Draft 2020-2040 NOAA Education Strategic Plan

Table of Contents

FRONT MATTER 2
- Placeholder: Letter from the Director 2
- Placeholder: NOAA Education Council Member Signatures 2

INTRODUCTION 3
- Advancing NOAA's mission through education 3
- NOAA's mandate to educate 4
- NOAA's unique role in education 5
- About NOAA Education 6
- Plan overview 8

GOALS, OBJECTIVES, AND STRATEGIES 9
- Goal 1: Science-Informed Society 9
- Goal 2: Conservation and Stewardship 11
- Goal 3: Ready, Responsive, and Resilient 14
- Goal 4: Future Workforce 16
- Goal 5: Organizational Excellence 18

BACK MATTER 20
- Implementation 20
- Evaluation 20
- Glossary 21
- References 25

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Front Matter

Placeholder: Letter from the director

Placeholder: NOAA Education Council member Signatures

The National Oceanic and Atmospheric Administration (NOAA) Education Council members represent education programs across the agency. Through their signatures, each member commits to supporting the goals and objectives of this Strategic Plan.

[Signatures from Education Council members]

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Introduction

Advancing NOAA's mission through education

The National Oceanic and Atmospheric Administration (NOAA) is a science-based agency within the United States Department of Commerce. Our experts study how the atmosphere and ocean connect to ecosystems, organisms, and society. NOAA helps people and communities make informed decisions using Earth system science.

> ***NOAA's vision***
> *Healthy ecosystems, communities, and economies that are resilient in the face of change.*

> ***NOAA's mission: science, service, and stewardship***
> *To understand and predict changes in climate, weather, oceans, and coasts; to share that knowledge and information with others; and to conserve and manage coastal and marine ecosystems and resources.*

Education extends NOAA's role in environmental research, forecasting, management, and protection. Every person needs to be able to understand scientific processes, consider uncertainty, and reason about the ways human and natural systems interact. Our complex task of improving economic and social well-being would not be possible without an engaged public.

Understanding and predicting our environment is not enough; we must educate so individuals can use this information to support robust economies, resilient communities, and healthy ecosystems.

> ***NOAA's education vision***
> *An informed society that uses ocean, coastal, Great Lakes, weather, and climate science to make the best social, economic, and environmental decisions.*

> ***NOAA's education mission***
> *To educate and inspire the nation to use science toward improving ocean and coastal stewardship, increasing safety and resilience to environmental hazards, and preparing a future workforce to support NOAA's mission.*

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NOAA's mandate to educate

Congress defined NOAA's role in science and stewardship education with the America COMPETES Act of 2007 and 2011 (Public Law 110-69; Public Law 111-358), which was last reauthorized in 2017 as the American Innovation and Competitiveness Act (Public Law 114-329). These acts provide broad authority for educational activities.

> *"The Administrator of the National Oceanic and Atmospheric Administration shall conduct, develop, support, promote, and coordinate formal and informal educational activities at all levels to enhance public awareness and understanding of ocean, coastal, Great Lakes, and atmospheric science and stewardship by the general public and other coastal stakeholders, including underrepresented groups in ocean and atmospheric science and policy careers. In conducting those activities, the Administrator shall build upon the educational programs and activities of the agency."*

NOAA is required to develop a 20-year, agency-wide education strategic plan, update it every five years, and evaluate education programs. In response, we developed the 2010–2030 NOAA Education Strategic Plan and the 2015–2035 NOAA Education Strategic Plan.

The American Innovation and Competitiveness Act complements additional mandates that make education integral to how we do business. These acts acknowledge the importance of education in fulfilling the distinct laws that NOAA executes, while the American Innovation and Competitiveness Act provides a unifying mandate for educational activities across the agency:

- Coastal Zone Management Act (National Estuarine Research Reserve System)
- Consolidated Appropriations Act, 2005 (Ernest F. Hollings Scholarship Program)
- Coral Reef Conservation Act
- Magnuson-Stevens Fishery Conservation and Management Act
- Marine Debris Research, Prevention, and Reduction Act
- National Marine Sanctuaries Act
- National Sea Grant College and Program Act
- Omnibus Public Land Management Act of 2009 (Federal Ocean Acidification Research and Monitoring Act)
- Omnibus Public Land Management Act of 2009 (Ocean Exploration and Research)
- Weather Research Forecasting and Innovation Act
- Tsunami Warning and Education Act

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NOAA's unique role in education

Since its inception in 1970, NOAA has become a world-class forecasting and resource management agency. NOAA Education is driven by NOAA's broader mission of science, service, and stewardship. We connect and inspire the public with science and technology, people and places, and products and services.

Science and technology

NOAA needs a broad understanding of the Earth's systems and its residents. NOAA-related sciences range from atmospheric science to zoology. Our experts include biologists, meteorologists, oceanographers, technicians, engineers, economists, climatologists, hydrologists, educators, analysts, and more. We work in the field and in the office, in planes, under water, on beaches, and on ice. We send unmanned robots below the sea and launch technology into space. NOAA gathers environmental data using labs, ships, buoys, and satellites to tackle real-world issues. These observation and monitoring systems provide the data that underpins much of our scientific work.

People and places

NOAA operates in every state and in the U.S. territories, which include American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, Puerto Rico, and the U.S. Virgin Islands. We have research labs, science centers, and weather and water forecasting offices around the country. NOAA manages special places such as national marine sanctuaries and national estuarine research reserves, both of which connect the public with natural and cultural resources. Our experts and educators are embedded in their communities and can provide local or regional perspectives.

Products and services

NOAA protects people and property by collecting environmental information to provide forecasts and warnings about weather, water, and climate. We create and publish nautical charts and tide tables to keep waterways accessible. NOAA resource management ensures sustainable fisheries and healthy ecosystems. NOAA collects massive amounts of data about our planet, from satellite sensors to backyard weather stations. The environmental data we collect is available to the public, and we develop tools and data visualizations so that anyone can find, use, and understand it.

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About NOAA Education

NOAA educators and our partners work in different offices, programs, states, and countries to help translate the broad range of NOAA sciences for educational audiences. Education activities are distributed throughout the agency, in both line offices and individual programs. Through these offices and programs, we gain networks of field educators working around the country. All of these components make up the NOAA Education community.

The NOAA Education Council includes representatives from 16 offices and major programs from the National Weather Service, NOAA Fisheries, NOAA Research, National Ocean Service, NOAA Office of Education, and NOAA Satellites. The Council, with support from the Office of Education, helps guide the community. We are united under a common vision and mission.

While NOAA's mission and mandates drive our programs, we also play a role in supporting science, technology, engineering, and mathematics (STEM) education across the United States. NOAA educators and programs are members of local, regional, and national STEM ecosystems, which pull together networks of formal and informal education organizations, businesses, government agencies, and nonprofits that support STEM learners.

Partners

Our partners include organizations and individuals who share our goals. They help us reach audiences, provide resources, and bring expertise and unique capabilities to strengthen education programming. Through partnerships, NOAA makes efficient use of investments and assets. Some of these are funded through grants and cooperative agreements, while others provide in-kind support. NOAA works with partners to amplify our reach, creating a broader impact. Partners also allow us to work effectively on local and regional scales. Local partners work on issues directly connected to our mission and can establish sustainable collaborations within communities.

NOAA partners [placeholder]
-Zoos, aquariums, and museums
-Government agencies
-Nongovernmental organizations
-Educational businesses
-Professional societies
-Education associations
-Fishery management councils and commissions
-State, local, and tribal governments
-State and local school systems
-Higher education institutions
-Minority serving institutions (MSIs)
-Stakeholder groups and resource users

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Our commitment to diversity, equity, and inclusion

We embrace diversity, equity, and inclusion as core values within our community and strive to implement these values in our education programs. As we seek to identify and overcome barriers to participation, it is critical for us to reach audiences and communities that are underserved and underrepresented in our programs. By valuing a variety of perspectives and experiences within the NOAA Education community, we can make our programs more culturally relevant for everyone.

> ***Diversity***[i]
> *The collection of individual attributes that together help us support our mission. Diversity is the presence of individuals with various backgrounds and identities. It is an outcome of equity and inclusion.*
>
> ***Equity***[ii]
> *Ensures everyone has access to the same opportunities and resources, regardless of their background or identity. Equity is tackling underlying root causes of disparities.*
>
> ***Inclusion***[i]
> *Connects everyone to the organization and encourages a culture of collaboration, flexibility, and fairness. Inclusion is everyone feeling a sense of belonging.*

Our understanding of these concepts and our efforts to fully realize them within our community and programs will continue to evolve over time. We recognize that we still have a great deal of work to do to ensure that everyone feels welcome and has equal access to our opportunities. The NOAA Education community is committed to prioritizing our diversity, equity, and inclusion efforts.

Operating principles

NOAA Education programs are rooted in our science, drawing on research, data, and expertise. We are guided by operating principles to provide high-quality programs. We strive to ensure our programs are:

- Aligned with the agency's strategic goals and include measurable objectives
- Aligned with appropriate national and state education standards
- Based on the best available science
- Informed by evidence-based practices
- Designed to incorporate authentic scientific practices
- Designed with equity, inclusion, and diversity in mind
- Aligned with literacy principles that are relevant to the agency's scientific mission
- Responsive to the needs of the participants through engagement and open communication
- Designed to be sustainable and consistent in quality
- Continually evaluated and improved

Plan overview

Strategic planning provides guidance for NOAA Education and a framework for tracking and reporting progress. This plan builds on the foundation of the 2015–2035 NOAA Education Strategic Plan. We gathered input on the 2015 plan to identify areas that needed improvement. We also reviewed the activities occurring across the agency to identify our core work and find commonalities.

NOAA has five education goals based on our mission, portfolio, and future needs. **The goals are the desired, long-term outcomes for society.**

> **Goal 1: Science-informed society**
> An informed society has access to, interest in, and understanding of NOAA-related sciences and their implications for current and future events.
>
> **Goal 2: Conservation and stewardship**
> Individuals and communities are actively involved in stewardship behaviors and decisions that conserve, restore, and protect natural and cultural resources related to NOAA's mission.
>
> **Goal 3: Ready, responsive, and resilient**
> Individuals and communities are ready, responsive, and resilient to the increasing challenges and impacts of hazardous weather, changes in climate, and other environmental threats monitored by NOAA.
>
> **Goal 4: Future workforce**
> A diverse and highly skilled future workforce pursues careers in disciplines that support NOAA's mission.
>
> **Goal 5: Organizational excellence**
> NOAA functions in a unified manner to support, plan, and deliver effective educational programs and partnerships that advance NOAA's mission.

In the pages that follow, the NOAA Education community outlines our approach for achieving each goal. Each goal is accompanied by objectives and strategies. **The objectives include the relevant target audience and the desired end state necessary to achieve the goal.**

Audience by Goal [placeholder]	
Goals 1, 2, and 3:	*youth and adults; educators; organizations*
Goal 4:	*students, recent graduates*
Goal 5:	*NOAA educators*

To support each objective, we identified specific strategies. **The plan strategies identify the activities conducted by NOAA Education to reach specific target audiences.** Plan strategies provide a line of sight between individual programs, objectives, and goals; however, they are not intended to be parallel between objectives or across goals. Plan strategies reflect the NOAA Education portfolio and reflect distinct groupings of activities.

Goals, objectives, and strategies

Goal 1: Science-Informed Society

An informed society has access to, interest in, and understanding of NOAA-related sciences and their implications for current and future events.

NOAA observes the ocean and atmosphere to understand our environment. We use natural and social sciences to provide timely information to people across the country to support healthy ecosystems, communities, and economies. Regardless of discipline, the use of data in scientific inquiry is the foundation for our work. We support a science-informed society where everyone, regardless of their background or profession, can use science to keep up with our changing planet.

NOAA encourages **youth and adults**—from preschoolers to retirees—to develop a greater understanding of Earth and its systems. We use a broad set of tools to reach diverse members of society, from videos to lesson plans to museum exhibits. NOAA supports climate and ocean literacy within the broader context of environmental literacy. NOAA-managed places, like national estuarine research reserves and national marine sanctuaries, are living laboratories where visitors can experience science in practice. NOAA citizen science opportunities engage people with diverse backgrounds and science experience in research and monitoring.

We reach students in the classroom so they are prepared to solve STEM challenges. NOAA's science is often place-based and locally relevant, enabling students to make connections to their lives. But science learning doesn't stop at the end of the school day or with graduation. Our educators and scientists bring NOAA-related sciences and resources to people of all ages. From outreach activities that encourage curiosity in our programs to informal education offerings that provide opportunities for learning outside the classroom, NOAA supports lifelong learning.

Educators are one of our core audiences. Educators, in informal and formal settings, engage people of all ages in science and inspire them to make science-informed decisions. Together, we bring science, data, and expertise into classrooms, place-based learning areas, and informal learning centers. Through educator resources and professional development, we give educators the tools they need to teach about the ocean and atmosphere.

Our **partners** help us with our goal of fostering a science-informed society. A broad range of partners, from universities to professional associations, amplify NOAA's message to their communities and networks. Informal learning institutions—like aquariums, zoos, and museums—spread the word about our science to their visitors. By working with partners, we can significantly extend our reach.

Through this goal, NOAA Education aims to increase the public's ability to understand and use NOAA-related sciences and services. We cannot achieve NOAA's mission without supporting the development of a science-informed society. Goal 1 underpins our work in Goals 2, 3, and 4.

Goal 1 Objectives and Strategies

1.1. Youth and adults from all backgrounds engage with NOAA-related sciences through education and outreach opportunities.

1.1.1. NOAA will provide formal science education opportunities for students at places and facilities that NOAA manages.

1.1.2. NOAA will provide formal science education opportunities for students in classrooms.

1.1.3. NOAA will provide informal place-based and hands-on education opportunities for youth and adults.

1.1.4. NOAA will participate in science outreach events for youth and adults.

1.1.5. NOAA will support citizen science opportunities that advance learning for youth and adults.

1.1.6. NOAA will support science and engineering competitions for youth.

1.1.7. NOAA will develop and disseminate science resources designed for youth and adults.

1.2. Formal and informal educators from all backgrounds integrate NOAA-related sciences into their teaching and programs.

1.2.1. NOAA will deliver professional development programs on NOAA-related sciences and resources for educators.

1.2.2. NOAA will develop and disseminate science resources designed for educators.

1.2.3. NOAA will support educator networks to promote and facilitate the teaching of NOAA-related sciences.

1.3. Organizations partner with NOAA to strengthen science, education, and outreach initiatives.

1.3.1. NOAA will work with partner organizations to integrate NOAA's science and education assets.

1.3.2. NOAA will support formal education systems with NOAA-related science programs and resources.

1.3.3. NOAA will work with partner networks to improve science teaching and programs.

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Goal 2: Conservation and Stewardship

Individuals and communities are actively involved in stewardship behaviors and decisions that conserve, restore, and protect natural and cultural resources related to NOAA's mission.

From American Samoa to Maine, NOAA protects ecosystems, conserves marine species, and promotes the sustainable use of natural resources. We also protect areas of historical and cultural significance. Finding solutions to environmental issues like marine pollution, climate change, and habitat degradation requires collaboration between NOAA, partner organizations, communities, and individuals.

Conservation and stewardship depend on relationships, since human actions impact how we manage ecosystems. When individuals and communities understand their local ecosystems, they are better equipped to advocate for their environment, culture, and economy. In some cases, NOAA engages the public in conservation and stewardship decisions because of federal laws. We also work with tribal and indigenous partners to co-manage natural resources, incorporating traditional ecological knowledge. Conservation and stewardship education strengthen each person's ability to participate in these processes, which can their impact lives and livelihoods.

Conservation and Stewardship Laws [placeholder]

Magnuson-Stevens Fishery Conservation and Management Act

Endangered Species Act

Marine Mammal Protection Act

National Environmental Protection Act

NOAA engages **youth and adults** in our conservation and stewardship work through formal and informal education and outreach. More than just knowledge gain, NOAA encourages people to connect with their local environment and to take individual or collective action to protect important resources for future generations.

Our programs turn communities into classrooms for learners of all ages. Formal education can help students develop a sense of place and a feeling of responsibility for their community's natural areas and resources. Beyond the classroom, informal education can immerse youth and adults in cultures, landscapes, and experiences that help them understand and connect to the environment. Outreach promotes awareness of issues, both local and global, encouraging new learners to engage and to act.

NOAA helps formal and informal **educators** bring the local environment into the classroom and their classes into the environment. By getting learners outdoors or engaged in hands-on activities, these educators empower them to contribute to science and to make a difference in their community. Professional development programs and educator resources promote environmental problem-solving and stewardship behaviors.

NOAA works with **partners** to mobilize environmental stewards and protect coastal resources at local, regional, and national scales. We work with formal and informal education organizations to integrate conservation and stewardship concepts and actions into their programs. We think about the big picture

of an environmental issue along with its local implications. Some partners support NOAA's work in communities, while others help build capacity across the nation.

Human actions can have a profound impact on the natural systems that NOAA manages and protects. These systems, and our management choices, also impact both individuals and communities. Our work under Goal 2 helps people from all backgrounds understand the human aspect of environmental management and how they can take action.

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Goal 2 Objectives and Strategies

2.1. Youth and adults from all backgrounds understand and apply conservation and stewardship in their lives and communities.

2.1.1. NOAA will provide formal stewardship education and action opportunities for students.

2.1.2. NOAA will provide informal stewardship education and action opportunities for youth and adults.

2.1.3. NOAA will provide conservation and stewardship outreach for youth and adults.

2.2. Formal and informal educators from all backgrounds integrate conservation and stewardship into their teaching and programs.

2.2.1. NOAA will deliver professional development programs on conservation and stewardship for educators.

2.2.2. NOAA will develop and disseminate resources on conservation and stewardship designed for educators.

2.2.3. NOAA will work with educators to implement stewardship action projects.

2.3. Organizations partner with NOAA to strengthen conservation and stewardship initiatives.

2.3.1. NOAA will work with partner organizations to implement conservation and stewardship initiatives.

2.3.2. NOAA will support formal education systems with conservation and stewardship programs and resources.

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Goal 3: Ready, Responsive, and Resilient

Individuals and communities are ready, responsive, and resilient to the increasing challenges and impacts of hazardous weather, changes in climate, and other environmental threats monitored by NOAA.

From the early days of ensuring safe passage for ships to today's extensive Earth-observing infrastructure, NOAA's environmental science and data protects lives and supports a strong economy in the face of sudden and prolonged environmental change. NOAA Education programs help people make themselves, their families, and their communities ready, responsive, and resilient to these challenges.

Individuals and communities who are ready, responsive, and resilient understand environmental hazards, such as hurricanes, extreme heat events, and drought. Informed individuals can make decisions that reduce their risk to these hazards. Our goal is to ensure everyone, including the most vulnerable populations who have the highest exposure to hazards and the fewest resources to respond, are empowered to protect themselves and their families.

NOAA helps **youth and adults** understand how their communities can be better prepared to face environmental hazards in their area and how they can take action to reduce the impacts. Our formal education programs integrate data on environmental hazards and their impacts into STEM education. We also reach lifelong learners within their communities through informal programs. Our informal education programs help community members understand what actions to take based on the hazards, social and economic conditions, and surrounding ecological systems in their area. Outreach opportunities bring NOAA educators and experts into communities, where they can increase awareness about local extreme weather and other environmental threats.

NOAA works with informal and formal **educators** to teach not only the science behind environmental hazards, but also how to build resilience to the challenges facing their communities. NOAA programs connect educators to our science and data through professional development and specially designed resources. When educators incorporate concepts of readiness, responsiveness, and resilience into their teaching and programming, more communities have access to important, local safety information and can take action to reduce impacts.

Our **partners** allow us to better reach individuals and communities. Organizations like schools, community groups, government agencies, hospitals, the media, and a wide variety of private businesses play a role in keeping their communities safe. Industry partners, state and tribal governments, emergency management agencies, and disaster response and relief organizations are important to extending NOAA's reach in these critical areas. Our partners infuse practical knowledge of potential environmental hazards and how to respond to them into science exhibits, media, materials, and programs.

People trust NOAA's information on environmental hazards and their impacts. Our work under Goal 3 helps build on this trust, providing individuals and communities with the tools they need to make decisions or take action to minimize damage from environmental threats and better prepare for future changes.

Goal 3 Objectives and Strategies

3.1. Youth and adults from all backgrounds understand the environmental hazards facing their communities and act to increase their community resilience.

3.1.1. NOAA will provide formal education opportunities on resilience, readiness, and responsiveness for students.

3.1.2. NOAA will provide informal education opportunities on readiness, responsiveness, and resilience for youth and adults.

3.1.3. NOAA will participate in outreach events on readiness, responsiveness, and resilience for youth and adults.

3.2. Formal and informal educators from all backgrounds integrate environmental hazards and resilience into their teaching and programs.

3.2.1. NOAA will deliver professional development programs on readiness, responsiveness, and resilience for educators.

3.2.2. NOAA will develop and disseminate resources on readiness, responsiveness, and resilience for educators.

3.3. Organizations partner with NOAA to strengthen environmental hazards- and resilience-related initiatives.

3.3.1. NOAA will work with partner organizations to integrate NOAA's readiness, responsiveness, and resilience assets.

3.3.2. NOAA will work with partners to engage vulnerable populations in becoming ready, responsive, and resilient.

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Goal 4: Future Workforce

A diverse and highly skilled future workforce pursues careers in disciplines that support NOAA's mission.

NOAA relies on a highly skilled workforce that is able to address today's national and global environmental challenges. We depend on a wide range of experts who support our mission, from fisheries biologists to satellite technicians to policy analysts. To continue NOAA's work to understand our changing planet, we need the country's best and brightest students to bring their diverse perspectives into our workforce.

We provide opportunities for students and recent graduates that engage them in understanding our world, keeping people safe, and using our resources wisely. We want to increase opportunities for underrepresented groups in NOAA science fields and create a workforce that mirrors the demographics of our nation. Building a diverse workforce trained in NOAA mission disciplines is crucial to maintaining American competitiveness in a rapidly changing global economy.

While a single experience may spark an interest in STEM and NOAA mission disciplines, it takes more than that to keep **students** engaged. Our programs start early, working with students from all backgrounds as they enter the formal education system. NOAA provides opportunities and resources for K-12 students to learn about NOAA-related careers. NOAA scientists and educators help students explore career options while breaking down misconceptions about who is — and who can be — a scientist. We work with informal and formal educators to bring these experiences into classrooms and other settings. As students grow, our programs continue to support them, providing opportunities for deeper learning, research, and training in science.

Our opportunities for undergraduate and graduate students help them develop the skills and networks they need to transition into NOAA-related careers. We engage students in developing a practical understanding of how their academic work and interests align with career possibilities. Students work with NOAA experts to conduct research that is applied in the real world. We also collaborate with academic institutions and faculty to reach postsecondary students. Importantly, we partner with minority serving institutions to support the education, training, and graduation of students from underrepresented minority communities to increase participation in NOAA-related sciences.

We provide opportunities to **recent graduates** to help them develop the necessary skills to succeed in competitive fields. Professional opportunities that support the transition of students from their education and training activities into the workforce are essential. Our programs embed recent graduates in the agency to build on their academic experience so that they are competitive for future positions.

Goal 4 builds on the foundations of Goals 1, 2, and 3. The environmentally literate public supported through these goals provide a base for the nation's future workforce.

Goal 4 Objectives and Strategies

4.1. Students, particularly from underrepresented groups, become aware of and interested in education and career pathways in NOAA mission disciplines.

4.1.1. NOAA will provide career interest programs.

4.1.2. NOAA will develop and disseminate career awareness resources.

4.2. Students, particularly from underrepresented groups, explore and prepare for careers in NOAA mission disciplines.

4.2.1. NOAA will provide scholarships and fellowships for undergraduate and graduate students.

4.2.2. NOAA will provide work-based learning for students.

4.2.3. NOAA will work with minority serving institutions and other partners to increase opportunities for students from communities that are underrepresented in NOAA mission fields.

4.2.4. NOAA will work with academic partners to prepare students for NOAA's future workforce needs.

4.3. Graduates, particularly from underrepresented groups, enter the NOAA mission workforce.

4.3.1. NOAA will provide fellowship and postdoctoral opportunities for recent graduates.

4.3.2. NOAA will remove barriers to bringing NOAA-supported students into the NOAA workforce.

4.3.3. NOAA will coordinate agency-wide recruitment efforts for the NOAA workforce.

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Goal 5: Organizational Excellence

NOAA functions in a unified manner to support, plan, and deliver effective educational programs and partnerships that advance NOAA's mission.

Each year, the NOAA Education community helps connect and inspire millions of people with NOAA's mission of science, service, and stewardship. We have many different types of programs, spanning formal and informal education and outreach. Our programs are driven by a common mission and face similar challenges. Working together to improve how we evaluate and communicate our work strengthens all NOAA Education programs. Likewise, focusing on diversity, inclusion, and equity helps us better reach our audiences.

NOAA leadership, recognizing the importance of education to achieving our agency's mission, has established a policy that encourages employee participation in programs, projects, events, and activities that engage, educate, or inspire audiences[iii]. Our educators work in different offices, programs, states, and countries. NOAA educators may work directly for the agency or be a part of one of our networks, like the National Estuarine Research Reserve System and state Sea Grant programs; they are all members of the NOAA Education community.

Just like for the informal and formal educators we serve, professional development and network opportunities are important to us. Our networks provide opportunities for NOAA educators from across the country to work together and share expertise and lessons learned. These connections are especially important because they provide forums for regular communication and coordination within NOAA educator networks.

The NOAA Education Council is the coordination body that promotes organizational excellence among NOAA's education programs. The scope of the Education Council has become more representative and inclusive of NOAA's education activities, evolving from an early focus on education policy to its current focus on connecting with, learning from, and supporting the NOAA Education community.

We work to make our programs strategic, evidence-based, and responsive to the needs of our audiences. Through planning and evaluation, we hold ourselves accountable to measure and report our progress and impacts. The Education Council has developed processes for reporting progress toward goals and objectives and for demonstrating the value of the NOAA Education community. The Council, with support from the Office of Education, works diligently to document and communicate the impacts of our work.

Our community is committed to extending the reach of our education programs to underserved audiences and helping individuals from underserved groups to advance in NOAA-related careers. Individual programs are committed to improving diversity, equity, and inclusion. Given the magnitude and complexity of this challenge, collective work among the NOAA education community is also needed to address systemic barriers across programs.

Our work under Goals 1, 2, 3, and 4 is strengthened by the objectives and strategies of Goal 5.

Goal 5 Objectives and Strategies

5.1. The NOAA Education community works together to better serve all educational audiences.

5.1.1. NOAA will support collaborative networks of NOAA educators.

5.1.2. NOAA Educators will cooperate across programs and offices.

5.2. The NOAA Education community is strategic, coordinated, and continually improving.

5.2.1. NOAA will monitor and evaluate education programs.

5.2.2. NOAA will develop strategic partnerships, networks, and policy priorities to support education.

5.2.3. NOAA will use communications to share the impact of NOAA education programs.

5.3. The NOAA Education community advances diversity, equity, and inclusion within our programs.

5.3.1. NOAA will undertake all appropriate measures to make programs inclusive and equitable.

5.3.2. NOAA will create inclusive spaces for internal dialogue and learning for educators on equity, inclusion, and cultural relevance.

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Back matter

Implementation

The NOAA Education community develops two-year implementation plans to supplement the strategic plan. Implementation planning allows programs to identify which actions and strategies will be used to carry out our goals. The implementation planning cycle provides an opportunity to evaluate the NOAA Education portfolio on an ongoing basis, while allowing us to respond to immediate needs, opportunities, and resources.

During an annual evaluation, we will document how programs are doing and establish the full portfolio of program activities that contribute to the strategic plan. This new process will build from and enhance existing internal reporting based on common measures and communicating impacts to the public.

Evaluation

NOAA maintains a comprehensive system for evaluating our education programs and activities, as required by the America Competitiveness and Innovation Act. This system allows us to collect evidence and set milestones across our portfolio of programs. Individual programs also conduct evaluations determined by their specific mandates and aims. Our NOAA-wide evaluation and individual program evaluations complement one another to strengthen our community and our ability to achieve the goals of our strategic plan. This holistic approach helps ensure that programs monitor their inputs, activities, outputs, and outcomes.

The approach that guides this comprehensive system is called "utilization-focused evaluation[iv]". It is based on the premise that evaluations should be judged by how programs use the information they collect. Therefore, any evaluative activity begins and ends with a conversation about how the results and findings will be used by decision-makers and program staff. Our programs are planning to use the information they collect throughout the process of evaluation. Our evaluative activities in this system are used in the following ways:

- Reporting accomplishments, outcomes, and impacts
- Being responsive to requests for data in a timely manner and without additional burden
- Making program improvements toward effectiveness and impact
- Informing policy and planning based on our portfolio of programs
- Monitoring progress of programs and the portfolio overall

Glossary

Adults: Individuals 18 years and older who engage in lifelong learning activities with the aim of enhancing their own knowledge, skills, and competencies from a personal, civic, social, or employment-related perspective.

Conservation: The preservation and careful management of NOAA trust resources to prevent further impacts (e.g., stabilize populations to make them functional members of their ecosystem), loss, or damage of NOAA trust resources. The goal is to remove or minimize human or other impacts to the ecosystem.

Citizen science: A form of open collaboration in which individuals or organizations participate voluntarily in the scientific process in various ways, including enabling the formulation of research questions; creating and refining project design; conducting scientific experiments; collecting and analyzing data; interpreting the results of data; developing technologies and applications; making discoveries; and solving problems.[v]

Disciplines that support NOAA's mission: All NOAA-related sciences and additional fields such as engineering, vessel and airplane operation, nautical charting, policy, graphic design, illustration, communications, law, management, uniformed services, social sciences, and marine observer programs.

Earth system science: An integrated approach to the study of the Earth that stresses investigations of the interactions among the Earth's components in order to explain Earth dynamics, evolution, and global change.[vi]

Education: The process by which individuals develop their knowledge, values, and skills. Education encompasses both teaching and learning. [iii]

Educators: Those who facilitate learning in various roles: public school teachers, private or independent schoolteachers, informal educators, interpreters, volunteers serving as docents or educators, homeschool educators, or preservice teachers.

Engagement: A two-way relationship between a service provider and society. It implies a commitment of service to society through a partnership based on reciprocity and sharing of goals, objectives, and resources. Implicit to engagement is a respect for each partner that involves listening, dialogue, understanding, and mutual support.[iii]

Environmental literacy: Environmental literacy includes: 1) the knowledge and understanding of a wide range of environmental concepts, problems, and issues; 2) a set of cognitive and affective dispositions; 3) a set of cognitive skills and abilities; and 4) the appropriate behavioral strategies to apply such knowledge and understanding in order to make sound and effective decisions in a range of environmental contexts.[vii]

Environmental education: Educational opportunities for participants to connect with local ecosystems and provides tools that can help them understand how individual behavior impacts the environment. These activities, including stewardship, encourage people to take an active role in managing and protecting these resources.

Environmental stewardship: The responsible use and protection of the natural environment through conservation and sustainable practices to enhance ecosystem resilience and human well-being.[viii]

Experiential learning: Experiential education programs engage learners in constructing meaning by immersing them in direct and meaningful hands-on experiences. This approach incorporates learning using real-world problems and interaction with natural phenomena.[ix]

Formal education: An organized set of educational activities that meet clearly defined learning objectives with a connection to the curriculum of the school or state. Programs and outreach for education activities provided by informal educators can be included.

Free-choice learning: Self-directed, voluntary education guided by an individual's needs and interests.

Indigenous knowledge: The traditions, culture, and belief systems of people whose ancestors inhabited a place or country before people from another culture or ethnic background arrived on the scene.

Informal education: A set of lifelong learning activities that are delivered or facilitated by an educator, meet clearly defined learning objectives, and are provided outside the established formal education system. Participants engage in these activities with the aim of enhancing their own knowledge, skills, and competencies from a personal, civic, social, and/or career-related perspective.

K-12 students: Children attending public, private, or charter schools from kindergarten to grade 12 and preschools, or who are home-schooled.

Minority serving institutions: Colleges and universities, including state colleges, private schools, religiously affiliated colleges, liberal arts colleges, and community colleges, that have a special focus on serving the needs of a minority audience. These universities have a historical tradition or mandate to serve a specific demographic of student, but often serve non-minority students as well. The term "minority institution" means an institution of higher education whose enrollment of a single minority or a combination of minorities exceeds 50 percent of the total enrollment.[x]

NOAA-related science: The collection of scientific disciplines that NOAA employs in its investigations, monitoring, evaluating, and forecasting of conditions and trends in the ocean, coasts, Great Lakes, weather, and climate and in building understanding of these natural systems and their relationship with human activities.

Outreach: Opportunities designed to build awareness, develop relationships, and inspire action (e.g., pursuit of further learning opportunities and behavioral change). Involves information exchange between provider and target audience. Frequently designed to reach diverse audiences, but can be personal and interactive, designed to identify and appeal to an individual's personal interest or motivation for information.[iii]

Place-based education: This method of instruction encourages participants to use the schoolyard, community, public lands, and other special places as resources, turning communities into classrooms.[xi]

Postsecondary students: Students who are enrolled in degree-seeking programs at a college or university.

Resilience: A capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment.[xii]

Social science: Academic disciplines concerned with the study of the social life of human groups and individuals, including anthropology, economics, communications, geography, philosophy, psychology, history, education research, political science, and sociology.

Service learning: A method under which participants learn and develop through active participation in thoughtfully organized service that is conducted in and meets the needs of a community; is coordinated with an elementary school, secondary school, institution of higher education, or community service program, and with the community; helps foster civic responsibility; and is integrated into and enhances the academic curriculum of the students, or the educational components of the community service program in which the participants are enrolled; and provides structured time for the students or participants to reflect on the service experience.[xiii]

STEM education: Formal or informal education that is primarily focused on physical and natural sciences, technology, engineering, mathematics, and computer science disciplines, topics, or issues (including environmental science, environmental stewardship, and cybersecurity).[xiv]

STEM ecosystem: Collaborations that engage educators and individuals within and outside a formal educational setting, such as families; school districts; state, local, and tribal governments; the Federal Government and federal facilities; libraries; museums and science centers; community colleges, technical schools, and universities; community groups and clubs; foundations and nonprofits; faith-based organizations; and businesses. STEM ecosystems focus on long-term, shared, sustainable, and flexible STEM missions that bridge, integrate, and strengthen the learning opportunities offered by organizations across sectors compared with isolated, independent entities. Ecosystem partners are not bound by geographic boundaries and can broadly involve individuals and organizations in both physical and virtual engagement to create STEM communities that expand from local to global.[xiv]

Stewardship action: The activities, behaviors, decisions, and technologies carried out by stewards—individuals, groups, or networks of actors. Those executed collectively by groups or communities are used to manage common-trust resources. The actors involved largely depends on the scale and complexity of the issue.[xv]

Traditional ecological knowledge: A cumulative body of knowledge, practice and belief evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.[xvi]

Underserved audiences: Populations who receive inadequate or inequitable services, who experience quality-of-life disparities, and who by design have little power or influence over outside decisions that impact their daily quality of life.[ii]

Underrepresented audiences: This category comprises three racial or ethnic minority groups (blacks or African Americans, Hispanics or Latinos, and American Indians or Alaska Natives) whose representation in science and engineering education or employment is smaller than their representation in the U.S. population. [xvii]

Youth: Individuals younger than 18 years old who engage in lifelong learning activities with the aim of enhancing their own knowledge, skills, and competencies from a personal, civic, social, or employment-related perspective.

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References

[i]NOAA (2017). NOAA Diversity and Inclusion Strategic Plan FY 2017–2019. NOAA. https://www.eeo.noaa.gov/d&i/NOAA%20Diversity%20and%20Inclusion%20Strategic%20Plan.pdf

[ii]Skeo (2019). DEIJ in Action: A Diversity, Equity, Inclusion, and Justice Guide for the Chesapeake Bay Watershed. Chesapeake Bay Trust. https://cbtrust.org/wp-content/uploads/CB-Watershed-DEIJ-Guide_May-2019.pdf

[iii]NOAA (2015). NAO 216-106A: NOAA Education and Outreach Policy. NOAA. https://www.corporateservices.noaa.gov/ames/administrative_orders/chapter_216/216-106A.html

[iv]Patton, M. Q. (2003). Utilization-focused evaluation. In *International handbook of educational evaluation* (pp. 223-242). Springer, Dordrecht.

[v]Crowdsourcing and Citizen Science Act, 15 USC § 3724

[vi]NASA Goddard Space Flight Center. NASA's Earth Observatory Glossary. NASA. https://earthobservatory.nasa.gov/glossary/e

[vii]Hollweg, K.S., J.R. Taylor, R.W. Bybee, T.J. Marcinkowski, W.C. McBeth, and P. Zoido (2011). Developing a Framework for Assessing Environmental Literacy. North American Association for Environmental Education.

[viii] Chapin, F. S., Pickett, S. T., Power, M. E., Jackson, R. B., Carter, D. M., & Duke, C. (2011). Earth stewardship: a strategy for social–ecological transformation to reverse planetary degradation. Journal of Environmental Studies and Sciences

[ix]Association for Experiential Education. What is Experiential Education?. https://www.aee.org/what-is-ee

[x]Higher Education Act, 20 U.S.C. § 1067k(3)

[xi]Place-based Education Evaluation Collaborative (2010). The Benefits of Place-based Education: A Report from the Place-based Education Evaluation Collaborative (Second Edition). https://www.nps.gov/mabi/learn/education/upload/Benefits%20of%20PBE.pdf

[xii]Reidmiller, D. R., Avery, C. W., Easterling, D. R., Kunkel, K. E., Lewis, K. L. M., Maycock, T. K., & Stewart, B. C. (2018). USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II.

[xiii]The Community Service Act of 1990, 42 U.S. Code § 12511

[xiv]Committee on STEM Education, National Science and Technology Council (2018). Federal Science, Technology, Engineering, and Mathematics (STEM) Education 5-Year Strategic Plan. https://www.whitehouse.gov/wp-content/uploads/2018/12/STEM-Education-Strategic-Plan-2018.pdf

[xv]Bennett, N. J., Whitty, T. S., Finkbeiner, E., Pittman, J., Bassett, H., Gelcich, S., & Allison, E. H. (2018). Environmental stewardship: a conceptual review and analytical framework. *Environmental Management*, *61*(4), 597-614

[xvi]Berkes F., J. Colding, and C. Folke. (2000). Rediscovery of Traditional Ecological Knowledge as Adaptive Management. Ecological Applications, 10(5), 1251-1262., as cited by https://www.legislative.noaa.gov/docs/19-065933-Traditional-Knowledge-in-Decision-Making-Document-Signed.pdf

[xvii]National Science Foundation, National Center for Science and Engineering Statistics (2019). *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2019.* Special Report NSF 19-304. https://www.nsf.gov/statistics/wmpd