities and industries sustain our coastal cultural heritage and provide for a thriving local seafood economy that is affordable and accessible for residents state-wide while conserving and/or restoring coastal and marine ecosystems and cultural resources.

Sustainable Fisheries and Aquaculture | GOALS

GOAL 11

Fisheries and aquaculture industries supply food and jobs, as well as economic and cultural benefits.

NHSG Supported Objective: *Aquaculture and fishing techniques, seafood markets, and business strategies are developed and shared leading to safe, sustainable, high-quality food, as well as economic, ecosystem, and cultural benefits.*

> **Desired Outcome | Innovation:** New approaches, methods, and techniques are developed to provide safe and sustainable seafood.

> **Desired Outcome | Learning:** Current and future fisheries, aquaculture industry members, and other local business leaders learn about approaches, methods, techniques, and processes to provide safe and sustainable seafood.

> **Desired Outcome | Action:** New Hampshire fishers, aquaculturists, and other local businesses implement innovative ways to provide safe and sustainable seafood that results in new jobs or more profitable, resilient businesses.

> **Desired Outcome | Consequence:** Additional people move into New Hampshire fisheries and aquaculture jobs and new businesses are established.

> **Desired Outcome | Consequence:** Local businesses are involved in processing and marketing locally sourced seafood, thus supporting working waterfronts.

NHSG Supported Objective: *Seafood consumers and the general public become aware of local fishing and aquaculture production methods, associated environmental impacts or benefits, seafood availability, and health and other considerations of consumption of New Hampshire seafood.*

> **Desired Outcome | Learning:** New Hampshire seafood consumers have increased access to knowledge and resources about local aquaculture and fishing practices and culture, as well as health considerations of consumption of New Hampshire seafood.

> **Desired Outcome | Action:** New Hampshire seafood consumers report an increase in local seafood consumption/purchasing and support of local seafood industries.

GOAL 12

New Hampshire natural resources are sustained to support fishing communities and industries, aquaculture businesses, and cultural resources—including commercial, recreational, tribal, sustenance, and other non-commercial uses.

NHSG Supported Objective: *Technologies and approaches that reduce the environmental impacts of seafood production and harvesting are developed and promoted to both fishers and aquaculturists.*

> **Desired Outcome | Innovation:** Innovative methods/approaches are developed for fisheries and aquaculture to reduce environmental impacts.

> **Desired Outcome | Learning:** New Hampshire's fishers and aquaculturists have increased access to innovative methods to reduce environmental impacts.

> **Desired Outcome | Action and Consequence:** New Hampshire's fishers and aquaculturists adopt innovative methods to reduce environmental impacts.

NHSG Supported Objective: *Methods and approaches are developed and implemented that integrate scientific, management, industry, and other interested party perspectives and knowledge to support ecosystem-based fisheries and aquaculture management.*

> **Desired Outcome | Learning:** New Hampshire's fishers and aquaculturists are aware of science and management relevant to their industries.

> **Desired Outcome | Action:** New Hampshire's fishers and aquaculturists are involved in science and management relevant to their industries.

> **Desired Outcome | Action and Consequence:** The knowledge and expertise from broad cultural and scientific perspectives are shared to improve ecological knowledge, inform more effective management options and practices, and balance economic, community, cultural, and conservation goals.

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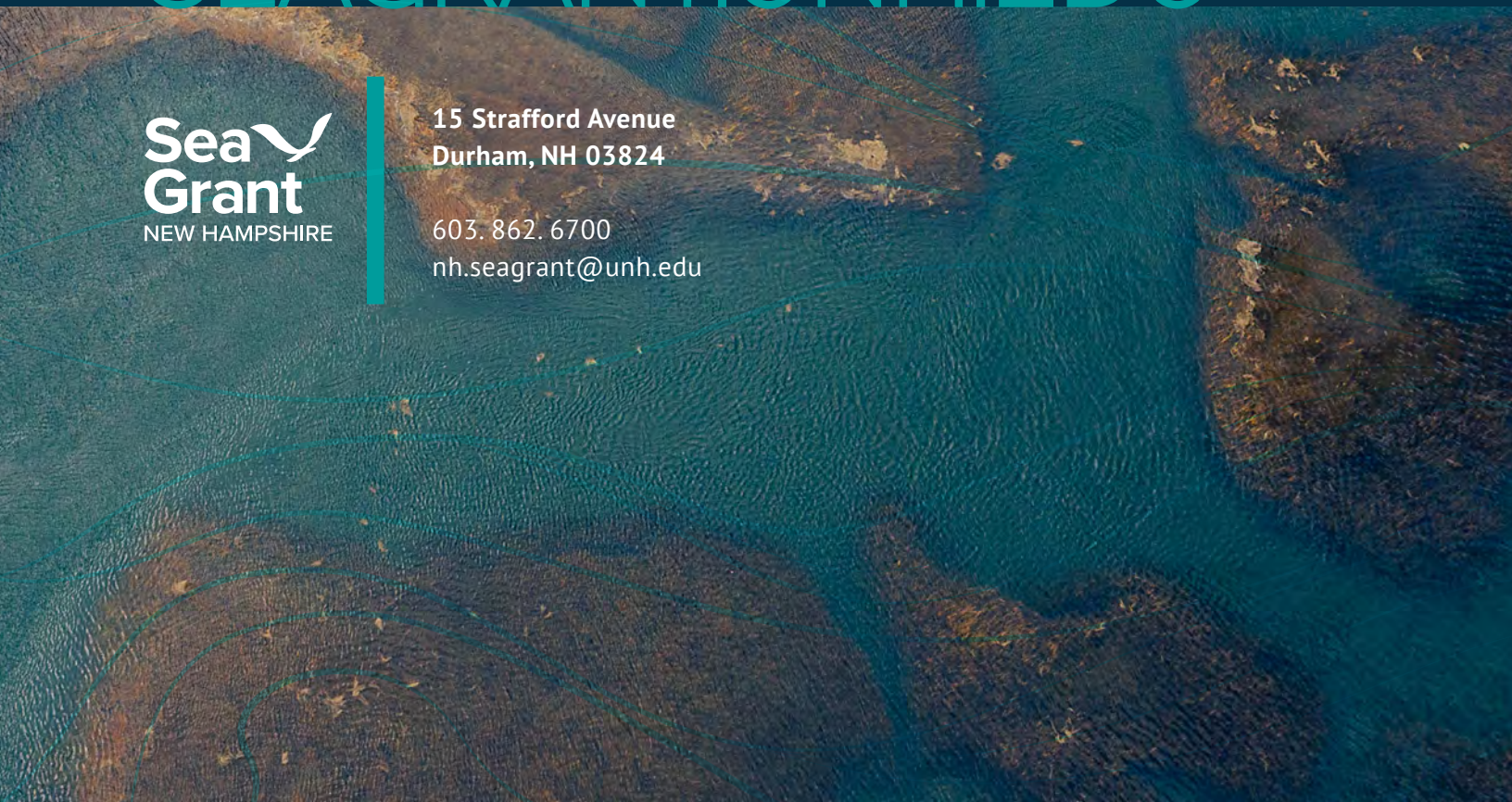

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