New Hampshire Sea Grant Strategic Plan 2018-2023

Revised January 2021

Outline of the Strategic Planning Process

The following 2018-2023 New Hampshire Sea Grant (NHSG) Strategic Plan is a revised and extended version of a previously developed and implemented 2018-2021 Strategic Plan. In response to changing conditions and circumstances in 2020, the opportunity arose to update many elements of the 2018-2021 plan with an eye toward the 2022-2023 timeframe.

The strategic planning process for revising the 2018-2023 NHSG Strategic Plan began during the spring of 2020 when an online survey was sent to each NHSG Policy Advisory Committee (PAC) member, NHSG staff, and other key stakeholders to gather feedback on whether the Situation Statements and Goals from our 2018-2021 Strategic Plan remained relevant today and moving forward into 2022-2023. We then reviewed the survey results and discussed changes to our Strategic Plan during a PAC meeting (June 24, 2020) and two NHSG all-staff meetings (August 13 and August 20, 2020). The information and feedback from the survey and in-person meetings were integrated into a draft Strategic Plan submitted to the National Sea Grant Office (NGSO) on October 9, 2020. Additionally, we shared the draft Strategic Plan with our PAC during a meeting on October 22, 2020. We received comments and feedback from the NSGO in November 2020, and have incorporated input from both the PAC and the NSGO in this current version (January 2021). NHSG staff will conduct an exercise to align Goals, Objectives, and Desired Outcomes with national and state Performance Measures in early January 2021. This alignment exercise will inform re-setting of Performance Measures, which will be submitted with a final version of the Strategic Plan by mid-January 2021.

Vision

New Hampshire Sea Grant envisions a future where people live, work, and play along our coast in a manner that sustains healthy ecosystems, economies, and people.

Mission

New Hampshire Sea Grant works to support a coastal environment that sustains healthy ecosystems, economies, and people.

Core Values

The New Hampshire Sea Grant core values that guide our behaviors and actions are:

- Innovation – NHSG staff and programs support creative solutions to emerging challenges in science and stewardship.
- Engagement – NHSG staff and programs are responsive, accessible, and facilitate the flow of information both to and from stakeholders to support decision-making that is mutually beneficial to a 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 take responsibility for behaviors and actions while creating an environment where others feel supported in doing the same.
- Sustainability – NHSG staff and programs communicate the importance of effective stewardship of ocean, coastal, and estuarine resources to quality of life for people in the state and region, both along the coast and inland.
- Objectivity – NHSG staff and programs are neutral and serve as honest brokers of science-based information.
- Responsiveness – NHSG staff and programs are responsive to changing conditions that create new challenges and opportunities.

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 are relevant to 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.
- Justice, Equity, Diversity and Inclusion – NHSG seeks to incorporate diverse perspectives and inclusively collaborate across stakeholder groups to foster more equitable and sustainable natural resource management and strengthen Sea Grant's mission and vision.
- Resiliency – NHSG staff and programs are based in building coastal resiliency, or the 'ability' to bounce back after natural and societal events or changes that disrupt ecosystems or human-environment relationships.

How We Work: Connecting, Integrating, Co-Producing

NHSG offers unique contributions to its partnerships because of its integrated functional capacities in research, education, communications, and extension. With primary structural relationships with the University of New Hampshire (UNH)'s School of Marine Science and Ocean Engineering and UNH Cooperative Extension, and connections with research and education institutions throughout the state, NHSG can entrain and integrate university expertise across multiple disciplines. These partnerships enable NHSG's reach to extend beyond the coastal region to inland and upland areas of the state. NHSG's focus on stakeholder engagement, local partnerships, and a community-centered approach brings this state-wide network of expertise and capacities to bear on resource challenges in headwater, coastal, and marine systems.

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, seek funding from, and/or form a partnership with NHSG. 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 us, 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, and economic benefits the Seacoast has to offer. Our watershed features 42 municipalities including rural towns, beach towns near the Hampton-Seabrook Estuary, a few small cities around Great Bay, 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 reaches the Gulf of Maine as a shallow, barrier beach system dominated by salt-marsh. The Seacoast is rich in indigenous, early settlement and maritime history, arts and culture, recreational opportunities and tourist attractions, and ecological and aesthetic treasures. The long-term survival of these resources, tourism, recreational and commercial activities – including beachgoing, boating, fishing, shellfishing, and aquaculture – as well as the quality of life in the area, 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 affected precipitation patterns. Warming temperatures have caused changes in species ranges, resulting in both increases and declines in local abundance of species in New Hampshire waters. Changes in phenology and local conditions may have important implications for ecosystem structure and function. While the ecosystem effects and vulnerabilities to ocean acidification are difficult to pinpoint, coastal and marine ecosystems are becoming more acidic and these effects could further disrupt important ecosystem processes and functions. Overall, the effects of climate change will require significant adaptive responses from coastal communities as they face the challenges and opportunities created by current and predicted climate-related coastal risks, hazards, and changing ecosystem conditions.

Societal and economic disruption caused by the COVID-19 Global Pandemic, and a national dialogue and refocusing on racial, socio-economic, and environmental justice, have transformed our perspectives and how we approach our future. There is uncertainty as we move forward and new economic, cultural, and societal realities 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 to each other and our environment with higher goals in mind.

Land Acknowledgement

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 combining 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, or misrepresented by the pervasive or dominant stories and teachings of American history. Indigenous people and cultures live on today here in New Hampshire, a fact that it not only is important to acknowledge but also to promote.

New Hampshire Sea Grant 2018-2023 Programming Overview

New Hampshire Sea Grant focuses its research, extension, education, and communications efforts within the four Focus Areas outlined in the National Sea Grant College Program's Strategic Plan. Each Focus Area includes a Situation statement, 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. To help understand the relationships between outcomes and progress towards 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 towards a goal.
- **Learning** – Learning outcomes lead to increased awareness, knowledge and 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.

Evolution toward a Goal often follows a progression through these Outcome categories – from Innovation to Consequence. Much of NHSG-supported work focuses on the earlier steps in this progression.

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 staff and technical capacities. Therefore, not all Outcomes have performance measures. Instead, selected Performance Measures reflect progress toward Goals that are as close to ultimate consequence and impact as possible.

The list of NHSG Performance Measures is included in the attached Appendix to this Strategic Plan.

Focus Area: Healthy Coastal Ecosystems

Situation:

Healthy coastal ecosystems are the basis of much of the economic and intangible qualities that define New Hampshire and make it a great place to live, work, and play.

The New Hampshire coastline has been a rich source of food, resources, and inspiration for the indigenous Abenacki, Pennacook, and Wabanaki Peoples both past and present who have stewarded the land for many generations. 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 into the ecosystem. Human population growth and development along with increasingly significant impacts from climate change have contributed to degradation and loss of coastal and estuarine habitats, resources, and biodiversity in New Hampshire.

While science-based pollution abatement efforts, fisheries management, habitat restoration, and dam removal activities have helped the Seacoast to recover from historic impacts, the health of NH's coastal ecosystems continues to be challenged by ongoing and emerging human-caused stressors (e.g. pollution, climate change, and ocean acidification) along the Seacoast and throughout the rest of the state. Resource extraction, fishing, and land-use changes – including the construction of homes and business, paving roads, and hardening shorelines – have driven habitat loss. Local interest in habitat restoration and acceptance of the value of restoring and conserving living shorelines is growing, but more information is needed to inform and increase the effectiveness of these efforts. Land-use changes have also resulted in increased pollution associated with wastewater facilities, stormwater, and septic-to-groundwater discharges. Increasing trends in pathogen levels, marine debris, and contaminants of emerging concern (CECs) threaten the health of human and aquatic life. Climate change impacts including increased rainfall and drought, rising sea levels, and a rapidly warming Gulf of Maine serve to amplify existing coastal ecosystem problems like flooding and shoreline erosion, the spread of invasive species, the levels and forms of contaminants, and the effects of ocean acidification.

In addition to these challenges, developing effective approaches and methods for understanding, evaluating, and measuring progress toward improvement of our ecosystems remains in significant demand.

There is an overarching need to harmonize and integrate human needs with ecosystem health considerations. Ecosystem monitoring efforts, engaged scholarship, community/citizen science programs, and municipal attention and participation in initiatives focused on understanding and conserving coastal ecosystems are gaining traction. In recent years, there is also an increasing awareness among scientists and resource managers that biodiversity, bio-complexity, and healthy ecosystem structure and function are essential attributes of natural systems that underlie their resilience and their long-term capacity to provide ecosystem services. The myriad challenges to ecosystem health are complex, interrelated, and require a forward-thinking, interdisciplinary,

equitable, and collaborative local-to-global approach to ensure a sustainably managed NH Seacoast for the future.

Approach:

NHSG recognizes the linkage of ecosystem issues in NH to regional and global-scale factors and management efforts. 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. Great Bay National Estuarine Research Reserve, NH Coastal Program, Piscataqua Region Estuaries Partnership), 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 provide stakeholders with technical support, current and historical data, and scientific expertise 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 justice, equity, diversity, and inclusion (JEDI) 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 to enhance sensitivity for the needs of vulnerable populations. Working together with our coastal watershed stakeholders in this way, NHSG will provide tools and knowledge to communities and resource managers that will inform decision making designed to maintain and improve overall integrated ecosystem health and address new challenges as they emerge. As our community of volunteers grows, we will look to create diverse and inclusive groups, and our engagement with them will be informed by cultural responsiveness. By encouraging diverse perspectives, and prioritizing inclusivity, we will take on a leadership role in building coastal communities that are both healthy and equitable.

Vision:

New Hampshire's coastal watershed stakeholders work together to share 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.

GOAL 1: Coastal ecosystem processes, functions, and services are preserved, enhanced, and/or restored.

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

> Desired Outcome (Innovation)**:** Scientific understanding and technical solutions are developed that can inform management and conservation of coastal and marine ecosystems in New Hampshire.
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> Desired Outcome (Innovation): Ecosystem-based management approaches are developed through broad stakeholder engagement and consideration of varied perspectives.
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> Desired Outcome (Learning): Resource managers are more aware of scientific knowledge and technological solutions that can be leveraged to develop, optimize, and evaluate methods for enhancing ecosystem services.
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> 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.

GOAL 2: Coastal waters support healthy ecosystems, are safe and clean for recreation, and locally harvested seafood is safe for consumers.

NHSG Supported Objective**:** Researchers and technical 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 waters 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.
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> 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 waters
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> 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: Coastal communities 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 and community/citizen science initiatives and volunteer opportunities related to New Hampshire's coastal ecosystems (primary audiences include natural resource managers, coastal community leaders including elected officials and volunteer board members, and residents), gaining improved ecosystem knowledge, scientific understanding, and inclusive perspectives (including environmental justice and historical and cultural context) and participate in decision-making that improves coastal ecosystem health (*crossover with NHSG's Environmental Literacy and Workforce Development Focus Area*).

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 and skills for how to use the scientific process to understand the world around them (improved 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: Volunteers participate in coastal research and stewardship projects using best practices for data collection and volunteer management.

Desired Outcome (Consequence): Researchers, natural resource managers, and communities increase their capacity to collect data and implement management strategies.

Desired Outcome (Learning): Volunteers 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): Researchers, coastal managers, and communities increase awareness of the value of including community scientists in their projects.

Desired Outcome (Consequence): Public involvement in research leads to informed decision making that improves New Hampshire's coastal ecosystems.

Focus Area: Resilient Communities and Economies

Situation:

NH's coastal watershed is home to over 25% of the state's population, and building resilience requires recognizing the interrelationships among social, environmental, and economic dimensions in coastal communities. While community leaders know their small communities well, they often have limited access to technical, financial, and human resources to deal with complex challenges. The COVID-19 pandemic has also shifted priorities and resources in small coastal communities to protecting public health, making adjustments to public services and facilities, and addressing the impacts of business closures and restrictions. Over the next several years, the pandemic and its effects are likely to expose new vulnerabilities and opportunities for communities and organizations working with them.

Efforts to assist NH's coastal watershed communities in responding to threats to social, environmental, and economic health need to recognize that the people of NH pride themselves on principles of local control. Community decisions, including those regarding land-use, are primarily made by municipal officials, many of whom are volunteer board members. This situation can result in communities feeling under-resourced and operating reactively rather than proactively. However, opportunities to make a real difference are growing thanks to strengthened partnerships, increasing availability of local scientific data, state-level recognition of the need to build resilience, and increasing traction with outreach and education for community leaders. In recent years, a number of NH municipalities have undertaken planning, regulatory, and outreach efforts to build resilience with support from NHSG and partners, and informed by local data and policy guidance resulting from a NH Coastal Risks and Hazards Commission established in 2014.

As in many coastal areas, development pressure and nonpoint source pollution potential for the Seacoast are high. Water quality in NH's coastal waters and river tributaries is threatened or degraded by sediment, pathogens, toxic contaminants, and excess nutrients. These pollutants can be attributed to effluent from wastewater treatment facilities and stormwater pipes, nutrient contributions from aging septic systems, increasing levels of impervious cover, and turf and agricultural fertilizer runoff. As a result, the Great Bay Estuary, NH's dominant estuarine system, was designated in 2010 and remains nitrogen-impaired according to the U.S. EPA.

Changing climate conditions and their effects such as flooding, saltwater intrusions and shifting groundwater tables, are compounding threats to community resources, including municipal infrastructure, natural resources, residential and commercial building, transportation routes, and cultural and historic sites. The climate effects that NH communities are already experiencing are anticipated to intensify. 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). Increasing development pressure in vulnerable areas exacerbates the threats from changing climate conditions. Without effective planning for the consequences of climate and environmental changes, the Seacoast risks degradation of its social, economic, and natural resources.

Community leaders have also expressed concern about vulnerable populations, especially with regard to flooding along coastal watershed rivers. Furthermore, a recent study conducted in the coastal region has identified geographic pockets of potential social vulnerability related to climate conditions. This growing attention and the emerging data will help NHSG work with communities and partners to better address the needs of underserved, underrepresented, or particularly vulnerable community members.

Building resilience crosses economic, social, and environmental boundaries. Preserving ecosystems services, safe-guarding and adapting economic and social systems, and recognizing cultural values are key steps for building community resilience.

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 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 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 capacity 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 communities with the best available data 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 and volunteers and business leaders).

NHSG is committed to integrating principles of justice, equity, diversity, and inclusion (JEDI) in this focus area by 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 JEDI efforts that will bring all coalition members along in approaches that are more inclusive and equitable.

Vision:

Coastal communities in NH can plan and prepare for, mitigate, recover from, or more successfully adapt to actual or potential adverse conditions, especially those related to severe weather, a changing climate, and increasing threats to water and marine resources.

GOAL 4: Coastal communities in New Hampshire, from headwaters to oceanfront, gain capacity 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 threats to water resources and consider approaches – especially through managing land use, land cover, and land care – to reduce threats.
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> Desired Outcome (Learning): Community leaders are motivated to support and implement relevant water resource protection strategies from parcel to regional scales.

NHSG Supported Objective: Community leaders have the access, support, and capability to apply data, tools, techniques, and 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 increase their resilience by gaining capacity to prepare for, recover from, adapt to, and evolve with the effects of severe weather and a changing climate.

NHSG Supported Objective: Community leaders increase their knowledge about current and projected weather and climate conditions, 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 access, support, and capability to apply data, tools, techniques, and strategies to reduce weather- and climate-related risks in coastal communities.

Desired Outcome (Learning): Community leaders 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 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 levels of risk, risk tolerance, and community priorities for environmental, social, and economic wellbeing.

Focus Area: Environmental Literacy and Workforce Development

Situation:

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 a number of provisions that have important implications for the Environmental Literacy and Workforce Development focus area, requiring that "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) – 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, in particular, are included in this set of national standards for the first time, and the support for the 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), NH school districts have adopted NGSS as NH Science Standards. NHDoE also supports the state's Environmental Literacy Plan (NHELP) which aligns with the NGSS and recommends a significant increase in field-based science instruction. The implications for NHSG are that programming to support professional development for NH teachers in ocean, climate, and environmental science is a significant need and both formal and informal education programs that support the standards will be valuable to the community.

In addition to formal K-12 education, there remains a critical need for a public with an understanding of ocean and coastal science, climate science, and planning for increased community resilience in the face of changing environmental conditions. In NH, there is a need for 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. National reports have reiterated the need for an informed public and well-trained workforce in ocean, coastal, and Great Lakes issues and remain pertinent (Pew Oceans Commission [2003]; U.S. Commission on Ocean Policy [2004]). Coordinated Sea Grant extension and education programming to address the conceptual and technical needs of this area remains a high priority.

In New Hampshire, there continues to be demand for skilled professionals at all levels to participate in science, management, and conservation in the state, as well as in growing coastal industries such as aquaculture, offshore wind, and climate mitigation. Skills-based training with hands-on components that prepare undergraduate, graduate, post-graduate, and non-matriculating students to help solve coastal issues is essential to meeting these needs for the state.

Finally, there is a continued need at national and local levels to increase science, technology, engineering, and mathematics (STEM) educational opportunities at all levels of post-secondary education. Recently, the U.S. business and industry sectors have reported a severe shortage in the number of STEM-trained graduates in the workforce, which has led to sourcing jobs overseas. Within the context of this overall shortage of STEM-prepared citizens in the U.S., underrepresented ethnic and racial minority groups, women, and persons with disabilities are disproportionately underrepresented in STEM fields – especially in the ocean sciences.

Approach:

Delivery of marine science education programs in the region will continue to rely heavily on the more than 180 NHSG-trained volunteers, the UNH Marine Docents. The Docents support NGSS, the Ocean Literacy and Climate Literacy standards, and the NH Environmental Literacy Plan by engaging pre-K through college students through in-school and field-based science activities and with adult audiences at events and public meetings. NHSG education staff also support increased literacy through teacher professional development programs and leadership in regional and national marine and environmental education initiatives. Programming is often accomplished together with local organizations, like the Seacoast Science Center, the Great Bay National Estuarine Research Reserve and the Gundalow Company, as well as university partners, like the University of New Hampshire's School of Marine Science and Ocean Engineering, UNH Cooperative Extension, and the Leitzel Center for Mathematics, Science, and Engineering Education.

NHSG will also continue to support workforce development in ocean-related industries by investing in and supporting undergraduate and graduate fellowships and mentoring opportunities. NHSG will also continue to prepare and recruit NH students for Sea Grant's John A. Knauss Marine Policy Fellowship and other NOAA and Sea Grant Fellowships. NHSG is also undertaking efforts to bolster workforce development by providing training and other hands-on learning opportunities for individuals interested in pursuing employment and careers in coastal science and industries. More broadly, NHSG helps connects interested students and adults with marine career information via the highly-regarded MarineCareers.net website that NHSG hosts and manages.

NHSG is committed to integrating principles of justice, equity, diversity, and inclusion (JEDI) in its education, outreach, and workforce development efforts. This will be achieved by actively engaging underserved community members throughout New Hampshire in both formal and informal education programming. We will utilize, and promote the use of, culturally responsive pedagogies, curricula, and teaching practices in all aspects of our programming. By encouraging diverse perspectives, and collaborating with traditionally underrepresented partners, we will assume a leadership role in building coalitions that are more inclusive and equitable.

Vision:

New Hampshire youth and adults from all backgrounds are environmentally literate and make informed decisions about ocean and coastal issues, have a range of opportunities to engage in the marine sciences, and are aware of and have access to marine-based career opportunities.

GOAL 6: NH community members' environmental literacy is enhanced through informal education and outreach opportunities in ocean, coastal, and climate sciences.

NHSG Supported Objective: NH residents are prepared to make informed decisions relevant to coastal resources as a result of knowledge and/or skills gained through informal ocean, coastal, and climate education programs that utilize the latest scientific research and educational best practices.

> Desired Outcome (Innovation and Action): Informal 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.
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> Desired Outcome (Learning): Engaged citizens increase their literacy in ocean, coastal, and climate science through participation in programs that incorporate the latest scientific research.
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> Desired Outcome (Consequence): Engaged citizens participate in resource-related decision-making with a sound background in scientific and environmental literacy.

GOAL 7: Environmentally literate youth in NH are supported by formal and informal 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 (CRT) practices.

NHSG Supported Objective: Formal pre-K – 12 and informal 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 (CRT) practices.
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> 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 (CRT) practices used in pre-K-12 schools.

GOAL 8: Formal and informal educators in NH incorporate ocean, coastal, and climate issues into curricula and programming that is grounded in NGSS, NHELP, and Culturally Responsive Teaching (CRT) practices.

NHSG Supported Objective: Support and training of informal and formal educators are provided through volunteer and teacher training programs.

Desired Outcome (Learning): Formal and informal 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 informal educators incorporate ocean, coastal, and climate literacy principles and standards into their teaching.

GOAL 9: New Hampshire develops a workforce prepared to address ocean, coastal, and climate issues through a range of learning approaches and environments, and with an increased awareness of marine careers.

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

Desired Outcome (Learning): Undergraduate and graduate students participate in courses that are informed and supported by NHSG resources and expertise.

Desired Outcome (Action): Undergraduate 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.

NHSG Supported Objective: The public has opportunities to explore and gain relevant skills across the range of ocean-, coastal-, and climate-related careers.

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 (Innovation and Action): Professional and technical training for marine and coastal professionals (e.g. fishermen, aquaculturists, resource managers, scientists, municipal planners) are developed and made available.

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.

Focus Area: Sustainable Fisheries and Aquaculture

Situation:

The COVID-19 pandemic severely disrupted seafood supply chain, and created challenges for harvesting, seafood processing methods. Over the next several years, the pandemic and its effects are likely to expose new vulnerabilities and opportunities for the New Hampshire fishing and aquaculture communities and the businesses working with them. A national focus on social and environmental justice, equity, diversity, and inclusion creates an opportunity to assess issues related to access to local seafood as well as a range of socio-economic considerations related to people and cultures at all stages of the seafood supply chain.

New Hampshire's commercial and recreational fishing industries continue to be affected by the combined impacts of fishing, changing regulations, shifting species range and ecosystem relationships in response to climate change, an aging and consolidated fleet, and unpredictable seafood markets. Cultural and knowledge gaps among fishermen, scientists, and managers continue to challenge efforts to co-develop successful fisheries management solutions. NH fishermen have experienced severe cuts in their allowable catch for valuable stocks and are experiencing difficulty in sustaining profitable businesses. Fleet consolidation and the dramatic reduction in groundfishing activity threaten the continued existence of dockside infrastructure in NH's three main ports (Portsmouth, Rye, and Seabrook). This trend is also leading to dimming prospects of developing new processing operations in NH, which could allow fishermen greater access to alternative, higher-value markets. The NH lobster industry faces several compounding pressures: bait shortages and high bait prices, the potential for negative population effects in response to a warming Gulf of Maine, the threat of shell disease, growing concerns about large whale entanglements, and increasing vulnerability to limited seafood markets. Even with high lobster landings and a general indication of healthy stock status at present, these pressures create uncertainty for future prospects in the lobster fishery. It is critical to continue monitoring and assessing factors affecting lobstering operations.

Offshore renewable energy development, a high priority for the State of New Hampshire and its neighbors, is likely to move forward quickly over the next few years. The extent to which this presents challenges and opportunities for NH’s fishing fleet is not well understood. However, it will be important for the fishing community to be engaged in the planning process as early on as possible in order to leverage opportunities and mitigating impacts.

Although the current situation for NH fisheries is riddled with challenges, there are several future avenues for NH fishermen and other industry stakeholders, such as emerging fisheries for new and lesser-known species. Local seafood businesses – including community-supported fisheries, restaurants, and some processors – continue to grow in the NH Seacoast, offering seafood to local consumers and institutional buyers while directing higher profits directly to fishermen rather than to traditional markets. This continuing trend offers some hope for market changes that can provide meaningful support for local fishermen and associated fishing businesses. More opportunities for cooperative research for commercial, recreational, and subsistence fisheries are

also emerging. These collaborations could provide novel research approaches and management while improving relationships among scientists, managers, and fishermen.

Coastal and marine aquaculture also offer business alternatives for the small vessel owner to either transition from wild harvest fisheries to farming and/or to subsidize the loss of fishing income with some aquaculture activities. Species of interest include shellfish (oysters and blue mussels), seaweed (kelp), and finfish (steelhead trout).

Changes in NH's state aquaculture permitting process regulated by the NH Department of Fish and Game have helped NH's oyster aquaculture industry to expand quickly. In 2019, there were 13 permitted commercial oyster farms actively harvesting market-sized oysters in NH's Great Bay Estuary and Hampton Harbor (78.4 acres of oyster farm sites). Between 2013-2019, the value of NH's oyster aquaculture industry has grown by over 600 percent. 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 NH is uncertain due to area closures related to water quality, available space, technological challenges, and potential conflicts with other stakeholders in NH's estuaries.

In addition to the existing oyster aquaculture industry in the estuaries, new opportunities for blue mussel, seaweed, finfish, and multi-trophic aquaculture exist in NH's nearshore and offshore waters. Regionally, the emerging aquaculture industry is limited by technical support, permitting requirements, public health risk management, and resources in training and expertise in the growth and husbandry of shellfish, seaweed, and finfish.

Approach:

NHSG works through partnerships with fishermen, 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 workshops, meetings, and collaboration among stakeholders, NHSG works to improve the efficiency, effective development, and sustainability of fisheries and aquaculture science, management, and policy. NHSG will continue to work alongside fishermen and seafood businesses to explore ways that they can take advantage of new opportunities for growth, best management practices, collaboration, 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 knowledge about topics of interest/concern, such as climate change and warming waters, offshore wind energy development, and species interactions. NHSG will continue to pursue the development and demonstration of multi-trophic aquaculture systems that combine seaweed, shellfish, and finfish culture to create an environmentally-friendly, nutrient-neutral system. We will also provide technical assistance to fishermen and other entrepreneurs interested in multi-trophic and other aquaculture ventures.

NHSG is committed to integrating principles of justice, equity, diversity, and inclusion (JEDI) in this focus area by seeking out opportunities to provide more diverse and affordable seafood to underserved communities, elevating underrepresented voices in science, policy and management decisions, encouraging diverse perspectives in decision-making, fostering inclusive engagement processes, and reaching new and more diverse audiences with all programming. 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 supports them.

Vision:

New Hampshire aquaculture and fishing communities and industries sustain our coastal economy while conserving and/or restoring coastal and marine ecosystems and cultural resources.

GOAL 10: 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, sustainable seafood.
>
> Desired Outcome (Learning): Current and future fisheries, aquaculture industry members, and other local businesses leaders learn about approaches, methods, techniques, and processes to provide safe, sustainable seafood.
>
> Desired Outcome (Action): New Hampshire fishermen, aquaculturists, and other local businesses implement innovative ways to provide safe, 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 support 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 NH seafood (crossover with NHSG's Environmental Literacy and Workforce Development Focus Area).

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 NH seafood.

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

GOAL 11: New Hampshire natural resources are sustained to support commercial and recreational fishing communities and industries, aquaculture businesses, and cultural resources.

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

Desired Outcome (Innovation): Innovative methods/approaches are developed for fisheries and aquaculture to reduce environmental impacts.

Desired Outcome (Learning): New Hampshire's fishermen and aquaculturists have increased access to innovative methods to reduce environmental impacts.

Desired Outcome (Action and Consequence): New Hampshire's fishermen 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 stakeholder perspectives and knowledge to support ecosystem-based fisheries and aquaculture management.

Desired Outcome (Learning): New Hampshire's fishermen and aquaculturists are aware of science and management relevant to their industries.

Desired Outcome (Action): New Hampshire's fishermen 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.

Appendix

New Hampshire Sea Grant and National Performance Measures by Focus Area

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. *Reference page 5 of the NHSG 2018-2023 Strategic Plan for category details.*

Performance Measures selected by NHSG are constrained by practical considerations including staff and technical capacities. Therefore, not all Outcomes have performance measures. Instead, selected Performance Measures reflect progress toward Goals that are as close to ultimate consequence and impact as possible.

Performance Measures by Focus Area are as follows:

Healthy Coastal Ecosystems (HCE)

NHSG Performance Measures

1. Number of sites at which improvements in habitat condition or ecosystem function are accomplished
2. New understanding or tools developed that can inform management and conservation of coastal and marine resources (e.g. tracking changes in ecosystem processes, improving ecosystem conditions or function, etc.)
3. Number of volunteers in NHSG community (citizen) science programs (e.g. Coastal Research Volunteer Program) who participate in scientific projects
4. Number of sources and/or causes of coastal contamination per year identified and/or reduced through NHSG-supported activities
5. Number of tools, strategies, or informational products per year developed and optimized for identifying and/or reducing contaminants and their effects on coastal ecosystems, recreation, and seafood consumers.
6. Number of stakeholders from local, state, or regional agencies or organizations that are reached through informational meetings and/or educational products about the effects of contaminants or climate conditions on ecosystem health and options to manage these threats.
7. Number of NHSG program participants who go on to participate in additional environmental stewardship activities.
8. Number of new and existing community science programs that learn about/incorporate best practices

National Performance Measures

1. Number of acres of coastal habitat protected, enhanced, or restored as a result of Sea Grant activities
2. Number of resource managers who use ecosystem-based approaches in the management of land, water, and living resources as a result of Sea Grant activities

Resilient Communities and Economies (RCE)

NHSG Performance Measures

1. Number of communities that seek information from NHSG and partners related to increasing capacity to reduce or prevent polluted runoff
2. Number of communities that engage with NHSG and partners in order to build their capacity to reduce or prevent polluted runoff
3. Number of communities that seek information from NHSG and partners related to increasing their resilience to climate effects and hazards
4. Number of communities that engage with NHSG and partners on specific projects in order to increase their climate and hazard resilience

National Performance Measure

1. Number of communities that adopt/ implement sustainable economic and environmental development practices and policies as a result of Sea Grant activities

Environmental Literacy and Workforce Development (ELWD)

NHSG Performance Measures

1. Number of pre-K-12 students who participate in NH Sea Grant in-school programs
2. Number of pre-K-12 educators that participate in NH Sea Grant education programs
3. Number of pre-K-12 educators incorporating curricula that align with NGSS, NHELP, and Culturally Responsive Teaching (CRT) practices
4. Number of educators who receive training in environmental science and graduate from the Marine Docent Program
5. Number of volunteer hours contributed by the Marine Docent Program
6. Number of undergraduate and graduate students who participate in NHSG supported classes, research opportunities, fellowships, or internships
7. Number of new visitors who explore marine-related careers through the marinecareers.net website
8. Number of people that receive professional and technical training relevant to marine and coastal resource-related careers
9. Number of people that report using skills gained through a NHSG supported training program in a new, or currently held, marine and coastal resource-related career

National Performance Measures

1. Number of people engaged in Sea Grant supported informal education programs
2. Number of Sea Grant-supported graduates who become employed in a job related to their degree within two years of graduation

Sustainable Fisheries and Aquaculture (SFA)

NHSG Performance Measures

1. Number of fishermen or aquaculturists that employ gear or practices that improve environmental impacts and business resilience as a result of NHSG programming

2. Number of NHSG supported businesses involved in processing and marketing practices that support local fishermen
3. Number of NHSG supported seafood operations or businesses in New Hampshire
4. Number of NHSG supported seafood production jobs in New Hampshire
5. Number of new techniques, harvesting, or production methods available to the seafood industry that are both environmentally and economically sound
6. Number of people receiving training and expertise that prepares them for employment or improved success in the fisheries or aquaculture industry related to NHSG programming
7. Number of participants in NHSG supported programs designed to share or integrate knowledge from scientists, fishermen, and managers that report improved engagement and trust among stakeholders involved in fisheries and aquaculture
8. Number of NH fishermen or aquaculturists that are engaged in science and management of marine resources with assistance from NHSG
9. Number of consumers that report an increase in purchasing local seafood, increasing seafood consumption, and/or providing other support of local seafood industries as a result of NHSG programming

National Performance Measure

1. Number of fishermen, seafood processing or aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Sea Grant activities