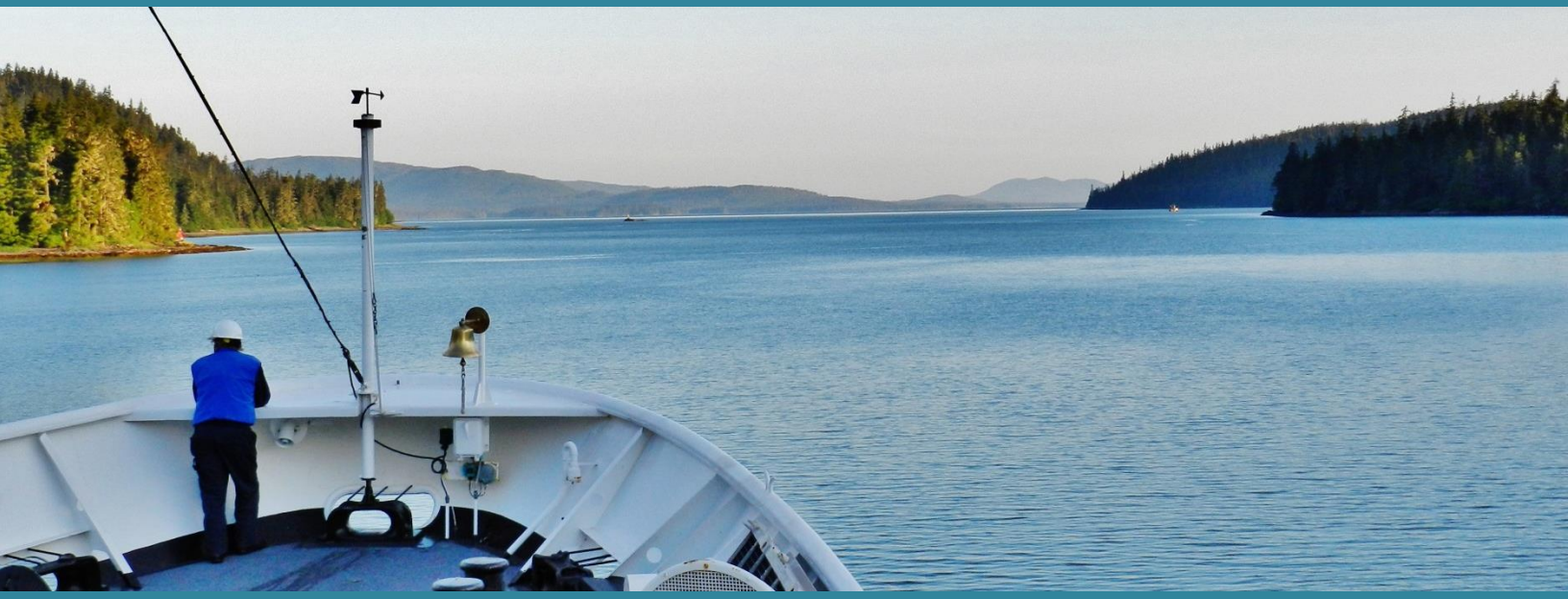
NOAA
National Oceanic and Atmospheric Administration



NOAA EDUCATION
ACCOMPLISHMENTS REPORT
Fiscal Year 2013

On the Cover

Top: NOAA Teacher at Sea enjoys a rare bit of breathing room in the passage of NOAA ship *Rainier* through Wrangell Narrows, Alaska.

Bottom right: Students check out a shark while exploring the San Francisco Bay estuary aboard the R/V *Robert G. Brownle.*

Bottom middle: Citizens explore the rocky intertidal in the Olympic Coast National Marine Sanctuary.

Bottom left: NOAA Teacher at Sea Rob Ulmer learns by observing ensign Micki Ream use old-fashioned compass-and-straightedge geometric constructions and calculations to plot a course through Hecate Strait, Alaksa.

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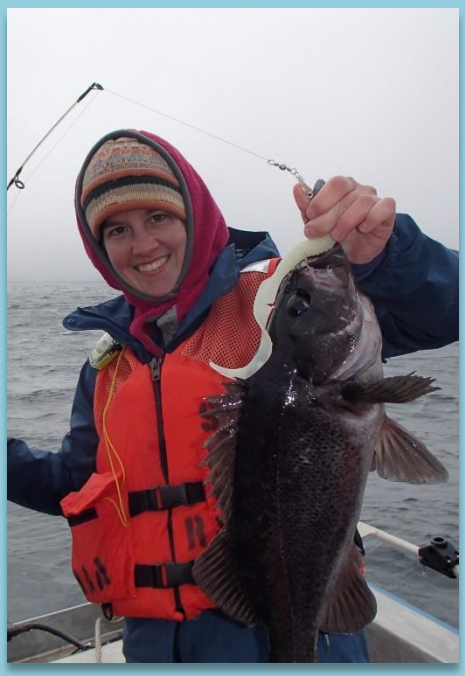

Above: NOAA Teacher at Sea Rosalind Echols catches a fish during a research cruise on NOAA ship *Rainier.*

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Right: Students plant a garden as part of NOAA's Climate Stewards Education Project.

Letter from the Director

Above: Students get immersed in marine technology by developing their own remotely operated vehicles (ROVs) out of PVC pipe at the Channel Island National Marine Sanctuary.

Below: John Lamson, a Marine Docent, teaches elementary school students about lobsters at a Day of the Coast event. The University of New Hampshire Marine Docent Program seeks to educate K-12 students and the general public about marine science.

Dear Partners and Friends of NOAA Education,

NOAA makes Earth system science matter for millions of Americans every day. Through our network of observations, forecasts, and assessments, we provide information that people need to live well and safely on this dynamic planet. At NOAA, we call this information "environmental intelligence," and producing it is at the core of our mission.

Building an environmentally-literate public is an important part of ensuring that our nation is well prepared to handle severe weather events, adapt to a changing climate, and act as good stewards of our coastal, Great Lakes, and marine resources. Reducing the impact of hazards not only requires timely and effective action in times of crisis, but also the foresight to build a foundation of understanding when skies are clear and oceans are calm.

NOAA has a broad mandate to educate the public about ocean, coastal, Great Lakes, and atmospheric science, service, and stewardship. As a leader in Earth system science, NOAA embraces the opportunity to expand the public's understanding of the Earth's dynamic systems. Education efforts take place across the agency, supporting NOAA's science, service, and stewardship functions in creative and innovative ways.

Critical to the success of NOAA education are ongoing partnerships with formal and informal educational institutions, businesses, organizations, and concerned individuals who dedicate their time to supporting our mission. We thank you for your interest in NOAA Education and look forward to working with you to improve our Nation's ability to protect life and property and build sustainable ecosystems and resilient communities.

We are proud to share examples of NOAA's work in education in fiscal year 2013. We are eager to demonstrate the effectiveness of our efforts and share our accomplishments with the Nation. The narratives in this document highlight the breadth and scope of NOAA Education and our continued efforts to promote environmental literacy and inspire the next generation of earth system scientists.

Sincerely,

Louisa Koch

Louisa Koch, Director, NOAA Education

Education in Support of NOAA's Mission

NOAA's mission :

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.

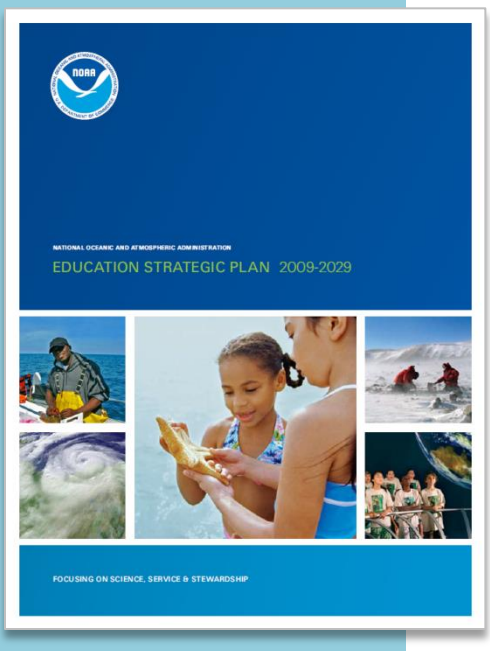
A Mandate to Educate

Education investments are a vital component of the National Oceanic and Atmospheric Administration's (NOAA's) science, service, and stewardship functions. NOAA programs invest resources in education activities as required by legislation and as a means of meeting their broader program mission. The mandate to educate appears in authorizing legislation* for individual programs such as the National Sea Grant College Program Act, the National Marine Sanctuaries Act, and the Coastal Zone Management Act, dating back to 1966. Complementing these mandates, the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education and Science (COMPETES) Act, most recently reauthorized in 2011 (P.L. 11-358), provides NOAA with a broad, agency-wide authority for education. Combined, they form a robust education portfolio that takes advantage of NOAA's unique assets.

In this report, we highlight examples from across the Agency that illustrate how education investments supported NOAA's mission in fiscal year 2013 (FY13, October 1, 2012 – September 30, 2013).

NOAA's Goals in Education

As required by the America COMPETES Act, NOAA developed an agency-wide education strategic plan. The 2009 – 2029 NOAA Education Strategic Plan supports the Agency's mission with the following two goals:



1. Environmental Literacy: An environmentally-literate public supported by a continuum of lifelong formal and informal education and outreach opportunities in ocean, coastal, Great Lakes, weather, and climate sciences.

2. Workforce Development: A future workforce, reflecting the diversity of the Nation, skilled in science, technology, engineering, mathematics, and other disciplines critical to NOAA's mission.

*Coral Reef Conservation Act (P. L. 106-562); Coastal Zone Management Act (P. L. 109-58), § 1461, National Estuarine Research Reserve System; Magnuson-Stevens Fishery Conservation, and Management Act (P.L. 109-479); National Marine Sanctuaries Act (P.L. 106-513, Sections 1431 et seq.); National Sea Grant College Program Act (P. L. 107-299)

Education in Support of NOAA's Mission

The importance of partnerships

NOAA's accomplishments in education could not be attained alone. NOAA works with hundreds of federal, academic, nonprofit, and private partners, all of whom contribute to the common performance measures.

Throughout this report, we highlight partners to acknowledge the broad array of organizations that work with NOAA toward science, service, and stewardship. Through these partners, NOAA creatively leverages assets to extend the Agency's reach.

Above: Students learn to use nautical charts in a National Marine Sanctuary education program.

In conjunction with the Strategic Plan, NOAA has been focused on developing the capacity to demonstrate effectiveness of NOAA education activities and position education programs to meet strong accountability requirements. As part of this process, NOAA collects common measures across major education programs to communicate the reach of our investments. Here are NOAA-wide accomplishments from FY13*:

Support an environmentally-literate public

- Over **61 million people** visited museums, zoos, aquariums, and other informal education institutions hosting NOAA-supported exhibits or programs. NOAA partners with informal learning institutions to make NOAA sciences, data, and other information widely available to the American public through interactive exhibits and programs.
- Over **470 institutions** increased educational capacity through NOAA-funded interpretive/educational centers, exhibits or programs. These institutions are uniquely equipped to make the distinct and significant resources of our mission-driven, scientific agency accessible to the American people.
- Over **2.2 million** lifelong learners participated in NOAA-supported informal education programs. Such programs aim to enhance understanding and use of ocean, coastal, Great Lakes, weather, and climate environmental information with the goal to promote stewardship and increase informed decision making.
- Over **340,000 preK-12 students** participated in NOAA-supported formal education programs. For America to be competitive in the global marketplace, we need bright, creative minds. Our job is to see that we give as many young people as possible many opportunities to learn, stretch in new directions, and develop critical thinking, ingenuity, and scientific expertise.

* Estimates represent the best available data at the time this report was published. Performance measures from FY13 are not finalized until FY15.

Education in Support of NOAA's Mission

Above: Teachers learn about remotely operated vehicles in a professional development workshop.

- Over **32,800 educators** participated in NOAA-supported professional development programs. Educating our educators in science, technology, engineering, and math (STEM) and other disciplines will help them understand their world and provide useful scientific advances to society. In turn, they prepare learners with the critical thinking skills they need to get better jobs with better pay for a brighter future.
- Over **19 million people** visited NOAA Education websites that support a broad spectrum of educational activities and provide critical information to the Nation. NOAA's products and services help explain real-world issues such as climate change, oil spills, extreme weather, weather safety, and appropriate management of coastal environments and sustainable fisheries.

Develop a diverse workforce

Right: Students participate in the Hawaii Intertidal Project in the Hawaiian Humpback Whale National Marine Sanctuary.

- Over **3,850 postsecondary students** trained in NOAA mission-related sciences through NOAA-funded higher education programs that prepare students for career paths at NOAA and related organizations. Through scientific rigor, cutting-edge research, and integrated education, NOAA is committed to developing and attracting the next generation of scientists who will drive the scientific and technological innovation our country needs to stimulate the economy and create jobs.
- Over **560 postsecondary degrees** in NOAA-related disciplines awarded to students who were supported by NOAA in higher education programs. NOAA is proud to play a role in the effort to prepare the next generation of scientists for tomorrow.

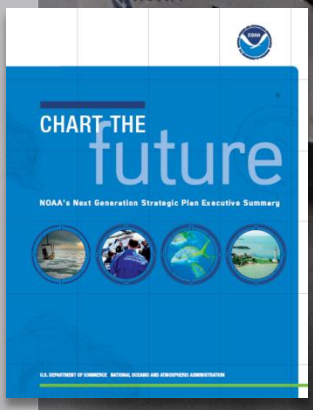
NOAA Education Goal 1: Environmental Literacy

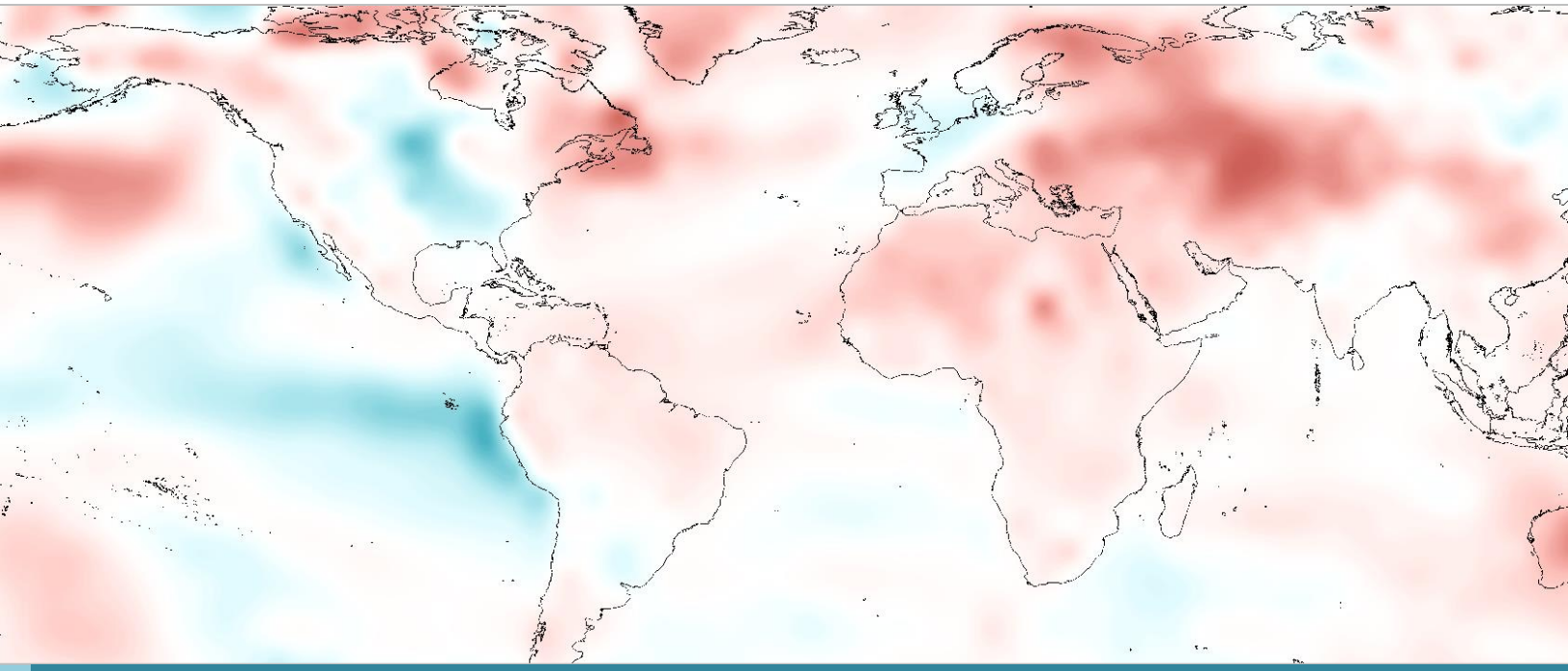
An environmentally-literate public supported by a continuum of lifelong formal and informal education and outreach opportunities in ocean, coastal, Great Lakes, weather, and climate sciences.

NOAA Education's goal of fostering an environmentally-literate public is an important component of achieving NOAA's mission. NOAA defines an environmentally-literate person as someone who has a fundamental understanding of the systems of the natural world, the relationships and interactions between the living and non-living environment, and has the ability to understand and utilize scientific evidence to make informed decisions regarding environmental issues. An educated public is needed to serve as stewards of the natural environment, take appropriate action in the case of severe weather, and participate in the national discussion about complex issues such as climate change. NOAA plays a key role in advancing this understanding through its educational programs, products, outreach efforts, and collaborations, supported by the agency's extensive breadth and depth of scientific resources.

In the following section, we share examples of how environmental literacy supports and promotes the broader NOAA mission by organizing our FY13 accomplishments according to the Agency's strategic goals in the Next Generation Strategic Plan (2010):

- Climate Adaptation and Mitigation
- Weather-Ready Nation
- Healthy Oceans
- Resilient Coastal Communities and Economies





Education in Support of Climate Adaptation and Mitigation

Above: Global temperature anomalies from 2013 shown in NOAA View. Temperatures warmer than the 1981-2010 average are shown in red, cooler temperatures in blue.

An informed society anticipating and responding to climate and its impacts

In this section, we share examples of how NOAA's climate community works to promote climate literacy by supporting education policy, educating formal and informal educators, and engaging communities at risk from climate-related hazards. NOAA's climate education efforts connect educators, decision makers, and the public with climate science from NOAA and its partners.

As a leader in climate science, NOAA recognizes the need for decision makers and the public to follow our evolving understanding of climate change and respond appropriately to climate-related environmental threats. In the Next Generation Strategic Plan, NOAA outlines the objective: "A climate-literate public that understands its vulnerabilities to a changing climate and makes informed decisions." Global climate change is projected to impact environmental processes, ecosystems, and the communities that depend on them. Climate literacy is a key component of a nation prepared to respond to and mitigate the local impacts of these global changes.

Education in Support of Climate Adaptation and Mitigation

Sampling vegetation in marsh sediment helps teachers tackle climate change at the roots

The Teachers on the Estuary (TOTE) program offers hands-on, field-based, professional development opportunities at National Estuarine Research Reserve sites (NERRS) across the Nation. The TOTE program's objective is to improve teachers' and students' understanding of the environment using local examples and research. TOTE training helps classroom educators learn about the science of climate change and how they can use this science with their students.

In FY13, NERRS offered TOTE professional development opportunities in eight states. In Oregon and Massachusetts, teachers investigated basic science such as how carbon behaves in the environment, where it is stored, and how greenhouse gases such as CO_2 in the atmosphere have accelerated the rate of climate change. In addition, teachers also learned about a new curriculum designed to highlight a research project called "Bringing Wetlands to Market" taking place at the Waquoit Bay NERR in Massachusetts.

Right: Investigating carbon – Teachers work as a team through a guided inquiry process to examine how carbon is stored by plants through the process of photosynthesis.

Education in Support of Climate Adaptation and Mitigation

Above: Core samples, collected by teachers in the TOTE workshop at South Slough, reveal carbon sequestered by the marsh and layers of sandy sediments deposited by a large tsunami on January 26, 1700 following a 9.5 magnitude earthquake along the Oregon coast.

With this new curriculum, teachers learned about the role coastal and estuarine wetlands play in storing or sequestering carbon and the need to calculate the economic value of natural resources. One of the activities that teachers appreciated the most involved excavation of a marsh sediment core containing roots and peat to demonstrate the value of salt marshes in sequestering carbon. While the topic of climate change and its impacts can be overwhelming, teachers in Oregon and Massachusetts took time during the summer of 2013 to dig in a little deeper, sharpen some new tools, and prepare themselves to help their students tackle this tough topic. Teachers are emerged from the training ready to engage their students in learning about the important ecosystem services provided by coastal wetlands and seagrass systems.

The Teachers on the Estuaries workshops will have a very positive impact on students for years to come. According to workshop participants, each of the teachers will reach approximately 70 students per year. As a result of these workshops an estimated 20,000 students will learn about the importance of estuaries and how they can help to protect them.

NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM

Education in Support of Climate Adaptation and Mitigation

Partners include:

100Kin10

Cooperative Institute for Research in Environmental Science at the University of Colorado Boulder

Delaware Department of Education

Delaware State University

Lifelong Learning Group

Maryland State Department of Education

Maryland Public Television

Monterey Bay Aquarium

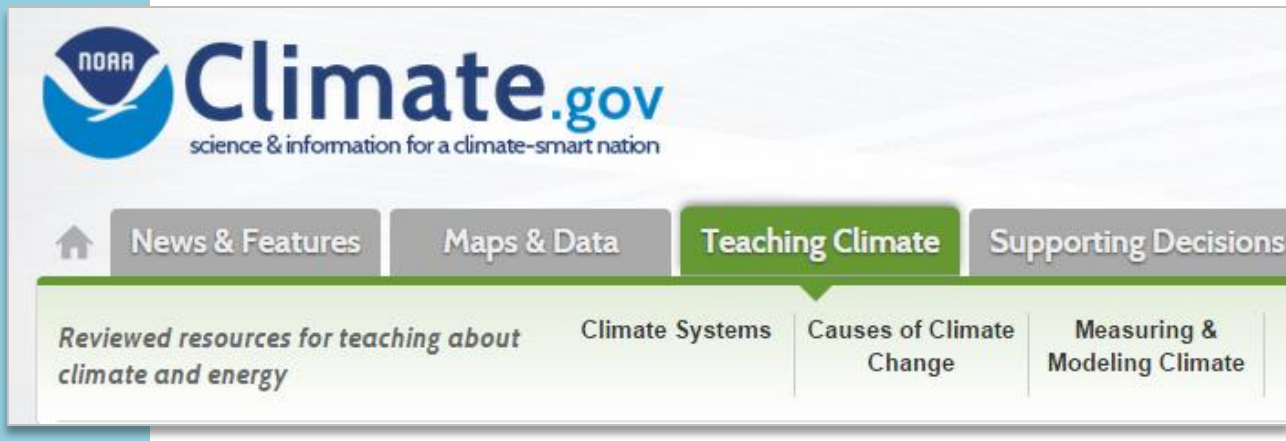
National Aquarium in Baltimore

National Science Teachers Association

NOAA's climate community supports a climate-literate nation and Next Generation Science Standards development and implementation

NOAA's Climate Program Office supported the development of comprehensive educational resources about climate, oceanic, and related sciences. Through partnerships, NOAA strives to facilitate a formal education system that produces climate-literate citizens by engaging participation from education policymakers, academic and informal education institutions, professional associations, and teachers. Partnerships have been an important part of this effort as noted below:

1. As a key member of the climate literacy community, the NOAA Climate Program Office (CPO) supported the development of the Climate Literacy Framework (2006-2009). CPO also contributed to the National Research Council's Board of Science Education in the development of the "A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core ideas" (2010-2012) that led to the Next Generation Science Standards (NGSS) final version. NGSS included a significant amount of climate literacy-related standards. The Teaching Climate section of Climate.gov will support teachers as they prepare to teach the new standards.



Right: The Teaching Climate section of Climate.gov provides resources for educators that allow them to integrate climate literacy concepts into the classroom.

Education in Support of Climate Adaptation and Mitigation

Partners, continued:

NatureBridge
New England Aquarium
Science Education Resource Center at Carleton College
Tahoe Environmental Research Center
Towson University
United States Global Change Research Program
University of Delaware
University of Maryland Center for Environmental Science
University of Maryland College Park
University System of Maryland

2. The Climate Program Office partnered with the Climate Literacy and Energy Awareness Network (CLEAN) to significantly expand the Teaching Climate section of Climate.gov. The website now hosts an online collection of 584 scientifically and educationally reviewed climate education resources. These resources are presented in a highly searchable system mapped to climate and energy literacy essential principles and K-12 standards.

3. The Maryland and Delaware Climate Change Education, Assessment and Research (MADE-CLEAR) program, funded by the National Science Foundation, continued to be a key partner of the NOAA CPO in the Next Generation Science Standards development and implementation in Maryland and Delaware. MADE-CLEAR's primary goal is to build the partnerships among the states' research and teaching universities, public schools, federal agencies, and public and private sectors to support innovations in interdisciplinary preschool through graduate school climate change education. This goal was advanced by building new pathways for teacher education and professional development leading to expertise in climate change content and pedagogy, better communication of climate change science for public understanding, and using innovative outreach strategies that employ new technologies and informal education mechanisms.

Right: The MADE-CLEAR partnership is giving educators fresh ways to teach students about climate through workshops like the Climate Academy.

Education in Support of Climate Adaptation and Mitigation

Partners include:

American Meteorological Society

National Earth Science Teachers Association

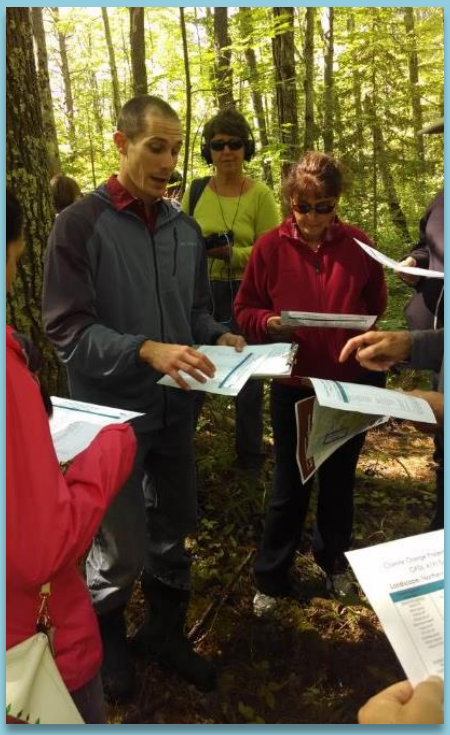
Northern Great Lakes Visitor Center

National Museum of the American Indian

National Science Teachers Association

Project Indigenous

United States Forest Service



Above: Climate Stewards Education Project provides products like digital badges that teachers can integrate into their curricula.

Center: Elementary students from New York participated in a stewardship project led by their teacher.

NOAA Climate Stewards Project for formal and informal educators continues to grow

NOAA Climate Stewards Education Project (CSEP) provided an array of professional development opportunities to increase understanding of essential climate concepts. In FY13, NOAA CSEP expanded to include over 200 educators in 46 states, the District of Columbia, and the United States Virgin Islands. The growth was assisted by the inaugural partnership with NOAA Fisheries to increase educator understanding of the effect of climate on the ocean and the Nation's fisheries through access to NOAA Fisheries' resources and scientists. Through direct interaction with scientists and education specialists, participants received instruction in the use of data resources, digital tools, and other innovative technologies and designed stewardship projects in their communities.

CSEP supported a collaborative online learning community to increase climate science knowledge and engage students in stewardship projects. Participants included educators from K-12 schools, community colleges, universities, and informal learning institutions, such as zoos and nature centers. In FY13, CSEP educators cumulatively completed over 1700 contact hours of professional development in climate change science and pedagogy via webinars, teleconferences, online tutorials, and face-to-face workshops. CSEP educators organized a two day traditional environmental knowledge workshop in Ashland, Wisconsin and gave formal presentations of their students' stewardship projects at national meetings of National Science Teachers Association and the American Geophysical Union.

Education in Support of Climate Adaptation and Mitigation

Partners include:

American Meteorological Society

American Museum of Natural History New York City

Collaborative For Urban Environmental Education at New York University

Colorado State University's Cooperative Institute for Research in the Atmosphere

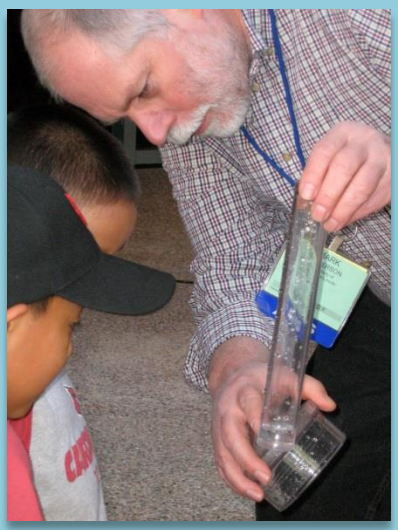
Institute for Learning Innovation

The Elumenati

Queens College, City University of New York

The Wallerstein Denver Museum of Nature and Science

WGBH Educational Foundation



Above: Mark Anderson of the University of Nebraska demonstrates how citizen scientists use rain gauges to measure precipitation.

Environmental Literacy Grants engage citizens in scientific research and learning

The practice of citizen science offers the opportunity to contribute to scientific understanding while enhancing the science literacy of participants. NOAA has a rich tradition of involving the public in its research. Citizen science methodologies have also been employed in Environmental Literacy Grant projects. These projects support NOAA's Climate Adaptation and Mitigation goal by providing participants with authentic learning experiences designed to broaden participants' understanding of weather and climate and advance their response to weather and climate impacts.

- The "Capitalizing on Technological Advancements to Expand Environmental Literacy through a Successful Citizen Science Network" project supported the Community Collaborative Rain, Hail, and Snow (CoCoRaHS) Network in aligning activities to Essential Principles of Climate Science and constructing training, data entry and visualization tools, cyberlearning tools, and hand-held device applications. This work impacts CoCoRaHS's growing community of over 15,000 volunteers that report over 300,000 measurements per month. Due to its success, CoCoRaHS received an award from the American Meteorological Society and was featured in a graduate-level course offered by the Citizen Science Academy.
- The "Into The Woods" project engages New York City Elementary teachers and their students in authentic environmental research to enhance understanding about the Earth System. A Science and Art Symposium hosted by the project featured 630 elementary school students, representing 10 schools from four boroughs, sharing information about their investigations.
- Through the "Environmental Literacy for All" project, NatureBridge, which has provided environmental science education to nearly one million K-12 students and teachers since 1971, is incorporating service learning citizen science activities into their programming. Their goal is to involve 60% of their field education participants in citizen science activities by the third year of the project. In 2013, these activities included a wide-range of projects-such as crayfish tagging, the California King Tides Initiative, snow surveys, the Marine Protected Area Watch, phenology observations, phytoplankton bloom monitoring and a microplastic transect study.

Education in Support of Climate Adaptation and Mitigation

Partners include:

Climate Institute, Mexico

Dongguan Meteorology and Astronomy Museum, People's Republic of China

E. O. Wilson Biophilia Center

Fuzhou Science and Technology Museum, People's Republic of China

Galaxy Elementary School

Indiana University

Museo delle Scienze, Italy

National Museum of Marine Science & Technology, Taiwan

Science Central

South Florida Science Museum

Techmania, Czech Republic

Above: Beth Russell gives a Science On a Sphere demo to students participating in 8th Grade Science Day at the Earth System Research Laboratory, an annual event for Boulder Valley School District 8th graders.

NOAA's Science On a Sphere® Network, 100 spheres installed worldwide and growing

The Science On a Sphere® Collaborative Users Network represents one of NOAA's largest education networks with more than 115 science centers, museums, and aquariums from 19 countries and 28 states displaying NOAA's data every day. Science On a Sphere® (SOS) is a 6-foot diameter sphere onto which projections of modeled and real-time oceanic, atmospheric, terrestrial, and socio-economical data are made that provide intuitive ways to view global phenomena and relationships. The network institutions, reaching more than 50 million people every year, have SOS on public exhibit and provide education programs based on NOAA science. In FY13, 13 new spheres were installed including the 100th installation of SOS, which was completed at NOAA's headquarters in Silver Spring, Maryland.

In FY13, NOAA hosted the 5th international meeting of the sphere network at the Aquarium of the Pacific in Long Beach, California, which brought together over 100 educators, technologists, programmers, and scientists to share the latest advances in how the sphere enables understanding of global interconnections among the public. This project supports NOAA's goal of Climate Adaptation and Mitigation, where NOAA's mission becomes global. Visualizing and understanding NOAA's climate models is challenging. NOAA's SOS provides an intuitive and stunning way to view and understand global data. NOAA's Environmental Literacy Grants program supports the sphere Network through awards for sphere installations, development of cutting-edge science content for the sphere, and training for the educators who interpret the sphere for visitors. NOAA's Earth System Research Lab supports institutions with spheres by providing continuously updated datasets, new versions of the sphere software, and tech support. NOAA hosts face-to-face meetings of sphere users in which best educational practices and new sphere content are shared.

Education in Support of a Weather-Ready Nation

Above: A shelf cloud looms over Northwest Illinois.

Society is prepared for and responds to weather-related events

Here we highlight examples of how NOAA works strategically to convey weather information aligned with user needs to promote a Weather-Ready Nation (WRN). These advancements in weather education include new and updated tools to visualize and access environmental data, creative methods for building capacity and infusing weather-related safety information into schools, and a push to employ knowledge of social sciences to improve the effectiveness of weather education.

In order to comprehend the risks and increase resilience following severe weather-related events, individuals not only need access to clear, timely messaging on hazards, but also a baseline understanding of weather and associated hazards. Environmental literacy is an important component of building a Weather-Ready Nation: the devastating impacts of extreme events can be reduced through an improved understanding of hazards and how best to prepare for them. Environmental literacy plays a large role in helping the Nation prepare for and respond to environmental threats that affect safety, health, the environment, economy, and security.

Education in Support of a Weather-Ready Nation

Partners include:

American Red Cross
Centers for Disease Control
COMET® Program
Federal Alliance for Safe Homes
Federal Emergency Management Agency
Insurance Institute for Business and Home Safety
International Association of Emergency Managers

Right: NWS Meteorologists Alan Campbell and Ashley Wester spoke to 30 students ranging from fourth to seventh grades about severe weather safety and tropical cyclone formation and dangers. The camp was designed for children affected by disaster. Most of the children were survivors of Hurricane Katrina (satellite image above). After the talk, meteorologists opened up the floor for discussion to hear the children's stories about Katrina.

Right: Owlie Sykwarn is the NWS's go-to owl for severe weather science and safety information. Follow Owlie on Facebook or meet him in person at a NOAA/NWS education outreach event.

Building a Weather-Ready Nation: Better information for better decisions

In support of NOAA's Weather-Ready Nation initiative, the National Weather Service (NWS) conducted over 10,000 education and outreach activities that targeted schools and students. Through this work, NWS reached nearly half a million teachers, students, and school officials to make them aware of the importance of being ready, resilient, and responsive to hazardous weather and flooding.

In addition to providing educational programs on a large scale, NWS continued to improve methods for effectively communicating about weather-related hazards. These efforts include the introduction of the Owlie Skywarn educational safety program online and through social media.

Education in Support of a Weather-Ready Nation

Partners , continued:

National Emergency Management Association

National Environmental Education Foundation

National Weather Association

Plan!T NOW

The Weather Channel

United States Geological Survey

Right: Meteorologist David Hotz interacts with fourth-grade students at the Tennessee Aquarium via the Internet from the NWS office in Morristown, Tennessee.

Elementary, middle, and high school students are a key audience of NWS outreach events because they play an influential role in communicating preparedness information to their families. Students can help bridge technological and cultural gaps, which is especially helpful in families that speak more than one language or where English is not the primary language. Educating students through the National Weather Service's school visit program and social media not only promotes environmental literacy, but also helps distribute weather safety information to parents and their communities.

Right: Bill Martin, Science and Operations Officer at NWS in Glasgow, Montana talks to students at the Fort Peck Reservation Earth Day event about how the National Weather Service gets data through satellites, radar, and observations.

Education in Support of a Weather-Ready Nation

Partners include:
ACE Info Solutions, Inc.
Cooperative Institute for Mesoscale Meteorological Studies

Severe Weather 101: The National Severe Storms Laboratory recharges weather education webpages

The National Sever Storms Laboratory's (NSSL's) Web team completed a major upgrade to the National Severe Storms Laboratory (NSSL) website to make weather information accessible to individuals and communities around the Nation.

The new and improved site included a redesign that allows it to be easily viewed on mobile platforms, an overhaul of the code, and a reorganization and major revision to bring the content up to date. Included in this accomplishment was a revamped "Severe Weather 101" education page designed to target an 8th grade reading level and address many of the frequently asked questions that come in to NSSL. Severe Weather 101 pages are the most popular, by far, on the NSSL website.

Right: The Severe Weather 101 website is designed to educate the general public about hazardous weather, including floods, tornadoes, and hail.

Education in Support of a Weather-Ready Nation

Partners include:

Cooperative Institute for Meteorological Satellite Studies at University of Wisconsin-Madison Space Science and Engineering Center

National Aeronautics and Space Administration Jet Propulsion Laboratory

National Environmental Satellite, Data and Information Service takes the pulse of the planet

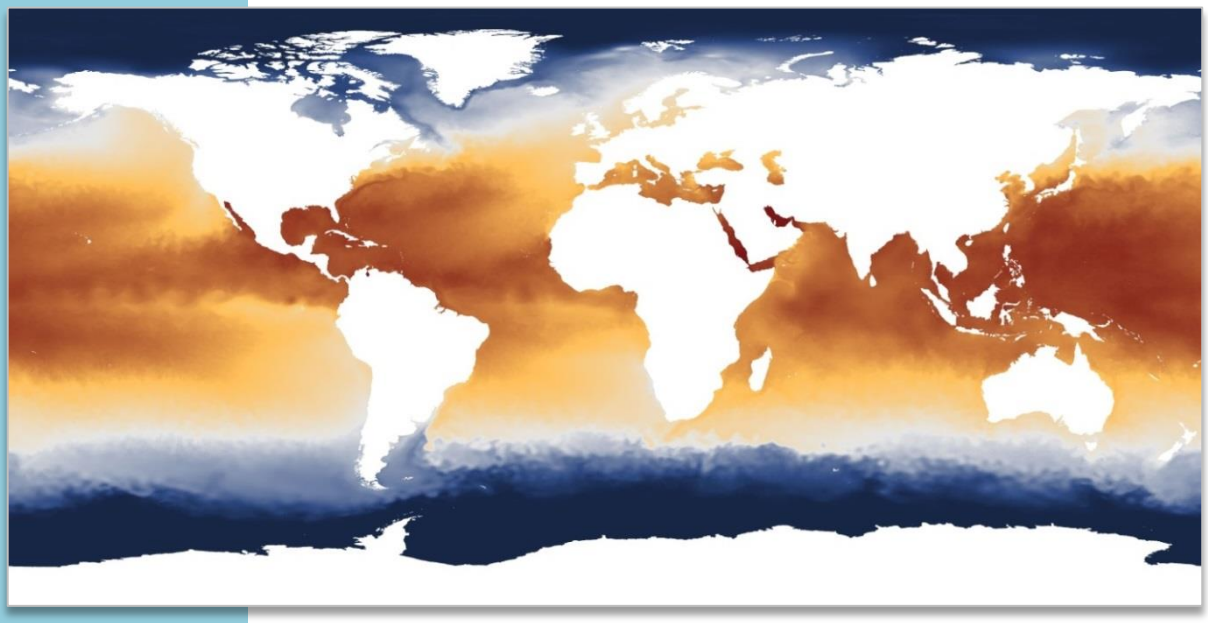
National Environmental Satellite, Data and Information Service (NESDIS) education contributes to a Weather-Ready Nation by providing the remote sensing and observations that underpin reliable forecasting. NESDIS' successful communication of its observations, systems, and technologies raises public awareness and understanding of NOAA. NESDIS promotes remote sensing, climate, and atmospheric sciences through websites and data visualizations. In addition, NESDIS supports community-based public education activities.

In FY13, the 2013–2018 NESDIS Education Strategic and Implementation Plan was published and is currently available online. These documents outline NESDIS' approach and commitment to educate the American public and increase environmental literacy. This unified and strategic approach supports the Agency's goal of a Weather-Ready Nation.

Right: The NESDIS Education Implementation Plan outlines how satellite data will be used in education.

Education in Support of a Weather-Ready Nation

NESDIS also launched NOAA View, an online data visualization tool using satellite data that gives the public, educators, media, academia, and stakeholders throughout the Nation interactive access to NOAA environmental data, enabling unique views of the world's oceans, land, atmosphere, cryosphere, and climate.



Above: Global sea surface temperatures in NOAA View. NOAA View uses best practices for data visualization and allows users to select variables and time frames of interest.

In addition to the NOAA View tool, mobile Apps, activity books, and games illustrating the use of satellite data and information were developed through collaboration with one of our partners. These successful education and outreach resources educate students, teachers, and the general public about meteorology, space science, earth-observing satellites, weather phenomena, and the benefits that earth-observing satellites provide to society by supporting forecasts and advanced warnings of weather events in order to protect life and property.

Right: Resources like this Hazards Quiz illustrate the use of satellite data in interactive educational programs.

Education in Support of Healthy Oceans

Above: NOAA Teacher at Sea Sue Cullumber photographed this Atlantic common dolphin swimming along side NOAA ship *Gordon Gunter*.

Marine fisheries, habitats, and biodiversity sustained within healthy and productive ecosystems

Education lays the groundwork for building trust and collaboration within communities that use marine and estuarine resources. Education efforts also leverage the special places that NOAA manages, including National Marine Sanctuaries and National Estuarine Research Reserves. Here we highlight NOAA's education activities that support Healthy Oceans by sharing examples of enhancing ocean literacy through partnerships, engaging educators, and building understanding of watersheds that impact marine resources.

NOAA's goal of Healthy Oceans requires managing and understanding ocean resources and the habitats that support them. Ocean literacy is a foundation for maintaining healthy oceans because it helps stakeholders and the public understand the research and science behind management decisions. Ocean literacy includes an understanding of complex connections among organisms, physical processes, and cultural and economic factors. Therefore, a strong understanding of ocean and estuarine ecosystems supports NOAA's approach to management.

Education in Support of Healthy Oceans

Above: NOAA Teacher at Sea Rob Ulmer uses a winch to cast a CTD (conductivity, tempurature, & depth sensor) from NOAA ship *Rainier*.

Right: NOAA Teacher at Sea Eric Velarde (right) helps sort catch during a sea scallop survey on board R/V *Hugh R. Sharp*.

Above: NOAA scientist and mentor Jodi Pirtle holds a lumpsucker fish caught during a pollock survey on board NOAA ship *Oscar Dyson*.

Teachers from around the United States receive hands-on ocean research experience with world-renowned NOAA scientists

NOAA gives teachers from around the Nation insight into oceanographic, hydrographic, and fisheries research by sending them to sea alongside premiere NOAA researchers. In 2013, 35 NOAA Teacher at Sea participants performed over 490 days of research at sea, and more than 650 program alumni, from every state, used NOAA science and data in the classroom, reaching thousands of students.

NOAA's Teacher at Sea Program provides authentic research experiences for kindergarten- through college-level teachers from around the United States aboard NOAA ships conducting scientific research. Successful communication of NOAA science comes from the close partnership between teachers and NOAA scientists. In FY13, the program also enhanced its alumni association activities and science communications efforts through the use of online technology and engaging teacher-created educational products. Our teachers say their "enthusiasm for the experience and the subject matter are exponential" and their "excitement will be apparent back in the classroom as well."

Education in Support of Healthy Oceans

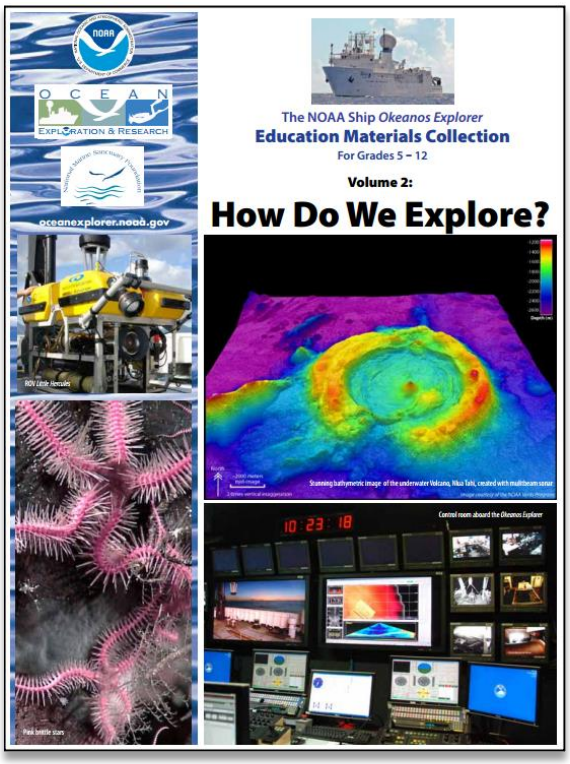
Partners include:

Aquarium of the Pacific
Audubon Aquarium of the Americas
Birch Aquarium at Scripps Institution of Oceanography
Dauphin Island Sea Lab
Georgia Aquarium
Hawaii Institute of Marine Biology
National Aquarium in Baltimore
New England Aquarium
Oregon State University Hatfield Marine Science Center
Pacific Science Center
San Diego County Office of Education
Seattle Aquarium
Seattle Times Newspapers In Education
Shedd Aquarium
South Carolina Aquarium
University of South Florida
Waikiki Aquarium

Right: NOAA designed a collection of educational materials to enable educators to engage students in ocean exploration through the real voyages of the NOAA ship *Okeanos Explorer*.

Educators learn to integrate the how to's of ocean exploration in the classroom

NOAA's Office of Ocean Exploration and Research conducted a national rollout of the second volume in the NOAA ship *Okeanos Explorer* Education Materials Collection entitled, *How Do We Explore?* The collection provided lessons for educators of middle and high school students and built on the unique exploration capabilities and assets of the Nation's only ship dedicated to ocean exploration.



The national rollout was delivered in concert with a series of professional development trainings designed to engage educators. At aquariums throughout the Nation, educators learned about strategies used to explore the ocean and advanced technologies that enable NOAA to collect new data, imagery, and communicate discoveries in real-time with explorers around the globe. Educators learned how to use expedition-based lessons; multimedia, Web-based classroom resources; and live video feeds from the ship at sea in their classrooms.

These new materials and associated professional development supported the National Research Council's Framework for K-12 Science Education, which influenced the development of the Next Generation Science Standards, integrating the practices of science and engineering into core standards.

Education in Support of Healthy Oceans

Bay Watershed Education and Training program restores watershed ecosystems

NOAA's Bay Watershed Education and Training (B-WET) program funds hands-on, experiential learning opportunities. In FY13, NOAA B-WET grantees conducted environmental restoration projects with students and educators in communities around the country. These activities also aligned with regional restoration policy efforts such as the Great Lakes Restoration Initiative, the Gulf of Mexico RESTORE Act, and the 2009 Chesapeake Bay Executive Order.

Examples include:

- Gulf of Mexico B-WET supported education related to habitat restoration through Louisiana State University's Coastal Roots program. Through this multiyear program over 10,000 students have grown over 91,000 native seedlings in school-based nurseries and later planted those seedlings to restore coastal habitat.
- Northeast B-WET supported the Cohasset Center for Student Coastal Research, which partnered with NOAA Restoration center sites including Parker Avenue Cut Restoration Project to conduct high school student research, maintenance, and monitoring.

Right: Students in the Louisiana State University Coastal Roots Program prepare seedlings for planting.

Education in Support of Healthy Oceans

Partners include:

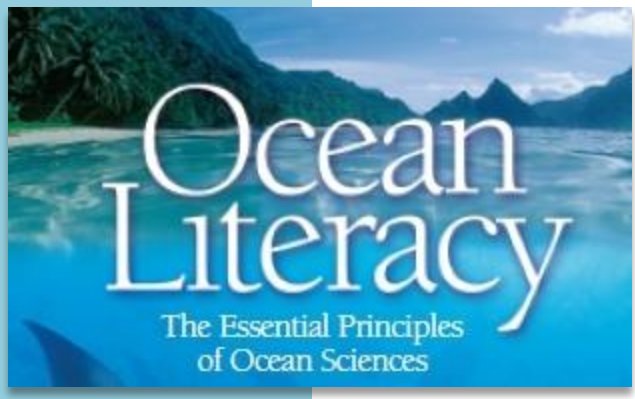
United States-European Union Science and Technology Joint Consultative Group on Transatlantic Cooperation

Ocean Exploration and Research engages international partners in ocean literacy

NOAA's Office of Ocean Exploration and Research (OER) took ocean literacy to the international level through its participation in the United States-European Union Science and Technology Joint Consultative Group on Transatlantic Cooperation. Achieving a healthy and sustainable ocean requires enhanced understanding of its diverse ecosystems among scientists, resource managers, policymakers, and stakeholders at local, regional, national, and international levels. Working toward ocean literacy on a global level requires robust coordination and collaborations across multilateral nations and states.

OER participated in The Atlantic – A Shared Resource organized by the European Commission and the Marine Institute in Galway, Ireland and the Transatlantic Ocean Literacy Workshop in Plymouth, England. The role of ocean literacy in advancing their research and coordination objectives was formally recognized. Ocean literacy is now explicitly stated in advancing the agenda of The Galway Statement on Atlantic Ocean Cooperation Launching a Canada-European Union-United States of America Research Alliance, signed in Galway, Ireland in May, 2013 by representatives of the European Union, Canada, and the United States.

Right: The principles of ocean literacy were integrated into The Atlantic – A Shared Resource.



Education in Support of Healthy Oceans

Partners include:

National Association for Interpretation

The Alaska SeaLife Center

The Florida Aquarium

The Monterey Bay Aquarium Foundation

NOAA's Environmental Literacy Grants builds educator capacity in aquariums to interpret NOAA sciences

For the past several years, NOAA's Environmental Literacy Grants (ELG) program has made targeted investments with the nation's accredited, non-profit aquariums that have further enabled the education and docent staff to incorporate and accurately interpret NOAA science in school programs. Since 2005, the ELG program has provided 24 awards totaling more than 13.5 million dollars in federal funding to 15 aquariums. The project supports NOAA's Healthy Oceans goal through meaningful capacity-building experiences designed to help informal science educators more effectively understand and communicate challenging ocean topics.

One major project that was funded by ELG and began in FY13 was the "Building Ocean Awareness Together (BOAT): Interpreting Challenging Ocean Issues", a collaborative effort among the Florida Aquarium, the Monterey Bay Aquarium, and the Alaska SeaLife Center. The project has increased the effectiveness of 252 informal science educators in and around Alaska, California, and Florida to promote public understanding of three complex topics that impact the ocean (oil spills, ocean acidification, and energy literacy) and encourage stewardship of ocean and coastal resources. Groups of educators developed, assembled, and produced online training toolkits, all of which were widely disseminated to the aquarium, science center, and museum community. Each toolkit utilized NOAA multimedia content, data visualization products, literature, expertise, and other relevant resources. Project participants – who interacted with a diverse mix of local, regional, national, and international visitors, including underserved local populations – provided enhanced training content for their colleagues through guide/interpreter training, a workshop, presentations at conferences, and online networks.

Below : Jeff Dillon, Alaska SeaLife Center interpreter, uses new approaches learned from the BOAT project to engage Girl Scouts in Anchorage, Alaska.

Education in Support of Healthy Oceans

Partners include:

American University's Center for Environmental Filmmaking

Jean-Michel Cousteau's Ocean Futures Society

Meridian International Center

The Global Learning and Observations to Benefit the Environment (GLOBE) Program

University of California, Santa Barbara's Marine Science Institute.

Right: High school student, Victor of Florida, gets immersed in the living classroom of NOAA's Channel Islands National Marine Sanctuary during the Ocean for Life field study.

Ocean for Life program cultivates ocean advocates and students interested in STEM

Ocean for Life brought together Middle Eastern and United States high school students of diverse cultures and backgrounds to study ocean science, cross-cultural engagement, and the power of visual storytelling. The program used one of America's National Marine Sanctuaries as a living classroom and during the summer of 2013, fostered 30 students to become ocean advocates, as well as enhanced these students' interest in science, technology, engineering, and math (STEM) education and careers. Extensive evaluations of Ocean for Life have demonstrated lasting positive effects on the student participants, their classmates, schools and local communities in terms of increased ocean awareness, conservation, stewardship, and enhanced cultural understanding.

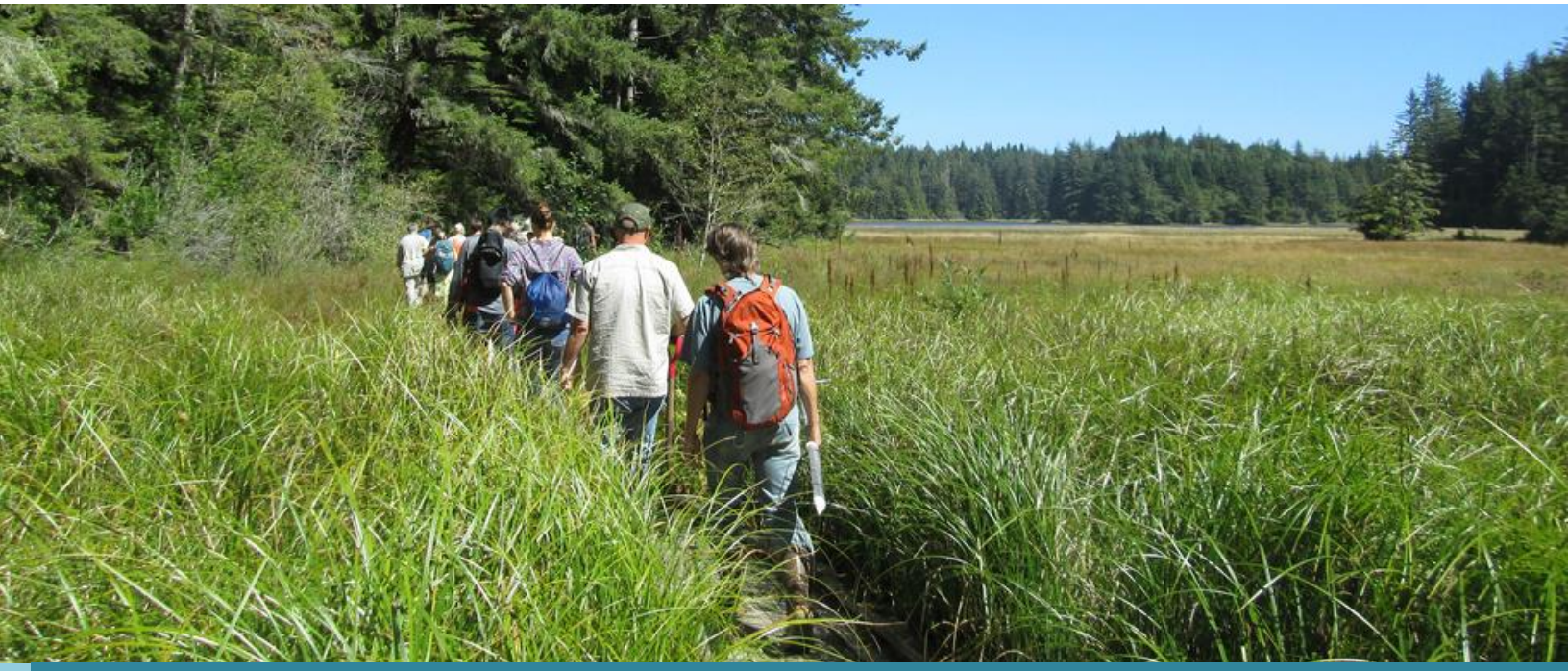
Ocean for Life is a unique program that promotes cultural understanding and acceptance in the context that we are one world connected by one ocean. The program was sculpted around three main themes: 1) sense of place, 2) interconnectedness, and 3) ocean conservation and stewardship. The 2013 Ocean for Life students gained a sense of place by learning about the temperate Pacific Ocean off the coast of California, the kelp forest ecosystem, and the marine life found within NOAA's Channel Islands National Marine Sanctuary. Students participated in several stewardship activities, such as beach cleanups and sand crab monitoring.

Education in Support of Healthy Oceans

The Ocean for Life students acted as ambassadors and mentored local elementary and middle school students about the issues of plastic pollution and marine debris. At the end of the field study, each student developed an Ocean for Life Action Plan highlighting how they planned to enhance cultural understanding and increase ocean conservation and stewardship at their schools and in their local communities. Participants also showed a 40% increase in “strongly agreeing” that they have plans to pursue studies or a career related to ocean or environmental science as a result of the Ocean for Life program.

The year 2013 marks a total of 115 students from 17 countries in the Greater Middle East, Europe, Australia, Canada, and locations throughout the United States who are now all Ocean for Life alumni and ambassadors of change. By sharing their experiences with others around the globe, they are laying the foundation for a safer, more tolerant society and a healthy, more sustainable world.

Right: Ocean for Life students mentor elementary school students during one of their stewardship activities off the coast of California.



Education in Support of Resilient Coastal Communities and Economies

Above: Scientist Craig Cornu follows a group of middle and high school science teachers to a sampling location at Hidden Creek marsh, one of the sentinel sites at the South Slough National Estuarine Research Reserve in Oregon.

Coastal and Great Lakes communities are environmentally and economically sustainable

In this section, we highlight NOAA Education programs that established and maintained creative and innovative partnerships to promote community resilience. These programs provide professional development, leverage special places for hands-on learning opportunities, and enable citizen involvement in coastal stewardship.

Achieving NOAA's goal of resilient coastal communities and economies is challenging, given the increasingly complex interdependence of human and environmental systems. Environmental literacy serves as a cornerstone of resilient communities by enhancing understanding of environmental change and the implications of decisions that take place at the local level. NOAA works to provide environmental information that promotes environmental and economic sustainability in coastal and Great Lakes communities.

Education in Support of Resilient Coastal Communities and Economies

Partners include:

McIntosh Academy Science Club

National Estuarine Research Reserves blur the lines between students and scientists

NOAA's National Estuarine Research Reserve System (NERRS) continued to coordinate and sustain a network of teachers, students, scientists, restoration specialists, and other community members that help ensure the health of our nation's estuaries. Participants were engaged in meaningful hands-on activities which provided investigative and problem solving experiences, and learning in real world ecological practices. Approximately 3000 volunteers and 84,000 students participated in activities that seemed, at times, to blur the lines between "students" and "scientists".

Right: Students from the McIntosh Academy Science Club in Georgia help bag oyster shell needed to help stabilize an estuarine bank.

Education in Support of Resilient Coastal Communities and Economies

Students examined the physical and chemical aspects of the estuary, removed invasive plants, planted native species, surveyed plant, animals and other organisms, cruised the water of the estuary, and put all of it into the context of using data in the classroom. Programs were conducted in a coordinated way between scientists and educators to provide teachers, students, and volunteers with meaningful hands-on activities.

Below: Student volunteers use reclaimed oyster shell to stabilize a "living shoreline" in the Sapelo Island National Estuarine Research Reserve.

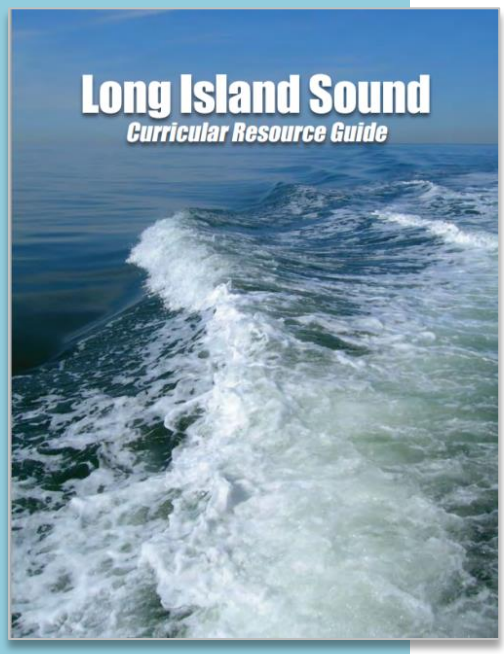
For example, after attending one of the Sapelo Island NERR's education programs in Georgia, a local school's science club decided to help the reserve in its efforts to promote alternative ways to stabilize estuarine bank. A partnership was developed between the reserve's education coordinator, research coordinator, and the McIntosh Academy Science Club. The McIntosh Academy Science club bagged reclaimed oyster shell for one of the reserves "Living Shorelines." This type of stabilization not only eliminates structures that could be detrimental to the health of the salt marsh, but serves both as a way to recycle oyster shell that may otherwise go into a county land fill. This type of stabilization greatly increases biodiversity and introduces no man-made toxins from industrial sources. By collaborating with a local school science club to bag oyster shell, the Sapelo Island NERR saved an estimated $1,500 in labor costs and provided the students with valuable experience learning about and working in wildlife and habitat conservation.

Education in Support of Resilient Coastal Communities and Economies

Partners include:
United States Environmental Protection Agency

Long Island Sound Mentor Teacher Program enhances marine literacy for Connecticut students through educator training

Connecticut Sea Grant's Long Island Sound Mentor Teacher program enabled teachers who incorporate Long Island Sound watershed and coastal ecosystem concepts into their curriculum to share their expertise with peers. The series of 24 workshops utilized 26 mentor teachers to reach more than 300 formal and informal K-12 educators, and through them, a self-reported over 13,500 students in 65 Connecticut cities, towns, and regional school districts. A subset of the mentor teachers also collaborated with Connecticut Sea Grant to produce the Long Island Sound Curricular Resource Guide as a means to share their expertise more widely.



Above: Long Island Sound Teacher Mentor Program provides curricular resources and workshops for teachers **(right)**.

The Curricular Resource Guide contains background information, activities, lesson plans, science lessons for a field site, and other resources. Available in English and Spanish, the document is correlated to National Science Education Standards, Connecticut Science Frameworks, New York Science Standards, and Ocean Literacy Essential Principles. Through informal feedback, several teachers who participated in the workshop reported that they now bring their own students to the shores of Long Island Sound to undertake some of the activities they learned. The Long Island Sound Teacher Mentor Program was funded in partnership with the United States Environmental Protection Agency Long Island Sound Study.

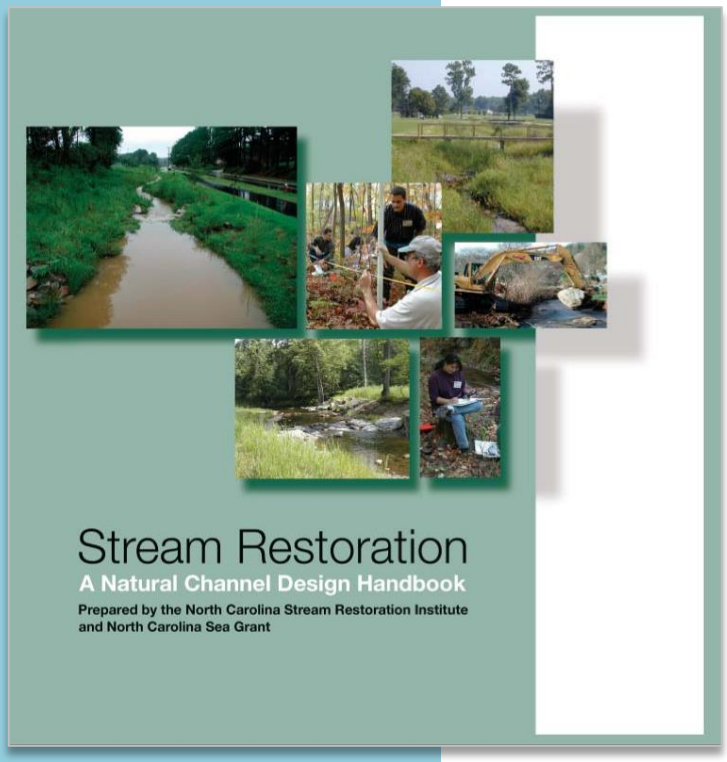
Education in Support of Resilient Coastal Communities and Economies

Partners include:
North Carolina State University

Sea Grant Education program improves stream restoration

North Carolina State University faculty and North Carolina Sea Grant (NCSG) developed a comprehensive education program to evaluate and demonstrate technologies and teach professionals how to accomplish stream restoration objectives effectively. The Stream Restoration Program involved a team of faculty, staff, and students working to improve water quality and aquatic ecology through research, demonstration projects, and education. The program included a series of River Course workshops in which more than 5,000 professionals learned about stream assessment, design, construction, and monitoring. Together with North Carolina State, NCSG provided leadership for the biennial Southeast Stream Restoration Conference, regularly attended by more than 500 practitioners, government officials, and academics. As a result of that training, more than 60 grant-funded projects across the state demonstrate and evaluate stream restoration practices in a variety of watershed conditions.

Below: North Carolina Sea Grant Stream Restoration Program provides resources for professionals.



By training professionals, the Stream Restoration Program has made a tangible impact on the environment. The quality of stream restoration projects in North Carolina has improved in the past decade as professionals have gained increased understanding of stream restoration principles and applications. Funding for projects has increased as resource agencies have determined that previous projects are successful in meeting water quality and habitat goals. Ecosystem mitigation policies have also been adjusted based on outcomes of this program to meet restoration goals.

Education in Support of Resilient Coastal Communities and Economies

Partners include:

Erie Times-News

Below: The Pennsylvania Sea Grant-supported Newspaper in Education offers regional environmental information to Erie Times-News readers.

Reconnect with your environment

Free workshop will cover planning for watersheds

Act now: limited supply

Hydrologic water cycle must be safeguarded

yourspace

Students plead with residents to keep neighborhood clean

This page brought to you by:

Sea Grant Pennsylvania

pennsylvania Coastal Resources MANAGEMENT PROGRAM

Newspaper in Education increases citizen involvement in protecting the Pennsylvania Lake Erie watershed

Pennsylvania Sea Grant (PASG) staff leads the Coastal Resource Management-funded Erie Times News-Newspaper in Education (NIE) project to educate students and citizens about water quality, invasive species, climate change, and other coastal zone issues. During the school year, PASG staff produced 34 full pages in the Erie Times-News, which provided 6,000 students and 135,000 potential Erie Times-News readers per issue with up-to-date scientific information, articles, photos, teacher lesson plans, and other materials. As a result of the project, attendance at several workshops was filled; two local businesses installed rain gardens; volunteers were recruited for the Weed Warriors program, tree planting programs, and Pennsylvania Lake Erie Coastal Cleanup; and PASG staff were invited to give presentations related to environmental topics.

The Erie Times-NIE "Learn about your environment project" proved to be an effective communication tool for PASG and other NOAA-supported programs by filling a void and reaching a market that was interested in gaining a better understanding of how their environment works and what they could do to make it better. Stories that often would otherwise not be told got local citizens to take action at their schools, and where they work, live, and play.

Education in Support of Resilient Coastal Communities and Economies

Partners include:

Environment Canada

United States Army Corps of Engineers

United States Geological Survey

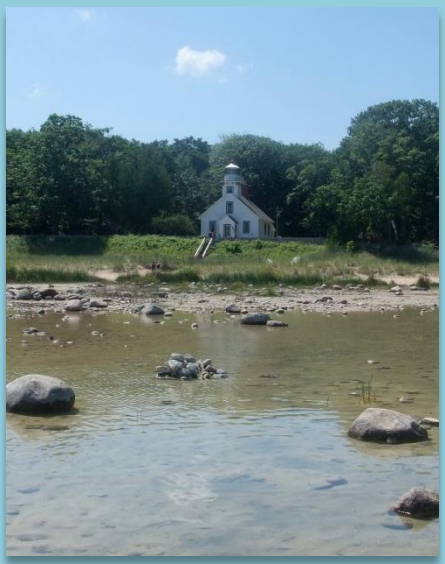
Interactive online tool developed for viewing water levels on the Earth's largest lakes

NOAA's Great Lakes Environmental Research Laboratory (GLERL) developed the Great Lakes Water Level Dashboard, a novel, dynamic, Web-based, interactive software tool that allows the general public to view historical water level data and forecasts over different time scales. This tool builds scientific literacy by allowing the public to understand the larger environmental and climatological context around a major regional resource, enabling them to understand the past and plan for resiliency.

GLERL's monitoring, analysis, and forecasting of the Great Lakes water budget (including precipitation, evaporation, ice cover, and water temperature) improved understanding of how regional changes in climate and meteorology drive water level fluctuations, and how they led to record-low water levels in the winter of 2012-2013. GLERL communicated that understanding to regional stakeholders and to the general public through a series of public forums and media events (including an appearance on NBC Nightly News), and through the Great Lakes Water Levels Dashboard. GLERL's Great Lakes water level research leveraged a strong collaboration with other NOAA Line Offices (including National Ocean Service Center for Operational Oceanographic Products and Services, responsible for maintaining the 53 United States Great Lakes water level stations; and National Climate Data Center, responsible for reporting daily meteorological station data) and with the United States Army Corps of Engineers, the United States Geological Survey, and Environment Canada.

Right: Athol Springs, New York during a seiche on Lake Erie, April 11, 2013. The yellow pillars are part of the town's boat ramp.

Below: Low water in front of the Mission Point Lighthouse, Grand Traverse Bay, Lake Michigan.



Education in Support of Resilient Coastal Communities and Economies

Bay Watershed Education and Training program explores estuaries

The Bay Watershed Education and Training (B-WET) classroom is the local environment. B-WET projects conduct meaningful watershed educational experiences (MWEEs), bringing students and teachers outside for sustained, place-based field experiences in their local watersheds. MWEEs include student and teacher field activities in local wetlands. Program evaluation demonstrates that these field experiences positively influence student engagement and local watershed stewardship. With 2013 funding B-WET reached an estimated 76,000 students and 1,900 teachers through competitive funding for 81 new and ongoing projects. B-WET projects leveraged the resources and expertise of the National Estuarine Research Reserve System (NERRS), local estuary partnership organizations, and relevant state agencies, while positively influencing student engagement and local watershed stewardship.

Below: Teachers learn about water quality monitoring with the Lake Superior National Estuarine Research Reserve.

Examples include:

- Great Lakes B-WET has funded a project led by the region's new National Estuarine Research Reserve, the Lake Superior NERR. They were awarded both 2012 and 2013 funds for their innovative Rivers2Lake educational program, which forms the core of the NERR's educational offerings and was developed based on a MWEE model. They have reached hundreds of students, including a cohort of teachers from the Fond du Lac Ojibwe School. The St. Louis River, home to the Lake Superior NERR, is listed as an United States Environmental Protection Agency Area of Concern.
- Pacific Northwest B-WET supported education programs related to major estuary restoration projects in Oregon and Washington. B-WET grantees conducted education related to restoring Puget Sound in cooperation with the Puget Sound Partnership. Additionally, B-WET funded the Lower Columbia Estuary Partnership and South Slough NERR.

Education in Support of Resilient Coastal Communities and Economies

Bay Watershed Education and Training program engages underserved audiences

Above: Students check out a shark while exploring the San Francisco Bay estuary aboard the R/V *Robert G. Brownlee*

Bay Watershed Education and Training (B-WET) experiences are for all. The B-WET program continued its strong commitment to expanding the knowledge and participation of low income and underserved student populations and the teachers who serve them. Many B-WET-funded projects bring students and teachers in Title 1 and other underserved, underrepresented, and minority-serving schools into the field. Specific audiences targeted include Native American tribes, native Hawaiian Islanders, Hispanic or Latino populations, and both urban and rural underserved communities.

Examples include:

- California B-WET supported Mira Vista School, a low-income, urban elementary school, with a school-wide action project to reduce the amount of plastic debris flowing into their watershed. Students used scientific process skills to study their local creek, the San Francisco Bay, and ocean habitats, both in the classroom and in the outdoors. The Mira Vista School project inspired students in this underserved community to protect and restore their watershed and help increase academic achievement.

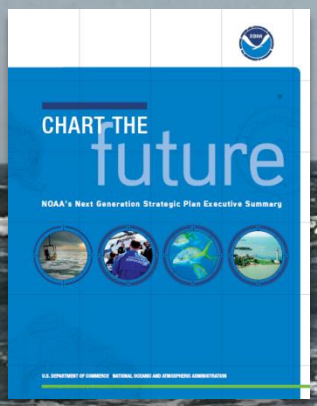
Above: Miloli'i Opelu Project in Hawaii educates communities about traditional fishing methods.

- The Miloli'i Opelu Project in Hawaii engaged an entire community to disseminate traditional ecological knowledge in support of local fishing and hazard resilience.
- Chesapeake B-WET supported the Living Classroom Foundation's School Leadership in Urban Runoff Reduction Project (SLURRP), a project-based learning experience created specifically for Baltimore City students and the largely impervious environment in which they live. SLURRP allows students to work within their own neighborhoods to investigate this important urban environmental issue, and empowers them to positively impact their schoolyards and communities.

NOAA Education Goal 2: Workforce Development

A future workforce, reflecting the diversity of the Nation, skilled in science, technology, engineering, mathematics, and other disciplines critical to NOAA's mission.

Accomplishing NOAA's mission requires an inclusive, diverse, and effective workforce that reflects the communities it serves. The America COMPETES Act mandates NOAA to build on its historic role in stimulating excellence in the advancement of ocean and atmospheric science and engineering disciplines, and in providing opportunities for the pursuit of academic studies in science, technology, engineering, and mathematics (STEM) fields. These efforts span the entire scope and breadth of NOAA sciences – oceans, coasts, Great Lakes, weather, and climate – to expose students to career options and foster interest and excellence throughout students' education.



Across the Agency, NOAA invests in intellectual capital by providing scholarship and research opportunities to promising, early-career scientists. Workforce development also means beginning earlier in the educational pipeline. Engaging students and exposing them to career options not only builds environmental literacy, but also encourages career exploration.

We highlight four stories organized under the NOAA Next Generation Strategic Plan's (2010) enterprise-wide objective directed at promoting career pathways and building expertise in the next generation of NOAA's workforce.

Diverse and constantly evolving capabilities in NOAA's workforce

Education in Support of Workforce Development

"My experience thus far has given me confidence in what I want to do as I move forward in developing my career goals. These goals align with NOAA's mission to provide services to mitigate and adapt to a changing climate. I am excited to take the first few steps to building a successful and fulfilling career path."

- Olivia Poon, EPP Scholar

Above: Front row, left to right: Autumn Chong, Chanelle Stigger, Nishan Pressley, Olivia Poon; top row: Joshua Bailey, Ricky Dickson, Justin Shaifer.

Center: EPP Scholar Kelly Nunez Ocasio beside a NOAA P-3 Hurricane Hunter plane. Kelly participated in a hurricane reconnaissance flight during her internship with the Atlantic Oceanographic and Meteorological Laboratory in Miami, Florida.

Right: EPP Scholar Lawrence Walsh conducting fisheries research in the Gulf of Alaska during his internship with the National Marine Fisheries Service.

Educational Partnership Program continues to increase diversity and develop the next generation of scientists in NOAA mission fields

The Educational Partnership Program (EPP) supports four Cooperative Science Centers (CSCs) that involve 22 academic partners in 11 states, the District of Columbia, and Puerto Rico. The CSCs, based in minority-serving institutions, collectively graduated 113 students, including 53 bachelor's degrees, 33 master's degrees, 5 JDs and 22 PhDs. The CSCs also funded 80 collaborative research projects which support NOAA's Next Generation Strategic Plan and produced more than 185 peer reviewed publications.

In addition, EPP supported 11 graduating EPP Undergraduate Scholarship recipients who completed internships at NOAA facilities across many NOAA-related disciplines. Students report that this experience has helped them develop and pursue their career goals in tangible ways.

Education in Support of Workforce Development

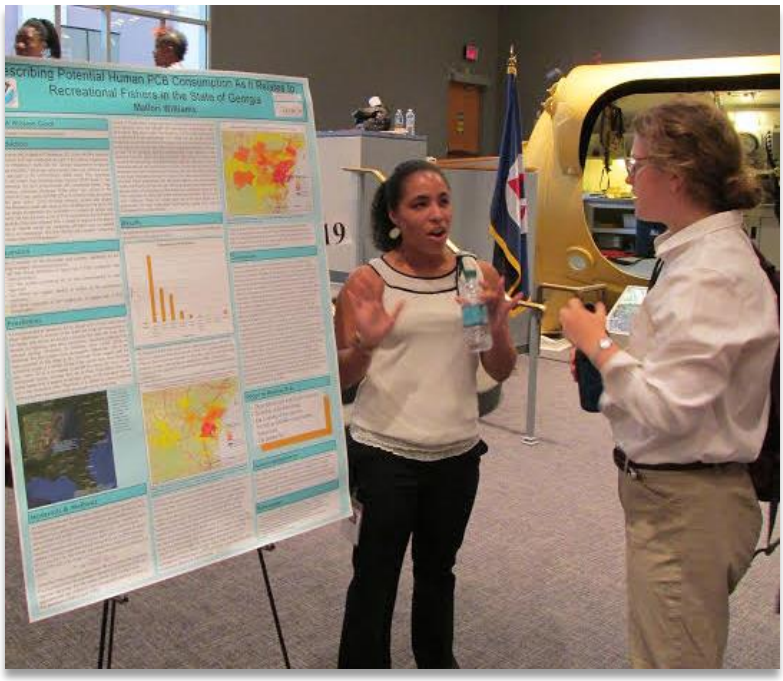
"This has been a fantastic internship all around. I managed my own project from start to finish, and developed real-world software that will be used long after I leave. Wherever I work in the future, it will be somewhere engaging and challenging, where I have the opportunity to affect positive and meaningful change."

- Kyle Nolan, Hollings Scholar

Hollings Scholarship Program continues to develop the next generation of scientists in NOAA mission fields

The Ernest F. Hollings Scholarship program provides successful undergraduate applicants with two years of academic assistance, a 10-week NOAA internship that provides "hands-on" experiences in NOAA-mission science, technology, and educational activities, and a NOAA mentor. In 2013 NOAA welcomed the incoming class of 125 Hollings Scholars including students from 32 states and 84 universities. NOAA provided summer internship experiences for 115 students from the class of 2012.

These students were involved in projects that span the range of NOAA sciences, including fisheries, environmental modeling, climate impacts, and more. Also in 2013, NOAA graduated 102 students from the class of 2011. Students report that it is a rewarding experience to take ownership of a research project from start to finish and make a significant contribution to NOAA-mission sciences.



Above: Hollings Scholar Ashley Gordon conducts fisheries research during her summer internship at the James J. Howard Marine Sciences Laboratory in Sandy Hook, New Jersey.

Right: Hollings Scholar Mallori Williams presents the research project she conducted during her summer internship at the Science and Education Symposium in Silver Spring, Maryland.

Education in Support of Workforce Development

Partners include:

3D GameLab
Boise State University
MacArthur Foundation
Mozilla

Below: Planet Stewards utilizes quest-based learning games to help students build competency in NOAA-related sciences, including climate, weather, oceans, and freshwater topics.

NOAA launches Planet Stewards Digital Badges for high school students

Led by the National Ocean Service education team, NOAA partnered with 3D GameLab at Boise State University to create NOAA Planet Stewards, a personalized high school competency-based curricular experience. The NOAA Planet Stewards Digital Badge effort completed a content review, pilot testing, and launched nationally to educators from across the country. A series of training webinars provided background in the wealth of NOAA resources available to teachers as they implemented this new tool into classrooms during the 2013-2014 school year. The badging system included 190 badges tied to NOAA science content and encourages career exploration for students.

NOAA is committed to pursuing innovative approaches and partnerships that deliver science content to students in relevant and engaging media. This effort was developed through funding from the Digital Media and Learning Competition: Badges for Lifelong Learning, sponsored by Mozilla and the MacArthur Foundation. Using NOAA's science content and 3D GameLab's game-based learning platform, students choose among Web-based quests, earning experience points, levels, and badges to demonstrate achievements in weather, climate, coastal, and ocean science in 15 NOAA career pathways. This new career resource was targeted to high school students and supported NOAA's education strategic plan in workforce development and science education.

Education in Support of Workforce Development

Partners include:

Association for Unmanned Vehicles

Office of Naval Research

United States Naval Academy

Working across federal agencies in support of ocean education

The NOAA Office of Ocean Exploration and Research joined forces with the United States Naval Academy (USNA), the Office of Naval Research, and the Association for Unmanned Vehicles to design the NOAA/SeaPerch Remotely Operated Vehicle (ROV) Ocean Exploration Workshop for Educators.

Educators received SeaPerch Build Kits and hands-on instruction from the USNA to build SeaPerch ROVs. OER staff taught educators to use standards-based classroom lessons that convey how ROVs are used in ocean exploration. Educators not only took their new mini ROVs, but also their new knowledge about real-world applications for these technologies back to classrooms to stimulate students' interests in the ocean workforce and other science-, technology-, engineering-, and math-based careers. This collaboration creatively leveraged elements of existing programs to provide teachers with a professional development opportunity related to ocean exploration.

Below: Educators build SeaPerch Remotely Operated Vehicles in a professional development program. Through this training, teachers can integrate ocean exploration into their classrooms.

Acknowledgements

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Paula Keener
Office of Education (OEd), K-12 and Informal Education
Christos Michalopoulos
OEd, Educational Partnership Program and Student Opportunities
Marlene Kaplan

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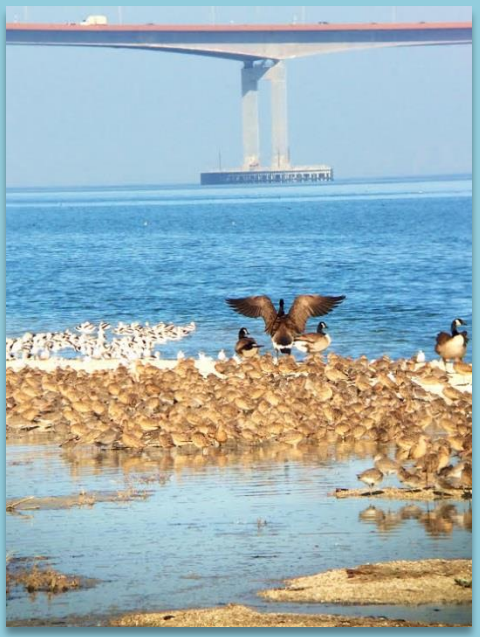

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