


10-YEAR NOAA SEA GRANT ENVIRONMENTAL LITERACY VISION

2018–2028

NOAA

Sea Grant

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New Hampshire Sea Grant's SeaTrek Program introduces middle schoolers to physical science that is relevant to underwater study and exploration. Participants rotate between two stations with hands-on activities, demonstrations, equipment display, and a short video. PHOTO, COURTESY OF NEW HAMPSHIRE SEA GRANT

High school teachers from Maryland in the Chesapeake Bay Teacher Research Fellowship Program, 2009, exploring a marsh in St. Mary's City, Maryland. PHOTO, J. ADAM FREDERICK/MARYLAND SEA GRANT

Delaware Coast Day is an annual open house for Delaware Sea Grant and University of Delaware's College of Earth, Ocean, and Environment. PHOTO, KATHY F. ATKINSON/UNIVERSITY OF DELAWARE

Teachers from Maryland participating in the Maryland Governor's Science Academy, 2008, observing biofilm discs from the Baltimore Inner Harbor. PHOTO, J. ADAM FREDERICK/MARYLAND SEA GRANT

Delaware Coast Day celebrates all of the ways we connect to our coastal environment and showcases the work of University of Delaware scientists, staff, and students. PHOTO, EVAN KRAPE/UNIVERSITY OF DELAWARE

DEFINITIONS

The terms below are known to have different definitions among different communities of practice. Since this is a 10-year Vision for Environmental Literacy and is intended to be a public document that may be read by people in a variety of professional contexts, the authors felt it is important to define what is meant by these terms in this document for the sake of clarity and consistency. In many cases, these definitions are borrowed and adapted from other policy reports and plans that continue to guide Sea Grant's and NOAA's education programs. While the authors could have included many other terms in this list, these were deemed the most essential to understanding this vision of environmental literacy for Sea Grant.

ENVIRONMENTAL LITERACY: The possession of knowledge and understanding of a wide range of environmental concepts, problems, and issues; cognitive and affective dispositions toward the environment; cognitive skills and abilities; and appropriate behavioral strategies to make sound and effective decisions regarding the environment. It includes informed decision making both individually and collectively and a willingness to act on those decisions in personal and civic life to improve the well-being of other individuals, societies and the global environment (adapted from Hollweg *et al.,* 2011).

LIFELONG LEARNING: All learning activity, formal and informal, undertaken throughout life, with the aim of enhancing knowledge, skills, and competencies from a personal, civic, social, or employment-related perspective.

- **Formal education:** Classroom-based learning provided by trained teachers.
- **Informal education:** Learning that happens outside the classroom, in after-school programs, community-based organizations, museums, libraries, or at home.
- **Free Choice Learning:** Self-motivated learning that takes place all the time, outside of the classroom, regardless of age. The learner decides what, where, and how they want to learn over their lifetime.

OUTREACH: Activities designed to build awareness, develop relationships, promote education products, and inspire educators, students, and the public to pursue further learning opportunities (NOAA Education Strategic Plan, 2015).

RESILIENCE: The ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events (National Research Council, 2012).

STEWARDSHIP: Individual or collective protection, restoration, and conservation actions, sustainable practices, and civic engagement activities that help prevent or mitigate environmental threats (adapted from NOAA Education Strategic Plan, 2015).

SUSTAINABILITY: Meeting the resource and services needs of current and future generations without compromising the health of the ecosystems that provide them (Brundtland Commission, 1987).

TRADITIONAL AND LOCAL KNOWLEDGE: A systematic way of thinking applied to phenomena across biological, physical, cultural and spiritual systems. It includes insights based on evidence acquired through direct and long-term experiences, and extensive multigenerational observations, lessons and skills. It is passed on from generation to generation.

VISION

NOAA Sea Grant's 10-Year Environmental Literacy Vision

Sea Grant's integration of natural and social science research, education, and outreach will foster an environmentally literate citizenry that makes informed decisions regarding ocean, coastal, and Great Lakes resilience.

INTRODUCTION

For 50 years, the National Oceanic and Atmospheric Administration's (NOAA) National Sea Grant College Program (NSGCP) has invested in research, education, and outreach across 33 state programs. A clear vision for the future will help guide upcoming strategic investments that foster environmental literacy. In May 2017, the National Sea Grant Office (NSGO) began a visioning process to develop 10-year plans for multiple priority areas. The purpose of this 10-Year Environmental Literacy Vision is to:

- establish the need for a coordinated approach to environmental literacy;
- describe long-term societal outcomes to which Sea Grant work can contribute;
- identify priority audiences on which to focus Sea Grant efforts; and
- define the various roles Sea Grant personnel have in promoting environmental literacy and achieving long-term outcomes.

The remainder of this document describes Sea Grant's 10-Year Environmental Literacy Vision.

BACKGROUND AND NEED

Defining Environmental Literacy

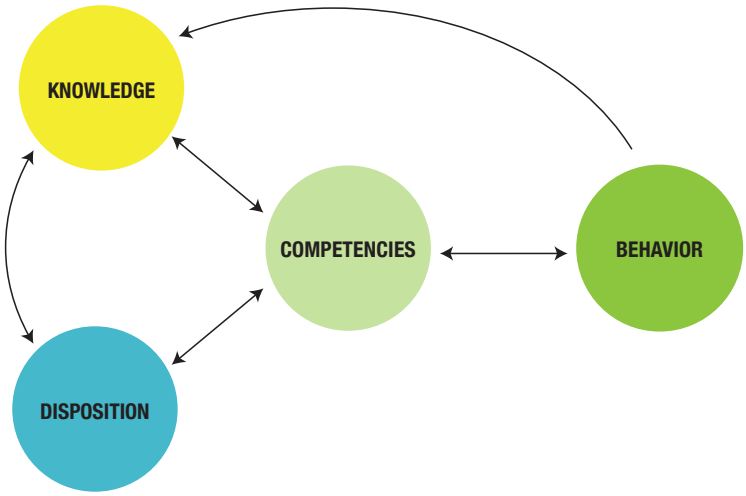
Environmental Literacy is the possession of knowledge and understanding of a wide range of environmental concepts, problems, and issues; cognitive and affective dispositions toward the environment; cognitive skills and abilities; and appropriate behavioral strategies to make sound and effective decisions regarding the environment. Environmental literacy includes informed decision making both individually and collectively, and a willingness to act on those decisions in personal and civic life to improve the well-being of other individuals, societies and the global environment (Hollweg *et al.,* 2011).

National reports have reiterated the need for an informed public and well-trained workforce in ocean, coastal, and Great Lakes issues (Pew Oceans Commission, 2003; U.S. Commission on Ocean Policy, 2004). A lack of understanding of the science surrounding these issues results in diminished public concern regarding the vulnerability and value of our nation's coastal resources. In turn, this leads to a lack of informed coastal conservation and management decision making by people who are or will be our country's voters, workforce, and political and community leaders.

Education for the sake of environmental literacy fills these gaps, integrating the knowledge, dispositions, and competencies that form the framework for making informed and responsible decisions related to environmental resilience. Developing environmentally literate communities is a proactive approach to building ocean, coastal, and Great Lakes resilience.

Sea Grant research informs education and outreach efforts to promote healthy, sustainable, and resilient coastal ecosystems and communities. The program

THE INTERACTIVE COMPONENTS OF ENVIRONMENTAL LITERACY



KNOWLEDGE about environmental issues
- Physical, ecological, social, cultural, & political systems
- Environmental issues & their multiple solutions
- Strategies for citizen participation & action

DISPOSITION toward environmental issues
- Attitudes & concern toward the environment
- Assumption of personal responsibility
- Sense of self-efficacy
- Motivation & intention to act

COMPETENCIES related to environmental issues
- Identify & ask relevant questions
- Investigate & analyze from primary & secondary sources
- Evaluate and make personal judgments about them
- Use evidence & knowledge to select & defend one's own position(s) to resolve them
- Create and evaluate plans to resolve them

ENVIRONMENTALLY RESPONSIBLE BEHAVIOR
- Involvement in intentional & habitual behaviors, individually and collectively, that work towards solving current issues and preventing new ones

has already had noteworthy success in the area of environmental literacy; Chapter 8 of the U.S. Commission on Ocean Policy (2004) highlights the significance and excellence of the Sea Grant education program and recommends expansion in its roles and responsibilities in education and outreach.

Historical Perspective of Environmental Literacy and Sea Grant

Environmental education began to emerge as a distinct field during the mid-1960s (Roth, 1992) and came to the forefront of education and society with seminal documents such as the *1970 National Environmental Education Act* and the *1977 Tbilisi Declaration*. These documents provided a vision for environmental education and illustrated the need for an increase in awareness and behavior change among citizens globally. *Closing the Achievement Gap: Using the Environment as an Integrating Context (1998)* further demonstrated the need and value of environmental and experiential study by students and served as the impetus behind numerous environmental education initiatives of the 21st century.

Education has been a critical component of the National Sea Grant College Program since its authorizing legislation in 1966. The legislation called for an "investment in a strong program of research, education, training, technology transfer, and public service" (National Sea Grant College and Program Act of 1966, Public Law 89-688). Early in its history, Sea Grant developed its role of supporting and enhancing education through the development of ocean, coastal, and Great Lakes curricula and professional development programs. Staff expertise has been the critical asset, their degrees and experience in both science and education, and their ability to translate research science for non-scientists help make Sea Grant relevant.

Since 1989, Maryland's Research Experiences for Undergraduates offers students to conduct research on the Chesapeake Bay. PHOTO, MARYLAND SEA GRANT

Recognizing this capacity, Environmental Literacy and Workforce Development (ELWD) was designated a national Sea Grant focus area in 2014 joining three previously established focus areas: Healthy Coastal Ecosystems, Sustainable Fisheries and Aquaculture, and Resilient Communities and Economies. Through this distinguished history of promoting environmental literacy, especially at

TABLE 1: JUSTIFICATION AND SOURCES

SOURCE	JUSTIFICATION
National Sea Grant College Program 2018–2021 Strategic Plan (pg. 14)	The current strategic plan clearly outlines three action items to address int he near future: 1) Enable the public to engage in informed decision making and community planning processes enabling adaptation to changing conditions by providing the best available information; 2) Develop and provide curriculum and other resources to preschool through 12th grade formal and informal educators to support more effective environmental literacy instruction; and 3) Increase effective environmental literacy communication to stakeholders, including how ecosustem change affects economic, social, and cultural values as well as implications for conservation and management.
2016 State of Sea Grant: Biennial Report to Congress (pg. 37)	The National Sea Grant Advisory Board specifically calls on Sea Grant to enable collboration through programmatic and travel support at state and national levels to develop collective projects and wider scale research and evaluation programs that demonstrate the impact of efforts to improve environmental literacy in classrooms and informal education.
2014 State of Sea Grant: Biennial Report to Congress (pg. 26)	The National Sea Grant Advisory Board specifically calls on Sea Grant to strategically strengthen its role in environmental literacy.

the K-12 level, Sea Grant has: (1) established solid relationships with formal and informal education communities at the local, state, and national level; (2) developed a diverse array of innovative and multidisciplinary programs and products; and (3) served in leadership roles at the local, regional, national, and international levels.

Rationale: Environmental Literacy as National Priority and Unique Focus Area

The elevation of environmental literacy to a dedicated focus area recognizes the critical role of Sea Grant's unique expertise and capabilities in this area. Nonetheless, environmental literacy efforts continue to span and integrate within initiatives and projects in the other three focus areas. In recent analyses and reports, the National Sea Grant Office and the National Sea Grant Advisory Board have recommended that Sea Grant strengthen its role in environmental literacy and provide its educators with the support they need to do so (Table 1).

As defined, environmental literacy includes the capacity to perceive, interpret and take action to maintain, restore, or improve the health of ocean, coast and Great Lakes systems. Thus, as the precursor to achieving sustainable fisheries and aquaculture, healthy coastal ecosystems, and resilient communities and economies, cultivating environmental literacy is a task for all of Sea Grant.

Sea Grant personnel interact directly and indirectly with a variety of audiences every day: coastal community resilience specialists collaborate with city planners to ensure that nuisance flooding is remediated and mitigated; educators bring local teachers together for professional development opportunities that enhance student learning; aquaculture specialists facilitate panel discussions to help shellfish growers navigate regulations. Achieving environmentally literate ocean, coastal, and Great Lakes communities is not just a job for Sea Grant educators.

Students from Francis Scott Key High School in Maryland using aquaculture as a tool for project-based learning. PHOTO, DANIEL STRAIN/ MARYLAND SEA GRANT

Environmental literacy is embedded within each of Sea Grant's other three focus areas and weaves together the work of Sea Grant researchers, communicators, extension agents, and educators. This necessitates a clear Sea Grant-wide understanding and coordinated approach to fostering environmental literacy in order to achieve its vision. The development and implementation of a 10-Year Environmental Literacy Vision will provide a coordinated and consistent national framework.

Scope and Development of the 10-Year Sea Grant Environmental Literacy Vision

The National Sea Grant Office combines environmental literacy and workforce development into one focus area. This current vision plan, however, focuses on environmental literacy only and will not specifically address workforce development. Because of its broad nature, components of environmental literacy may be a part of other visioning efforts (e.g., Diversity, Equity and Inclusion, Community Based/Citizen Science, and Traditional and Local Knowledge). While broadly incorporated, this document will not explicitly address these topics separately.

The National Sea Grant Office, state Sea Grant Programs, and the National Oceanic and Atmospheric Administration's Office of Education contributed to the development of this 10-year vision for advancing environmental literacy; State Sea Grant programs provided input on the priority areas and audiences addressed in this vision via a series of online surveys in late summer of 2017; a core writing team met in the Fall 2017 to begin drafting the vision and implementation plans; and an expanded team of Sea Grant personnel reviewed and finalized this product in 2018.

This Sea Grant 10-Year Environmental Literacy Vision provides the framework necessary for developing an implementation plan that advances environmental literacy and fosters a resilient citizenry. It establishes the need for a coordinated approach to environmental literacy; describes long-term societal outcomes to which Sea Grant work can contribute; identifies priority audiences on which to focus Sea Grant efforts; and defines the various roles Sea Grant personnel have in promoting environmental literacy and achieving long-term outcomes. The implementation plan further articulates steps, strategies and measurable objectives for each Sea Grant role when working with priority audiences to achieve long-term societal outcomes strategies and foster environmental literacy.

LONG-TERM OUTCOMES

As a nation, we struggle to set effective plans in place to achieve a scientifically literate populace while operating in a fiscally constrained environment. Many blue-ribbon panels and federal commissions have been convened to make recommendations on improving public support of science and improving science education (e.g. Lieberman and Hoody, 1998; National Commission on Mathematics and Science Teaching for the 21st Century, 2000; National Academies of Sciences, Engineering, and Medicine, 2007; National Research Council, 2009; National Research Council, 2012). In the areas of science where Sea Grant works, public audiences' attitudes and values are highly variable in their support of science and often intractably at odds with current findings of the scientific community.

The following long-term outcomes represent the ideal sum of Sea Grant's research, extension, and education contributions to achieving the vision of an environmentally literate citizenry making informed decisions regarding ocean, coastal, and Great Lakes resilience.

1. Environmental Literacy

Environmental literacy is an essential part of lifelong-learning education initiatives.

Environmental literacy is as a way of thinking that brings the environment to the forefront of dialogue and decision making in regard to societal issues that impact the environment and subsequently each individual. It should be viewed as a **lifelong-learning** initiative whereby individuals seek to increase their understanding of, and make informed decisions concerning, the environment throughout their lifetime.

Sea Grant programs are well positioned to help existing and future educators and citizens become an environmentally literate populace. Sea Grant provides access to quality science research, instructional resources and programs, offer first-hand experiences to life-long learners and professional development opportunities for educators, and partner with other organizations to achieve mutual goals with respect to building environmental literacy.

Sea Grant's work over the next decade will contribute to the following long-term outcomes related to environmental literacy:

- Education communities will integrate both environmental literacy standards and practices that promote the development and engagement of a mindful environmentally literate citizenry in all phases of lifelong learning.
- Environmental literacy will be a priority when disseminating scientific research to the public.
- Education and **outreach** professionals will play an integral role in translating research for the public.
- Environmentally literate decision makers will develop appropriate knowledge and strategies to inform public policy and engage stakeholders regarding stewardship, sustainability, and resilience.
- Our culture (local, regional and national) will value the philosophy behind environmental literacy and the promotion of an environmentally literate citizenry.
- Education and culture in the United States will shift to value the role of environmental sciences in decision making.

2. Research as a Decision-Making Tool

Natural and social sciences research—including education research—are trusted and valued as decision-making tools.

The application of research in the natural and social sciences to societal issues related to "…the understanding and wise use of ocean, coastal, and Great Lakes resources and the environment" is core to Sea Grant's mission (National Sea Grant Program Act, 33 U.S.C. §1121(a)). American attitudes about the role of science and technology in our lives as well as public investment in science and technology are generally positive (National Science Board, 2018). However, American attitudes about science related to climate change, vaccines, and food safety are more varied. A wide range of factors influence public views on these science-related issues (Pew Research Center, 2015). For instance, ideology is often a stronger indicator of one's views on issues related to climate change and energy production than is scientific knowledge of the issue (Pew Research Center, 2015).

Complex issues—including ocean acidification, microplastics and marine debris, sea-level rise, and extreme weather events—are affecting coastal communities. Support for action related to these concerns requires knowledge of the natural and built environments, and considers what we know about human behavior and societal systems in searching for solutions to address these complex issues. Yet at a time when societal need for thoughtful, evidence-based reasoning is at a high, the dearth of evidence-based reasoning in common discourse today threatens society's ability to deal with complex issues.

Aquaculture-in Action, Maryland teachers proudly displaying their newly constructed 260-gallon recirculating aquaculture system for use in their classrooms. PHOTO, J. ADAM FREDERICK/MARYLAND SEA GRANT

Individual Sea Grant educators, communicators, and extension agents currently apply the findings of relevant social science research to their programming, communications and outreach so that individuals and communities served by Sea Grant value and are able to use evidence-based reasoning in their decision making about ocean, coastal, and Great Lakes resources. Yet gaps remain in the application of social science research to these efforts.

Sea Grant's work over the next decade will contribute to the following long-term outcomes related to research as a decision-making tool:

- High quality research on how people learn, make decisions, and take action will be consistently solicited in Sea Grant funding opportunities.
- Social research findings will be applied systemically throughout Sea Grant programming.
- Public audiences will have more direct input into research and applied science priorities at local, state, and national levels.
- Public audiences will have opportunities to participate in science research initiatives and activities.
- Public audiences will be able to easily access and apply new scientific findings to complex issues.
- Decision makers at all scales (local to national) will be environmentally literate and will take appropriate action to address the complex issues confronting their communities.

3. Stewardship and Sustainability

A culture of stewardship resulting in sustainability is embodied within individuals and society.

Noted by the *Millennium Ecosystem Assessment* (2005), "over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history." Environmental stewardship is a key component to sustaining the ocean, coasts and Great Lakes for future generations. Individuals and societies should strive to "meet the resource and services needs of current and future generations without compromising the health of the ecosystems that provide them" (Brundtland Commission, 1987).

Sea Grant extension and outreach efforts are essential to communicating common messages and research findings within communities, assisting them as they consider the health of the environment in their daily choices. Sea Grant personnel's expertise in both science research and

Watershed Stewards Academy volunteers in Maryland help install a residential rain garden. PHOTO, AMANDA ROCKLER/UNIVERSITY OF MARYLAND EXTENSION—SEA GRANT EXTENSION PROGRAM

education makes it strategically poised to provide: (1) lifelong learning opportunities for community members that develop their environmental literacy and prepare them to take action to prevent or mitigate environmental threats; (2) training to develop community stewardship by assisting in identifying needs and facilitating individual and community-wide efforts toward sustainability.

Sea Grant's work over the next decade will contribute to the following long-term outcomes related to stewardship and sustainability:

- Individuals will make decisions for the benefit of the environment and the community.
- Community leaders will translate individual commitment into community action to build stewardship networks prepared to respond to environmental challenges.
- Individuals and communities will embody stewardship behaviors of protection, restoration, conservation and civic engagement activities to help achieve sustainability resulting in clean and safe air, waterways, and spaces which are valued and protected.
- Communities engaged in continued stewardship create a culture of sustainability.

4. Resilience

Communities are prepared and resilient.

Most natural communities have evolved responses to environmental fluctuation. Most modern human systems, however, have not. Resilience is a dynamic by-product of preparedness.

To achieve preparedness, communities must understand the ways that human and natural systems function and interact.The specific impacts those interactions have on natural and human-made hazards in their communities must also be understood. Human activities that occur without that understanding could result in a failure to achieve resilience and exacerbate the impact of adverse events. The need to build community resilience is particularly urgent since billion-dollar weather events are at an all-time high—2017 was the costliest on record due to hurricanes and wildfires alone (Smith, 2018).

To achieve resilience, communities must implement effective solutions addressing the adverse impacts of human and natural system interactions. Government, academic and research institutions, non-governmental organizations, community-based organizations, public and private partnerships, and industry must innovate and redesign, independently and in concert, solutions that can lead to resilience. Those effective solutions can result from adequately supported research combined with robust outreach and education programs. The strong local relationships that characterize Sea Grant programming place the agency in a unique position to support, affect and coordinate that research, outreach, and education in local communities.

Sea Grant's work over the next decade will contribute to the following long-term outcomes related to resilience:

- Societies will understand and value resilience.
- Government, academic and research institutions, non-governmental organizations, community-based organizations, public and private partnerships, and industry will actively develop resilience solutions supported by adequate funding.
- Policies supporting resilience will be prioritized and implemented at national, regional, state, and local levels.
- Implementation of effective resilience practices will minimize economic and environmental impacts of adverse environmental events.

PRIORITY AUDIENCES

While recognizing that Sea Grant personnel are known for and have the capacity to work with stakeholders from many age groups and backgrounds, in a vast array of settings, and with a variety of goals in mind, certain audiences are the priority of this 10-Year Sea Grant Environmental Literacy Vision. The key learner groups addressed in this document were identified by a network-wide survey of all Sea Grant personnel. While other classifications were identified in the survey (e.g., families, post-secondary students, fisherpeople, partnering agencies), children and youth, formal and informal educators, adult learners, and professionals and decision makers were chosen as the priority audiences to advance environmental literacy throughout all facets of Sea Grant's work. A conscious effort will be made to broaden participation in Sea Grant Environmental Literacy efforts, with special emphasis on reaching underserved and underrepresented communities.

CHILDREN AND YOUTH AUDIENCES include all learners under the age of 18, both in and out of a formal classroom setting. As future voters, decision makers, and caretakers of the environment, it is imperative that we foster their sense of wonder of the natural world and provide them with a solid foundation in science.

FORMAL AND INFORMAL EDUCATORS include teachers in public and independent schools as well as educators from federal, state, and local agencies, non-governmental organizations, and businesses. Educators are keystone purveyors of science content; they need high-quality professional development based on sound science to improve their content knowledge, pedagogy, and confidence in teaching relevant content.

ADULT LEARNERS are individuals who participate in environmental literacy programs and activities for personal and professional growth and to foster their sense of inquiry and exploration of the natural world. Providing opportunities for these lifelong learners helps to create an environmentally literate citizenry that can make informed decisions and help to ensure the community strives for environmental sustainability.

PROFESSIONALS AND DECISION MAKERS include local, state, regional, and national staff and officials who rely on sound science to inform their duties. These individuals play an important role in creating and enforcing policies and regulations in their communities.

Aboard University of Vermont's research vessel, The *Melosira*, students learn about current research and apply scientific tools and techniques to collect data. PHOTO COURTESY OF UNIVERSITY OF VERMONT

PERSONNEL ROLES

Fostering an environmentally literate citizenry that makes informed decisions regarding ocean, coastal and Great Lakes resilience is the responsibility of all Sea Grant personnel. Sea Grant personnel have many roles and responsibilities (sometimes overlapping), thus it is important to define them for the purpose of the 10-Year Sea Grant Environmental Literacy Vision and Implementation Plan.

RESEARCHERS are scientists (graduate students to tenured faculty) receiving support to address emerging and pressing needs related to the four national strategic focus areas. Their primary role is to conduct sound science and share their natural and social science research results and broader impacts with scientific and nonscientific audiences. They partner with Sea Grant education, extension and communication personnel to translate their research into resources and programs that advance environmental literacy.

EDUCATORS provide ocean, coastal, and Great Lakes resources and programming to PK-12, undergraduate,

Delaware Sea Grant highlights its efforts to educate the public about coastal issues and research through its popular annual open house, Delaware Coast Day. PHOTO, KATHY F. ATKINSON/UNIVERSITY OF DELAWARE

graduate, professional, technical, and public audiences. Working closely with researchers, extension agents, and communicators, they design pedagogically sound materials based on Sea Grant research, and develop and disseminate multidisciplinary, locally- and culturally-relevant instructional programs that build connections between learners and the environment. Educators use program evaluation tools to guide development and implementation of effective programs and resources.

COMMUNICATORS play a key role in informing the public about how researchers work to understand ecosystems and human interaction with them. They collaborate with Sea Grant researchers, educators, and extension personnel to translate research through the development of products that provide context, depth, and narrative for a variety of audiences. Communicators understand the needs of Sea Grant stakeholders and how to best share information with them and other Sea Grant collaborators.

EXTENSION PERSONNEL take the best science-based solutions produced by Sea Grant researchers and make them useful to coastal residents, businesses, and communities (Bunting-Howarth, 2013). As trusted experts who are considered honest brokers of information (non-advocacy), extension personnel provide reliable technical and science-based information to stakeholders that addresses local needs while also transferring research priorities back to their universities. They focus on specific topics, sharing best management practices with stakeholders, while incorporating environmental literacy components that advance lifelong learning. Extension personnel collaborate with educators and communicators to develop impactful resources and programs.

Individual **SEA GRANT PROGRAMS** embody the Sea Grant mission and vision at state and local levels. Leadership guides program efforts, supports staff professional development, and interfaces with regional and national counterparts. To reach priority audiences, Program leaders ensure the integration of environmental literacy vision outcomes throughout all Sea Grant elements and personnel roles.

The **NATIONAL SEA GRANT ADVISORY BOARD** is the National Sea Grant College Program's Federal Advisory Committee (FAC). The Board advises NOAA and the National Sea Grant College Program on strategies to address the Nation's highest priorities in terms of the understanding, assessment, development, management utilization and conservation of ocean, coastal and Great Lakes resources. The Board considers ways to foster environmental literacy across all aspects of Sea Grant programs.

The role of the **NATIONAL SEA GRANT OFFICE (NSGO)** is to provide dedicated support to Sea Grant personnel that enable and encourage collaboration within and across networks in order to foster environmental literacy. Specifically, the NSGO Education Lead provides greater connectivity for Sea Grant educators within NOAA Education, with other NSGO Leads, and across other NOAA offices and programs. Program and financial support, communication tools, and networking opportunities are some of the ways in which the National Office supports Sea Grant personnel.

CONCLUSION

An environmentally literate citizenry underscores Sea Grant's ability to achieve sustainable fisheries and aquaculture, healthy coastal ecosystems, and resilient communities and economies, and thus cultivating it is a task for all of Sea Grant.

Reviewing Sea Grant's longstanding history of environmental literacy efforts, describing the agency's contributions to long-term societal outcomes, identifying priority audiences for greatest impact, and defining various roles of Sea Grant personnel provides a coordinated and consistent framework for the 10-Year Sea Grant Environmental Literacy Vision. This document lays the foundation for integrating and coordinating the work of Sea Grant researchers, communicators, extension agents, and educators necessary to develop an implementation plan to advance environmental literacy and foster a resilient citizenry.

The implementation plan further articulates strategies and measurable outcomes for Sea Grant research, education, and outreach to advance these goals and foster environmental literacy.

IMPLEMENTATION

The following list outlines priority infrastructure and activities needed to achieve the environmental literacy vision. Details about these priorities can be found in the 10-Year NOAA Sea Grant Environmental Literacy Implementation Plan 2018–2028.

Sea Grant Intrastructure

- All Sea Grant programs have a **full-time and dedicated faculty or staff** member in each of the four personnel areas to ensure intra- and inter-agency programming and collaboration to effectively advance environmental literacy.
- The National Sea Grant Office supports a **dedicated liaison** from each of the four personnel areas to faciliate communication and collaboration within and across networks.

Environmental Literacy

- The National Sea Grant Office supports an **all-Sea Grant conference** for environmental literacy professional development.
- The National Sea Grant Office supports **specialist exchanges** in order to learn more about other state programs including how they function, the types of education/extension programs they offer, and how counterparts plan and implement programs.

Research as a Decision-Making Tool

- Within each Sea Grant program, faculty will be trained in environmental literacy to expand Sea Grant assets which will provide leverage for **access to audiences** resulting in better informed decisions.
- Sea Grant links research to lifelong learning, **building trust with audiences.**

Stewardship and Sustainability

- Sea Grant **provides access to research and best practices** within the network and beyond.
- **Sea Grant serves as a connector** to other organizations, inside and outside of NOAA with similar missions, to share ideas and enhance conversations.

Resilience

- Cross-disciplinary Sea Grant specialists from around the country **network, create, and share** resources.
- Resilience **success stories** that model best practices and programs are are shared across the network.

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