

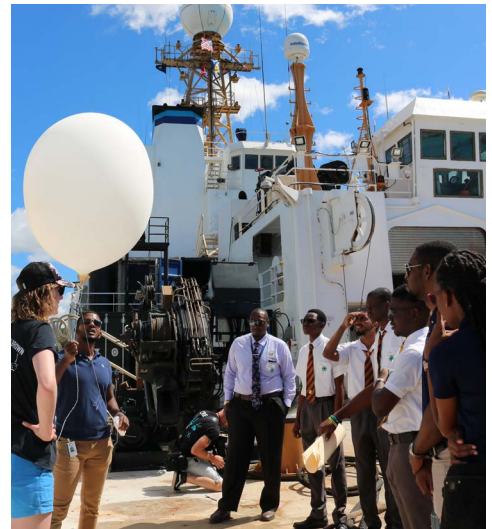


National Oceanic and Atmospheric Administration  
U.S. Department of Commerce

Fiscal year 2020

# NOAA Education Accomplishments Report

Advancing NOAA's mission through education



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# From the Director

## Friends of NOAA Education,

On behalf of the NOAA Education community, I'm pleased to present our 2020 Accomplishments Report. This report highlights the important role that education played in meeting NOAA's mission of science, service, and stewardship throughout an unprecedented year.



The year 2020 marked NOAA's 50th anniversary. We were proud to celebrate our agency's heritage, although some of our plans and celebratory events were dramatically shaped by the global COVID-19 pandemic. Like many organizations across the nation, we transitioned our in-person education programs to virtual formats, and I am inspired by the creativity and dedication that the NOAA Education community showed during this difficult time. In this report, we share a mix of old and new, celebrating our programs' long-term successes alongside examples of novel approaches and unexpected changes.

As we navigated through the pandemic, our nation once again heard a call to action to end the ongoing racism that permeates our country. I, along with the NOAA Education community, have heard this call many times, and we take our commitment to diversity and inclusion seriously. Our educators and partners work hard to break down the barriers that many Black, Indigenous, and other people of color face in the fields of science, technology, engineering, and math. We strive to empower students to take action and make changes in their schools and communities while inspiring others to do the same. This renewed nationwide focus on equity coincided with the release of our updated NOAA Education Strategic Plan, which was published in January 2021 with an emphasis on breaking down systemic barriers. I am proud of the work that NOAA does to create more equitable and inclusive education programs, but I recognize that there is more work to be done.

In this report, we introduce you to an education program in Alaska that has been bringing in young students to learn about ocean creatures for five decades, a citizen science project that now engages over 20,000 volunteers around the country in gathering crucial weather data, and dozens of programs that changed directions mid-year in response to the pandemic. We highlight the NOAA Diversity and Professional Advancement Working Group and many of our other ongoing efforts to create more equitable and inclusive education programs. These efforts show the depth, breadth, and resiliency of the NOAA Education community.

In these extraordinary times, we deeply appreciate the contributions of our partners and the people we serve. Without innovative organizations, talented students, and passionate educators, we would not be able to accomplish so much in support of NOAA's mission. We look forward to what the future will bring in the years to come.

Sincerely,

*Louisa Koch*

Louisa Koch  
Director of NOAA Education

# Introduction

## Advancing NOAA's mission through education

The [National Oceanic and Atmospheric Administration](#) (NOAA) is a scientific agency that observes and predicts conditions in our ocean and atmosphere. From daily weather forecasts to long-term climate monitoring and from fisheries management to marine commerce, NOAA provides communities, decision-makers, and people across the country with the information they need when they need it.



High school students demonstrate how to use a remotely operated vehicle for younger students at the 20th Annual Seagrass Awareness Festival in Gulf Breeze, Florida, in early March 2020. This work was supported by the Gulf of Mexico Bay Watershed Education and Training program. (Anne Laurenzi)

Education extends NOAA's role in environmental research, forecasting, management, and protection. The complex task of improving economic and social well-being through Earth science would not be possible without an engaged public. It is not enough for NOAA to study the ocean and atmosphere; our agency must also educate so that individuals can use this information to support robust economies, resilient communities, and healthy ecosystems.

NOAA takes an "all hands on deck" approach to education. Our educators and partners work in different offices, programs, states, and even countries, covering topics that span from the surface of the sun to the depths of the ocean. NOAA Education reaches preschoolers through retirees both inside and outside the classroom. We rely not only on full-time educators, but also on scientists, resource managers, and others who volunteer their time to share their expertise and passion for their work.

We continue to strengthen this community of educators within NOAA. The community is connected through the

[NOAA Education Council](#), which is composed of representatives from education programs throughout the agency. It is our forum for coordinating efforts and developing new ideas. The council learns from NOAA educators and partners while providing leadership and support to the NOAA Education community.

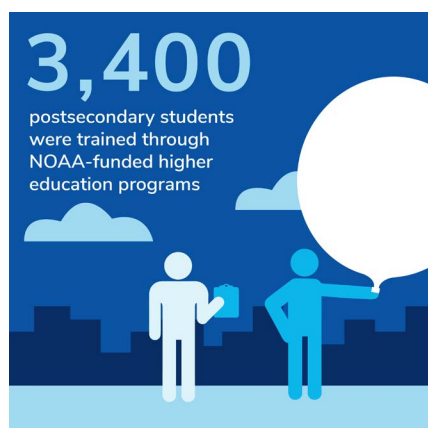
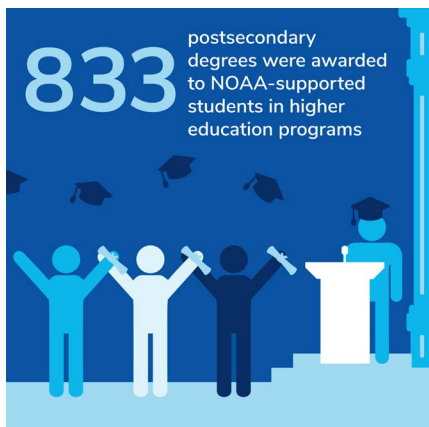
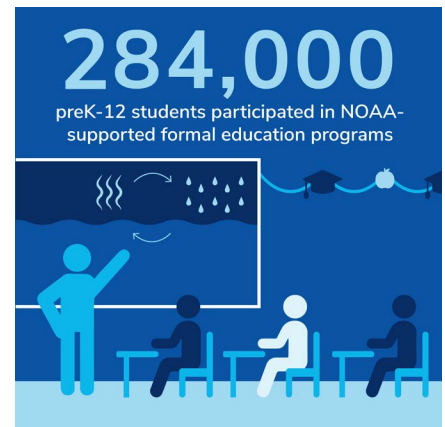
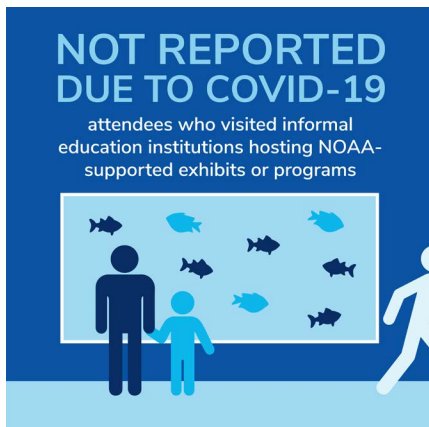
In January 2021, the NOAA Education Council released an updated [Education Strategic Plan](#). In this guiding document, we outlined five goals and supporting objectives that help us advance NOAA's mission through education. These 20-year goals give the NOAA Education community a shared focus across a wide range of activities.

To learn more about NOAA Education, please visit [www.noaa.gov/education](http://www.noaa.gov/education).

**Note:** Some images in this report were taken prior to face mask and social distancing guidelines related to the COVID-19 pandemic.

# NOAA educates people at every age and every stage

Each year, NOAA Education connects millions of people to Earth science. Our programs take place both inside and outside the classroom, reaching people of all ages. To quantify our impact, we collect information from the [NOAA Education Council](#). In 2020, these numbers were heavily impacted by the COVID-19 pandemic. With many in-person programs switching to virtual learning and partner institutions closing their doors to visitors, the NOAA Education Council worked hard to continue providing meaningful learning experiences to students and educators in a new virtual world. Though the numbers below look different from previous years, they capture the combined, extraordinary efforts of educators across the agency, spanning all of NOAA's mission areas.



# 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.*



Young students explore the pier at Santa Rosa Island in NOAA's Channel Islands National Marine Sanctuary in California. People of all ages come to Santa Rosa Island to learn about the sanctuary, the ocean, and all it has to offer. (Claire Fackler, NOAA Office of National Marine Sanctuaries)

## Overview

NOAA Education enables people to explore their environment, broaden their horizons, and seek solutions to environmental problems using science and technology. This year, we celebrate programs that have been helping students, educators, and the public develop a greater understanding of Earth and its varied systems for a decade or longer. These longstanding efforts have made significant contributions to science education and are cornerstones to NOAA's education portfolio.

## NOAA Fisheries celebrates 50 years of Sea Week with Juneau schools and students

In 1970, a student field trip to [Auke Bay Laboratories](#) to explore local marine life collected by NOAA divers kicked off the first year of Sea Week, a unique program started by parents and teachers in Juneau, Alaska. This initial visit grew into an annual week-long community program with hands-on activities, field trips, and classroom lessons that connect students with their local marine environment through interdisciplinary exploration.

In 50 years, Auke Bay Laboratories, part of NOAA Fisheries [Alaska Fisheries Science Center](#), has engaged 45,000 elementary school students during Juneau's Sea Week. Kindergarten through sixth grade students in the Juneau school district have gotten up close and personal with marine life in Auke Bay Laboratories'



A NOAA scientist at Auke Bay Laboratories in Juneau, Alaska, connects local students to marine life during one of the first Sea Weeks circa 1970. (Taylor Jarvis, NOAA Fisheries)

aquarium and touch tank to learn about NOAA science in laboratory spaces. Over 70% of the lab's staff join in to connect kids to marine science, from collecting invertebrates for the touch tanks to helping students control remotely operated vehicles. Auke Bay Laboratories now hosts over 1,200 students annually for Sea Week, which has expanded beyond Juneau to other Alaska communities. The program now also includes an Alaska Sea Grant-supported state-wide curriculum, [Alaska Seas and Watersheds](#).

Sea Week looked quite different in 2020 due to the COVID-19 pandemic. The Juneau School District adapted the Sea Week curriculum to focus on lessons that families could do on their own, helping students explore the marine environment while learning remotely.

## The Climate Literacy and Energy Awareness Network advances climate literacy for a decade

For years, educators have faced the challenge of helping their students stay informed while preparing youth to address the environmental and economic issues caused by climate change. However, until about a decade ago, there was no shared definition of climate literacy. In 2008, a community of leaders from across academia, federal agencies, and nongovernmental organizations came together to change this. They formed the [Climate Literacy and Energy Awareness Network](#) (CLEAN), an organization that educated the students who would come to be known as "the climate generation."

CLEAN worked with a variety of partners to identify essential principles and fundamental concepts of climate literacy. With National Science Foundation funding, a consortium of partners including the NOAA [Climate Program Office](#) used the [Climate Literacy](#) guide to develop the [CLEAN Collection](#), which provides essential curricula support for over 1 million science educators across the nation. "CLEAN is by far the most reliable resource for teachers," said one educator from New York.

CLEAN and the Climate Program Office also helped ensure that the 2013 Next Generation Science Standards incorporated significantly more information about climate change and climate science than previous standards. Now, these standards are guiding over 71% of the nation's classrooms and educators.

Since it began, CLEAN has won three prestigious awards, including the National Center for Science Education's "Friend of the Planet" Award. This year, the CLEAN website and NOAA [Climate.gov](#) brought in over 7 million visitors. By building lasting relationships with educators, CLEAN has created a vibrant community committed to advancing climate literacy into the next decade.



Community, business, and education leaders participated in a workshop at the 2018 Affiliate Event of the Global Climate Action Summit. At this forum, they showcased and explored models that built the capacities needed to assist communities and businesses in supporting place-based climate solutions. (Jim Callahan, Mobile Climate Labs)

## Educators jump feet-first into National Estuarine Research Reserve System science

NOAA's [Teachers on the Estuary](#) (TOTE) workshops celebrated 12 years of helping educators get their boots wet while exploring and learning about coastal habitats. The program gives formal and informal educators the opportunity to visit and learn about NOAA's unique "living laboratories" in the [National Estuarine Research Reserve System](#) (NERRS). During TOTE workshops, educators can be found wading through shallow water with a seining net, building remotely operated vehicles to learn about the estuary from an underwater perspective, exploring data from the NERR's unique [nationwide monitoring system](#), and learning how to bring these activities to life for their students.

Like all successful nationwide programs, TOTE's development took time. Educators from across the 29 research reserves worked together to



In 2008, a group of educators explored Taskinas Creek, part of the Chesapeake Bay National Estuarine Research Reserve in Virginia, by canoe as part of their Teachers On the Estuary workshop experience. (Sarah McGuire, Chesapeake Bay National Estuarine Research Reserve)

develop a framework for a system-wide educator professional development program based on data collected from surveys and needs assessments. In 2008, 13 high school teachers participated in the first TOTE workshop, which was held at the [Chesapeake Bay-Virginia NERR](#), in conjunction with the [Delaware NERR](#) and [Chesapeake Bay-Maryland NERR](#). TOTE is now a nationally implemented program with all 29 reserves hosting annual TOTE workshops. Since 2008, local scientists and experienced environmental educators have trained more than 2,356 educators. Educators consistently report that TOTE workshops are some of the best professional development opportunities they have had and that materials and resources from the workshop will be implemented in their classrooms. "It was such a different experience to be able to explore the local area and watershed instead of just listening to information," said one TOTE participant.

## Office of Ocean Exploration and Research partners facilitate educator professional development in the Pacific Islands

NOAA [Office of Ocean Exploration and Research](#) (OER) has shared the excitement of deep-sea exploration with educators through a national professional development program for nearly 20 years. This year, they brought the program to Guam and Saipan, two remote islands that have limited opportunities for students and educators to engage with the science of ocean exploration despite their proximity to water. OER [Education Alliance Partners](#) from the Waikīkī Aquarium and the Hawai'i Institute of Marine Biology traveled to Guam and Saipan to deliver valuable ocean education resources and virtual tools just before the COVID-19 pandemic began to spread worldwide.

The partners engaged 20 teachers in Saipan and, in collaboration with the Guam Department of Education and NOAA's [Office of Coastal Management](#), 38 teachers in Guam in a two-day immersive exploration of OER learning resources. During the workshops, teachers learned about recent exploration expeditions, discovered amazing image and video galleries, and explored archives of information on deep-sea organisms and ecosystems, many of which were in the Central and Western Pacific. Educators also received activity supplies to use with students in their classrooms.

Shortly after the instructional team returned, students started virtual learning as COVID-19 spread. Adapting quickly, the team hosted a virtual follow-up session for workshop participants. In addition, OER began creating a new, innovative online professional development mini-series focused on a variety of ocean exploration topics to continue connecting educators to this content. The teachers in Saipan and Guam join a cohort of over 11,000 educators across the country and in U.S. territories who have participated in OER professional development training.



Saipan educators participate in an ocean exploration professional development workshop in February 2020. (Hawai'i Institute of Marine Biology)



## Teacher at Sea Program provides hands-on research experience to educators for 30 years

Sailing aboard NOAA Ship *Oregon II* in 1990, Debora Mosher gained unique hands-on ocean research experience as NOAA's first Teacher at Sea. Since Mosher's voyage, some 850 formal and informal educators from all 50 states and three U.S. territories have participated in NOAA's [Teacher at Sea Program](#), immersing themselves in research on NOAA ships and enriching their classrooms through their experiences.

In July 2020, the Teacher at Sea Program celebrated its 30th anniversary by highlighting the work of their dedicated program alumni. Combined, these educators have spent more than 150,000 hours collecting data at sea in the past three decades, helping NOAA scientists track ocean chemistry, sample fish populations, chart coastlines for safe navigation, and more. Educators brought these experiences to life through engaging blog posts and

classroom curricula. With reduced access to science at his school, Justin Garritt, a 2018 Teacher at Sea, was excited to integrate the scientific data he collected at sea into math lessons. "I can't wait for my students at my school to picture themselves someday working as scientists with NOAA and solving our world's most important problems that involve our precious environment," said Garritt.

Educators continue to find creative ways to share their often life-changing experiences at sea with students, educators, and the general public years after they sail with NOAA through the Teacher at Sea Alumni Association. "I thank the entire staff of NOAA for introducing me to the beauty and wonder of the world," said Mosher. "I have been enriched, satisfied, and fulfilled with this experience."



For three decades, teachers from around the nation have assisted NOAA scientists in conducting vital research at sea through NOAA's Teacher at Sea Program. Key to their experience is learning how NOAA keeps crew and scientists safe. In this then-and-now comparison, teachers Virginia Figura (left) and Callie Harris (right) try on survival suits (nicknamed "gumby" suits for their shape) — 26 years apart. Figura sailed on now-decommissioned NOAA Ship *Miller Freeman* in 1993, while Harris sailed on NOAA Ship *Oscar Dyson* in 2019. (NOAA Teacher at Sea Program)

# 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.



At the Lake Champlain Sea Grant Watershed Educator Internship training in the fall of 2019, undergraduate students at the University of Vermont were trained on stream monitoring protocols as a part of the Watershed Alliance community science program. (Ashley Eaton, Lake Champlain Sea Grant)

## Overview

Everyone has a part to play in protecting our coastal and marine resources. NOAA Education works with communities to ensure that people have the resources to make informed choices that support the environment and take actions to protect the resources they care about. From cultural histories that reach back generations to newer technologies like virtual reality, the programs and events highlighted here show the wide variety of approaches that NOAA educators and our partners use to connect people to their environment.

## Lummi Nation prepares the next generation through *schelangen* and watershed education

In the Pacific Northwest, Lummi Nation has kept their *schelangen* (shuh-LANG-un; “way of life”) alive by transmitting their cultural knowledge, worldview, and traditions to the next generation. Watershed management is particularly important to the Lummi community because the abundance of one of their most culturally important food sources, salmon, depends on watershed health.

*Schelangen* is one of the Lummi’s oldest collections of data for knowing seasons, animals, and places. Since 2016, Lummi Nation has received five NOAA [Bay Watershed Education and Training](#) awards to support integrating traditional ways of teaching *schelangen* into the Lummi Nation School curriculum. This is accomplished through [Meaningful Watershed Educational Experiences](#), place-based experiential learning focused on investigations into local ecosystems that enable students and teachers to develop stronger relationships to their environment and community.

The Lummi Natural Resources Department engages 150-250 elementary school students annually at the Lummi Nation School in active stewardship of the environment and fosters leadership skills in natural resource management. Throughout the curriculum, students learn

the importance of the five C’s — cold, clean, and clear sediment-free water, as well as connected and complex river ecosystems — to salmon health. “The kids were vested in salmon. They learned so much from the interactive tank setup, and they were proud of the salmon,” said fourth grade teacher Alana Marshal. This project equips Lummi students to become the next generation of natural resource managers, empowering them to improve the environment and ensure the survival of their community and culture.



In 2019, Lummi Nation students engaged in Meaningful Watershed Educational Experiences and related stewardship activities, including measuring water quality, planting native plants to restore habitat, and raising salmon in the classroom for release in a nearby stream. (Paul Cline)

## NOAA Marine Debris Program hosts annual art contest

Marine debris is a global problem that touches every corner of our ocean and Great Lakes. Thanks to the NOAA [Marine Debris Program](#) annual [art contest](#), students have been raising awareness about this issue for the past decade. Each year, students in kindergarten through eighth grade from all U.S. states and territories are invited to submit artwork that demonstrates how marine debris impacts the ocean and the Great Lakes and what they can do to help prevent it.

The 2020 art contest received more than 500 entries from students in 23 states, the Commonwealth of the Northern Mariana Islands, and the U.S. Virgin Islands. Thirteen winners were featured in the [2021 Marine Debris Calendar](#).

Third grader Selina S. from the Commonwealth of the Northern Mariana Islands was one of the winners of the 2020 contest. “Imagine if we were the animals, and we were getting trashed by the people, it will hurt. So [we’ve] got to treat the fishes the way we want to be treated,” said Selina, whose artwork boldly proclaimed the ocean creatures’ thoughts about marine debris with the word “BAD” as the center of her piece.

Since 2011, the Marine Debris Program has released 10 calendars featuring creative artwork and messages about marine debris. Faced with a problem so large, the Marine Debris Program art contest shows that students can make a meaningful impact by raising awareness in creative ways.



This artwork by Selina S., a third grader from the Commonwealth of the Northern Mariana Islands, was one of the winners of the 2021 Annual NOAA Marine Debris Program Art Contest. (Selina S., NOAA Marine Debris Program Art Contest)

## NOAA Planet Stewards equips educators and students with resources to become environmental stewards

Over a decade ago, formal and informal educators at nature centers, aquariums, and museums were looking for ways to build communities that are prepared to respond to environmental challenges. After participating in numerous conversations with these groups, two educators from the [National Ocean Service](#) realized there was a need to increase educators' and students' environmental literacy through hands-on and distance learning. In 2010, they formed [NOAA Planet Stewards](#), a program that has grown to offer webinars by nationally known scientists, a book club, regional workshops, and the popular bimonthly newsletter, "The Watch."

Now, Planet Stewards directly engages over 20,000 formal and informal educators across the United States and around the world through its programs and bimonthly newsletter. The program has distributed over 195 environmental stewardship grants, funding

projects ranging from a school-wide composting program in Athens, Georgia, to coral reef restoration in the Florida Keys. By participating in these stewardship activities, over 31,000 students have gained a deeper appreciation of their environment on a local and global scale.

NOAA Planet Stewards has enabled educators and students to become leaders in their communities as they gain a deeper knowledge and appreciation of their environment by providing access to current science, professional development opportunities, educational resources, and funds to carry out hands-on projects. One educator stated, "NOAA Planet Stewards has helped me integrate the impacts of climate change on our world and made me conscious in everything I do to practice sustainability and teach it to others every day."



Students from South Plantation High School take a photo after a day learning science and conducting stewardship at Hugh Taylor Birch State Park in Fort Lauderdale, Florida. Students explored ecosystems, canoed through natural and historic waterways, collected and analyzed water quality samples, and carried out a beach cleanup. (Jody Berman)

## Virtual reality technology allows everyone to immerse themselves in national marine sanctuaries

What began as a set of 360° photographs from eight national marine sanctuaries has grown into a collection of videos and educational resources that take viewers on a virtual dive to explore our sanctuaries' hidden treasures. Whether you want to observe thriving underwater forests, immerse yourself in bustling coral reefs, see whale breeding grounds, or investigate shipwreck sites, these normally hard-to-reach marine habitats can now be easily explored from the comfort of your home.

NOAA recently released four virtual reality (VR) videos in the [Sanctuary 360° series](#) that can be viewed on VR headsets, phones, tablets, and computer screens. Viewers are able to explore a vast variety of marine life, ecosystems, and maritime history at [Florida Keys](#), [Channel Islands](#), [Hawaiian Islands Humpback Whale](#), and [Thunder Bay](#) national marine sanctuaries without getting

wet. Since its release, the VR website has attracted more than 204,000 visitors, making it the Office of National Marine Sanctuaries' most visited webpage.

In an effort to help educators and parents to further engage students in ways that also align to best practices in science education, the NOAA [Office of National Marine Sanctuaries](#) partnered with [Ocean First Education](#) to create [lessons](#) that complement each VR video. The lesson plans, which have brought in over 2,100 web visitors, teach middle school students about ocean literacy and national marine sanctuaries and are aligned to the Next Generation Science Standards. Through the VR videos and lessons, almost anyone can explore our national marine sanctuaries, our ocean's most treasured places.



People everywhere can now immerse themselves in national marine sanctuaries through virtual reality. (Greg McFall, NOAA)

# Goal 3

## Ready, Responsive, and Resilient

*Individuals and communities are informed and actively involved in decisions and actions that improve preparedness, response, and resilience to challenges and impacts of hazardous weather, changes in climate, and other environmental threats monitored by NOAA.*



In May 2019, a group of volunteers gathered at Canyon del Oro High School in Arizona to install a rainwater garden. This is one example of eight similar projects at Tucson-area schools funded by NOAA's Environmental Literacy Program in which students developed rainwater garden plans with assistance from staff from Arizona Project WET and the Watershed Management Group. (Sarah Schoedinger, NOAA)

## Overview

In 2020, the United States experienced [16 weather and climate disasters](#) and a [record-breaking Atlantic Hurricane season](#) that resulted in over \$1 billion in losses. After each event, communities came together to rebuild lives, strengthen physical infrastructure, and improve policies — all of which depend on public engagement. NOAA Education programs help people build the foundation of understanding that will enable them to be ready, responsive, and resilient to future environmental hazards.

## Volunteers play critical roles in monitoring precipitation across the nation and beyond

In 1997, a major flood swept through Fort Collins, Colorado, and caused significant damage to neighborhoods and the campus of Colorado State University. In response, state climatologist Nolan Doesken decided to explore ways to collect data about the storm to better inform the city for the next extreme weather event. Doesken quickly realized that members of the community wanted to help with these efforts and eventually formed the [Community Collaborative Rain, Hail, and Snow Network](#) (CoCoRaHS). Since then, citizen scientists from Colorado and across the country of all ages and backgrounds have been measuring precipitation and reporting high-quality, accurate data.

In 2020, there were over 20,000 active weather observers, making CoCoRaHS the largest source of precipitation observations in our nation.



As CoCoRaHS volunteers, these brothers observe a rain gauge, which is a measurement tool used to collect precipitation data. (John McLaughlin, NOAA)

Supported in part by two NOAA [Environmental Literacy Program](#) grants, the network now reaches all 50 states and three U.S. territories.

Collectively, CoCoRaHS volunteers have logged [over 50 million observations](#). Researchers, local governments,

farmers, and educators are among those who use the data to help communities become aware of their local precipitation patterns and learn how to appropriately respond to weather and climate hazards. “To me, the most unique thing is all the different types of people who are out there measuring the rain in their backyard. It could be anyone from a third grader to a professor of meteorology. You just never know, but they’re linked together in this cool way of measuring precipitation,” said one CoCoRaHS volunteer.

## The National Weather Service JetStream website provides reliable weather education

Daily forecasts from the [National Weather Service](#) (NWS) play an important role in our lives. To stay informed, it is helpful to understand basic meteorological concepts from a trusted source. This is what motivated now-retired NWS employee Dennis Cain to create [JetStream: An online school for weather](#). Educators, emergency managers, and anyone interested in learning about the wonders and dangers that abound in the Earth’s atmosphere can do so through the comprehensive and colorfully illustrated curricula offered on JetStream.

The idea began in 1987 when Cain assumed the persona of “Professor Weather” and began giving educational presentations at science conferences. After Cain spoke with countless teachers about the value of having class-

room-friendly weather and safety materials, he used his presentations as the basis to create the JetStream website, which officially debuted in 2003.

Over the past 17 years, JetStream has been used as a resource to help educate the public on basic meteorological concepts. As technology and communications capa-

bilities have improved over the years, JetStream has become a critical NWS source for weather science, safety, and educational content. Today, JetStream has classroom learning modules that cover a wide variety of topics, as well as free lesson plans and activities. This resource is recognized by educators across the country and brings in over 1 million web visitors per year.



Retired National Weather Service meteorologist Dennis Cain — also known as “Professor Weather” — demonstrated an ocean motion activity about wind-driven currents for students in 2013. (Jeannine Montgomery, NOAA)

## NOAA Environmental Literacy Program publishes theory of change for community resilience education

What does a resilient community — one that's prepared to thrive in the face of weather- and climate-related hazards — look like? NOAA's new [Community Resilience Education Theory of Change](#) explores this question while articulating the value of informal and formal education in this emerging field. Complete with intriguing illustrations, the theory of change shows how community resilience goes beyond the realm of civil engineers and city planners, empowering all members of society to develop the environmental literacy necessary to make informed decisions about the environmental challenges they face.

The report, published in July 2020, communicates the overarching philosophy guiding NOAA's [Environmental Literacy Program](#) grant investments. Informed by a review of relevant literature on environmental literacy, climate literacy, community science literacy, social-ecological resilience, and environmental justice,

it lays out education and community engagement pathways, including over 100 outcomes, that lead to community resilience. The report also provides the first definition of "community resilience education."

The theory of change is being used by a variety of audiences, including government agencies and philanthropic organizations, to address their specific needs. The Environmental Literacy Program will use it to guide future funding decisions and evaluation efforts, while grant applicants will use it as a resource as they develop their projects. Anyone working to build community resilience to environmental hazards may find the theory of change helpful for shaping, refining, and articulating the need for their own programs. The theory of change will remain a work in progress, and as the field grows, new and refined pathways and outcomes will be integrated into the document.



In this illustration, the goals of NOAA's Community Resilience Education Theory of Change are brought to life through a portrayal of the future. It includes all of the major institutional players, such as museums, aquariums, Kindergarten through 12th grade schools, universities, and other educational and community-based organizations that are involved in community resilience education. It also depicts the key approaches that have been identified as effective. Here, children, youth, and adults are learning together and directly engaged in activities that improve the resilience of their community. (NOAA Office of Education & Jessica B. Bartram, licensed under CC BY-NC-SA 4.0)

# Goal 4 Future Workforce

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



Oregon Sea Grant 2019 summer scholars enjoy an afternoon at Beverly Beach State Park north of Newport, Oregon. (Tiffany Woods, Oregon Sea Grant)

## Overview

NOAA Education has a long legacy of inspiring the marine biologists, meteorologists, educators, and other professionals of tomorrow. Our programs introduce young students to NOAA careers and prepare emerging professionals for the workforce, focusing on equity and inclusion at every step along the way. After all, when NOAA's workforce mirrors the composition of the communities we serve, we can better carry out our mission.



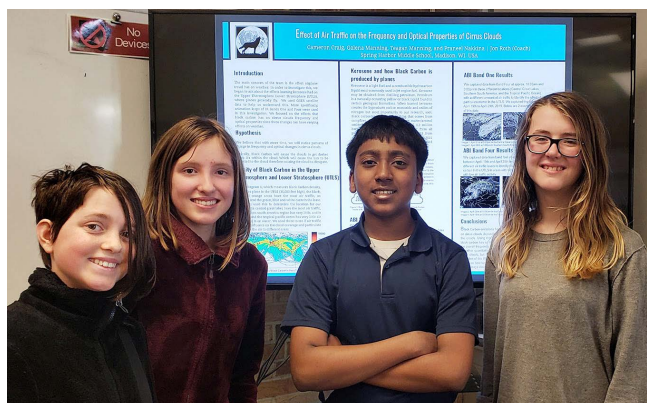
## Students design science projects using NOAA satellite data from the nation's most advanced fleet of geostationary weather satellites

When NOAA launched the two latest satellites in the [Geostationary Operational Environmental Satellites](#) (GOES) series, an expanded treasure trove of data became available to weather forecasters and researchers worldwide. These satellites provide data with more detail and faster coverage than ever before. Thanks to the [GOES-16/17 Virtual Science Fair](#) for pre-college students, data from these satellites is also being used by some of the youngest audiences.

The NOAA [Cooperative Institute for Meteorological Satellite Studies](#) (CIMSS) debuted the GOES-16/17 Virtual Science Fair in 2019. At this nationwide virtual science competition, students worked in small teams to design projects that use the GOES 16/17 satellite data to investigate weather or natural hazards. Each team shared their project through a scientific poster and a short video presentation.

In its first year, the Virtual Science Fair received nine submissions from four different states. The winning team members received an official NOAA invitation to a satellite launch at Kennedy Space Center in Florida. In 2020, CIMSS retooled the science fair guidelines to enable

students to participate remotely and submit solo projects. “The Virtual Science Fair serves as an important pipeline to NOAA’s future workforce by engaging students in real-time data and requiring them, with help, to share their projects in a universally recognized scientific format,” said Margaret Mooney, the education director at CIMSS.



A team from Spring Harbor Middle School in Madison, Wisconsin, presented their poster, “Effect of Air Traffic on Frequency and Optical Properties of Cirrus Clouds,” at the 2019 GOES 16/17 Virtual Science Fair. (Jon Roth, Spring Harbor Middle School)

## Lab tours inspire the next generation of Great Lakes scientists

Each year, students from Michigan universities swap their lecture halls for a day in a laboratory — something that the [NOAA Great Lakes Environmental Research Laboratory](#) (GLERL) and the [Cooperative Institute for Great Lakes Research](#) (CIGLR) have been hosting for over a decade. Students spend a day touring these labs to learn about Great Lakes science, explore aquatic instrumentation in action, and see how autonomous vehicles provide information on key weather and water conditions throughout the Great Lakes. Along with sharing their research, scientists offer guidance to students about pursuing careers in science.

In the past 10 years, the CIGLR/GLERL tours, now led by the [Engagement, Career Training, and Outreach Program](#), have brought in 400 students. This year, because of the COVID-19 pandemic, CIGLR/GLERL provided a virtual live tour in which staff members showed students their research buoys, autonomous vehicles, and other field equipment. Students were also able to tune into a laboratory and see researchers using sediment cores to understand [hypoxia](#) (low levels of dissolved oxygen) in Lake Erie.

So far, five students who visited on a tour have gone on to join NOAA through the CIGLR/GLERL [Great Lakes Summer Fellows](#) program, and others have joined the NOAA workforce. One Eastern Michigan University student said, “This visit made me aware of some of the research-oriented careers that can be pursued.” Whether engaging in person or virtually, tours offer a day of discovery and inspiration for students and staff alike.



Eastern Michigan University limnology students attended presentations and a tour at the NOAA Great Lakes Environmental Research Laboratory. (NOAA Great Lakes Environmental Research Laboratory)

## The inaugural class of Sea Grant’s Community Engaged Internship offers research experience to undergraduates from diverse backgrounds

In 2020, [Sea Grant](#) launched the [Community Engaged Internship](#), a new program to recruit, retain, and engage undergraduate students from communities that are underrepresented in science, technology, engineering, and math (STEM) fields, including Indigenous communities. The interns participate in place-based research, extension, education, and communications projects. In the coming years, the internship program is expected to broaden participation in marine and coastal professions by providing training and mentorship to the next generation of scientists, decision makers, and citizens.

This summer, the inaugural cohort of the Community Engaged Internship program included 30 interns from 21 different state Sea Grant programs. Due to COVID-19 safety concerns, the intern-

ships were adapted to a virtual setting. Within the cohort, interns connected virtually to participate in professional development opportunities and network with each other. In addition, they received mentorship from Sea Grant professionals and Sea Grant [John A. Knauss Marine Policy Fellows](#).



Honour Booth, an intern with the Haystack Rock Awareness Program and Oregon Sea Grant’s 2019 summer scholars intern, looks at fertilized clam eggs under a microscope. Every summer, Oregon Sea Grant places undergraduates from around the U.S. with Oregon-based federal and state agencies and nongovernmental organizations in paid internships. The Oregon Summer Scholars program was offered as a Community Engaged Internship program opportunity in 2020. (Ellie Buchanan, Oregon Sea Grant)

“This internship helped me realize that hard work and hope can bring a whole lot of change,” said David Martinez Vasquez, an intern with Michigan Sea Grant. Based on the success of the inaugural class of the Community Engaged Internship, Sea Grant hopes to continue to develop and build on relationships with national, state, and local organizations through the internship program and support students as they champion traditional and local knowledge.

## The future is bright: National Weather Service provides unique opportunities for students to join the workforce

Through volunteer programs and paid internships, the [National Weather Service](#) (NWS) has been dedicated to investing in the future workforce and providing valuable early-career experiences to students since the early 1970s. Students have had opportunities to volunteer at weather forecast offices, river forecast centers, national centers, and regional and national headquarters. Though the technology, science, and nature of the work have changed in the years since the first students entered NWS future workforce programs, the opportunity to experience working for the NWS remains invaluable today.

NWS supports student training through volunteer programs like Student Career On-Site Training (SCOuT), which gives students the opportunity to spend time at a variety of offices to experience diverse meteorological careers, learn basic

operations, and familiarize themselves with computer systems and everyday activities. Tyler Harrington, the first student in the SCOuT Program, said, “My experience in the program was incredible. I learned so much about the Weather Service, and I got to connect with meteorologists from across the country.” The NWS also supports students through the [William M. Lapenta NOAA Student Internship Program](#), which pairs college students with NWS scientists. Each intern is hosted by a local NWS forecast center, regional office, or prediction center during their 10-week position. This year, 62 students completed their internships virtually.



Two student volunteers prepare to launch a weather balloon at the National Weather Service forecast office in Albany, New York, in 2000. (National Weather Service)

Steven Cooper, the former NWS Southern Region Director, joined the NWS as an undergraduate student volunteer in 1979 and, since then, has enjoyed over 40 years of service. “The future is bright,” he said, “and the quality of the people coming into this agency is amazing.”

## The José E. Serrano Educational Partnership Program with Minority Serving Institutions supports NOAA’s mission and candidates for a future STEM workforce

For the past 20 years, the [José E. Serrano Educational Partnership Program with Minority Serving Institutions](#) (EPP/MSI) has provided unique educational and professional development opportunities to over 4,000 students through scholarships, fellowships, and internships. A federal STEM education program, EPP/MSI has developed a pool of highly qualified, diverse candidates to support NOAA’s mission and the NOAA mission enterprise.

Since its inception in 2001, the program has funded over 1,200 undergraduate students, over 500 master’s students, and over 300 doctoral degree recipients. The program is currently providing financial support for 278 postsecondary students. From 2003-2019, the EPP/MSI Cooperative Science Centers supported 54% of African Americans who graduated with Ph.D.s in atmospheric sciences, 35% with Ph.D.s in marine science, and more than 30% with Ph.D.s in environmental science.

Currently, 59 alumni work for NOAA, several of whom hold senior management positions. LaToya Myles, Ph.D., acting director of the [Atmospheric Turbulence and](#)

[Diffusion Division](#) of NOAA’s Air Resources Laboratory, was supported by EPP/MSI during her graduate training. Martin Yapur, director of the NOAA [National Environmental Satellite, Data, and Information Service Technology, Planning, and Integration for Observations Division](#), was supported by EPP/MSI both as an undergraduate and graduate student. Myles and Yapur now mentor EPP/MSI students, and both credit the program as one of the experiences that led to their successful careers at NOAA. Through a new [Direct Hire Authority](#), NOAA hopes to recruit more highly qualified alumni from EPP/MSI into the NOAA workforce.

From 2003-2019, the EPP/MSI Cooperative Science Centers supported:

**54%**

of African Americans who graduated with Ph.D.s in atmospheric sciences

**35%**

of African Americans who graduated with Ph.D.s in marine science

**30%**

of African Americans who graduated with Ph.D.s in environmental science



José E. Serrano Educational Partnership Program with Minority Serving Institutions alumni LaToya Myles (left) and Martin Yapur (right) now hold senior management positions at NOAA. LaToya Myles, Ph.D., is the acting Director of the NOAA’s Air Resources Laboratory Atmospheric Turbulence and Diffusion Division. Martin Yapur is the Director of the National Environmental Satellite, Data, and Information Service Technology, Planning, and Integration for Observations Division. (Courtesy of LaToya Myles and Martin Yapur)

# 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.



Members of NOAA's Diversity and Professional Advancement Working Group attended the 2020 Black Engineer of the Year Awards in February. (Kandis Boyd, NOAA)

## Overview

NOAA Education represents the combined efforts of dedicated education professionals across our agency. This year, we are putting a spotlight on our community's efforts to advance diversity, equity, and inclusion within our education programs. Through strategic partnerships, employee resources groups, and new opportunities to engage students from underrepresented populations, we strive to build an inclusive environment both within NOAA and for the people we serve. We also recognize the many ways in which our educators rose to the challenges of educating during a global pandemic. Through creative approaches, we tried to ensure that students maintained access to Earth science education through various virtual platforms and to support the educators who taught them.

## Members of the NOAA Education community promote diversity, equity, and inclusion within their programs

Our educators and partners are committed to increasing diversity, equity, and inclusion (DEI) within their programs. We work hard to break down the barriers that many Black, Indigenous, and other people of color face in the STEM fields, including at NOAA. Below are examples of the ways in which we strive to empower people and communities to take action and to make our own agency a truly inclusive place to work.

- The **Diversity and Professional Advancement Working Group** (DPAWG) — a NOAA employee resource group that focuses on recruitment, retention, and advancement — connects NOAA science and careers to students and early career professionals from diverse backgrounds. This year, DPAWG successfully coordinated NOAA's engagement with these groups at annual scientific conferences, including the 92nd annual National Technical Association Conference, the Black Engineer of the Year Award STEM Conference, the Society of the Advancement of Chicanos/Hispanics and Native Americans in Science Conference, and the American Meteorological Society Conference. During these conferences, DPAWG promoted NOAA science and careers while performing targeted recruitment for NOAA's student and educational opportunities.
- DPAWG participated in three hour-long networking sessions for NOAA's [José E. Serrano Educational Partnership Program with Minority Serving Institutions](#) and [Ernest F. Hollings Undergraduate Scholarship Program](#), which enabled scholars to expand their professional networks within NOAA and for DPAWG to increase recruitment efforts and strengthen NOAA's return on its flagship internship programs.
- DPAWG launched the "20% Podcast" to inform members of important topics, such as ways NOAA can retain a diverse and healthy workforce. This podcast is featured on the updated DPAWG website, which is available to NOAA employees, to promote initiatives like the "NOAA Legends" video series, a recruitment and retention tool that examines NOAA's unsung "heroes and sheroes" from diverse backgrounds. The working group also used its collective knowledge to host meetings that serve as training resources for the entire agency through workshops including resume writing, executive resume writing, interviewing, how to publish a book, and more.
- Lastly, DPAWG members met with NOAA leadership at all levels of the organization to discuss and recommend strategies to address barriers to retention and advancement from underrepresented groups within NOAA. This included developing a set of recommendations for ways the Leadership Competencies Development Program could become a more inclusive program.
- The [National Weather Service forecast office in Riverton, Wyoming](#), participated in annual STEM activities with the seven schools on the Wind River Reservation involving the Northern Arapaho and Eastern Shoshone Tribes. Each year, the National Weather Service works with the Tribes to connect with approximately 500 students via the annual Wyoming Youth in STEM event and Native American Education Conference on the Wind River Reservation. Although the in-person events were canceled in 2020 due to COVID-19, NWS Riverton was able to provide virtual weather education, safety, preparedness, and STEM presentations at the 2020 annual Native American Education Conference, held on August 6, 2020, at Central Wyoming College in Riverton.
- [NOAA Planet Stewards](#) will be supporting undergraduate students at five minority serving institutions in the study of the effectiveness of living shorelines in protecting vulnerable coastal communities. Although it was postponed due to COVID-19, the project entitled "Ecological Significance of Living Shorelines in Coastal Communities" will be coordinated through NOAA's [Center for Coastal and Marine Ecosystems](#), a Cooperative Science Center funded by the [José E. Serrano Educational Partnership Program with Minority Serving Institutions](#). In the year-long program, the students will be exposed to local research and coastal management, which will aid them as they pursue STEM-based careers.



As part of a NOAA Planet Stewards project, scientists from NOAA's Phytoplankton Monitoring Network conducted a virtual training in harmful cyanobacteria identification for students of St. John's High School in Charleston, South Carolina. Here, a biology teacher student assistant shows the device she invented to collect water samples from stormwater retention ponds. (NOAA)

- The [Environmental Literacy Program](#) funded eight new projects that will specifically engage populations who are disproportionately vulnerable to extreme weather and other environmental hazards. The 2020 Environmental Literacy Program [funding opportunity](#) included an increased emphasis on engaging vulnerable individuals. These community members include minority, low-income, rural, and Indigenous peoples. Each project will employ best practices for engagement, including meaningful partnerships with community-based organizations and providing adequate compensation for the community members' efforts toward the project.
- The [National Sea Grant Office](#) recently conducted a comprehensive review of the recruitment and evaluation practices for the [John A. Knauss Marine Policy Fellowship](#). Updates to the program are currently underway, and completed actions include updating language in the funding opportunity to remove unnecessary barriers, such as broadening the definition of who can provide an applicant's reference, allowing applicants to submit unofficial transcripts, and recruiting a more diverse review panel. The Knauss Justice, Equity, Diversity, and Inclusion Committee, the National Sea Grant Office, and the [Sea Grant Community of Practice](#) also began meeting to discuss the work of each group and how they could complement and support their collective efforts to increase diversity and inclusion. Sea Grant has added a [diversity statement](#) as a programmatic priority, which was based on recommendations from these groups.
- [NOAA Environmental Satellite, Data, and Information Service](#) (NESDIS) conducted a comprehensive workforce planning discussion to improve pathways for students from diverse backgrounds to enter the NOAA workforce and ensure that their objectives were aligned with the strategies and actions of the NOAA [Diversity and Inclusion Strategic Plan](#). The team posted recruiting advertisements at four colleges and universities and made agreements to participate in upcoming hiring fairs. NESDIS will continue working with their current partners at minority serving institutions and has identified new associations to reach out to, including historically Black colleges and universities and affinity groups.
- The [National Centers for Environmental Information](#) hosted or mentored a total of 30 interns and early-career fellows through internships and programs in 2020. Additionally, the NASA DEVELOP Summer Term worked with the Eastern Band of Cherokee Indians Natural Resources Program to detect year-to-year changes in the forest canopy composition of a Tribe-purchased land trust covering more than 50,000 acres in western North Carolina.
- [Flower Garden Banks National Marine Sanctuary](#) (FGBNMS) partnered with Mercer R. Brugler, Ph.D., at City University of New York College of Technology (CUNY) on a project to collect black coral specimens. Most of Brugler's students were from underrepresented groups and did not have opportunities to participate in scientific research and field work before taking his biology class. A particular specimen the students collected in an area near FGBNMS turned out to be a new species of black coral, and their work was recently published in the *Journal of the Marine Biological Association of the United Kingdom*. FGBNMS's partnership with CUNY has allowed non-science majors to gain meaningful field experience and inspired them to pursue careers in the sciences.



Remotely operated vehicle operators Lance Horn (left) and Eric Glidden (rear) brief research assistant Nadia Alomari and Marissa Nuttall, sanctuary research specialist, on collection procedures during a survey for black coral in Flower Garden Banks National Marine Sanctuary. (G.P. Schmahl, NOAA)

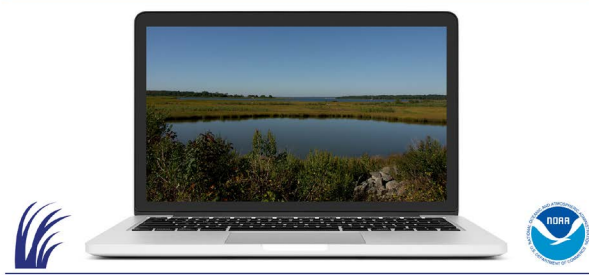
- The NOAA [Bay Watershed Education and Training](#) (B-WET) program is committed to funding projects that reach marginalized communities. For example, in 2020 the Chesapeake B-WET program supported a project called Outdoor Learning Network Initiative, which develops a shared strategy for implementing environmental literacy programming in low-capacity school districts. Through the Outdoor Learning Network Initiative, a cluster of three rural, low-income school districts in West Virginia have built a diverse network of eight partners who will work together to train 36 educators and engage 450 students in robust [Meaningful Watershed Educational Experiences](#) in the coming year.
- The NOAA [Marine Debris Program](#) worked to consider issues of equity and diversity in reviewing grant proposals, including evaluation criteria for projects involving veterans, minority serving institutions, or entities that work in underserved areas. The [Marine Debris Program Fiscal Year 2020 Competitive Grant Awards for Removal and Prevention](#) include projects that work with minority-owned, women-owned, and small businesses in Chicago to reduce waste and with Alaska Native communities and organizations to remove marine debris and reduce waste.

## People of all ages learn at home

As COVID-19 spread across the United States, many educational opportunities were interrupted. The NOAA Education community responded quickly to the rapidly changing situation and coordinated with partners to help people around the country continue learning virtually.

**VIRTUAL ESTUARY EDUCATION RESOURCES FOR AT-HOME LEARNING!**

BROUGHT TO YOU BY YOUR LOCAL NATIONAL ESTUARINE RESEARCH RESERVE

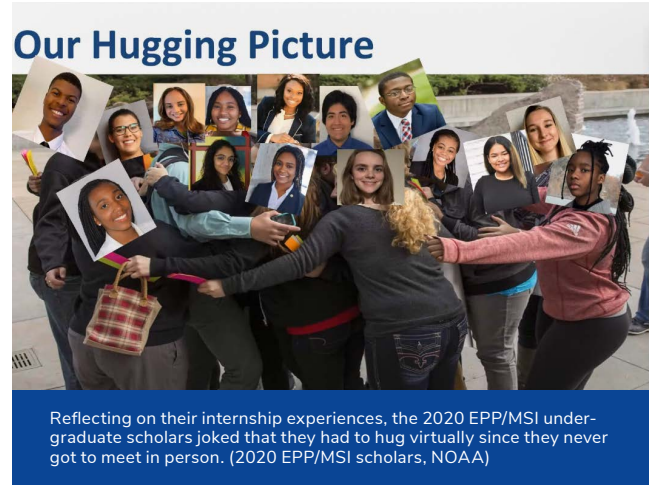


**Estuaries for Everyone**  
[coast.noaa.gov/estuaries](http://coast.noaa.gov/estuaries)

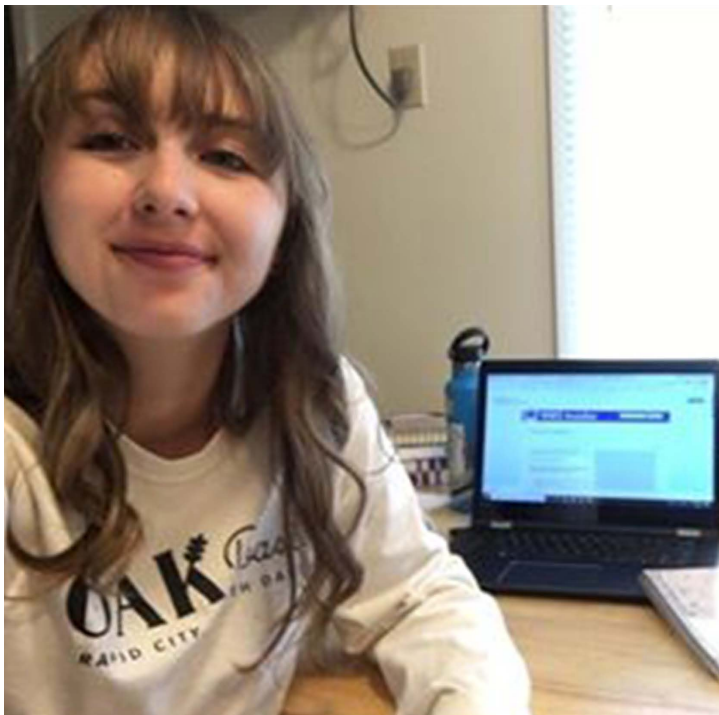
Students and educators can "tour" research reserves around the country and learn more about these living laboratories with virtual estuary education resources. (National Estuarine Research Reserve System)

- With reserve sites closed, the [National Estuarine Research Reserve System](#) educators got creative about developing robust [virtual educational programs](#) and activities for children, educators, and homeschooling parents. Staff led virtual trail tours introducing students to wildlife and plants and weekly Facebook Live events where students could learn about life in the estuary and interact with the staff. In addition to these virtual events, which gained over 6,000 views, the [Rookery Bay](#) reserve created a webpage of fun and educational virtual family activities. This webpage alone brought in 3,000 [website](#) visitors.
- To support at-home learning, NOAA's [Office of Education](#) created a one-stop website that features content developed by NOAA Education programs and offices. An initial [news story](#), which had nearly 18,000 views in its first two months, evolved into a [resource collection](#) highlighting the best resources for educators and parents working with kids at home. Realizing that many programs were developing new, live webinar series for students, the Office of Education also created a [public calendar](#) of upcoming events and a list of [archived webinars](#).
- In response to the pandemic, NOAA's [Office of Ocean Exploration and Research](#) (OER) collaborated with University of Rhode Island's Inner Space Center to create a new online educator professional development initiative to provide access to ocean science topic experts, share classroom resources, and support the shift to online instruction. They also produced engaging media content resources on multiple ocean science topics and tested a new innovative programming platform for online educator instruction. This programming will continue through the academic year and is expected to become a permanent part of the OER professional development repertoire.
- With funding from NOAA Fisheries [Pacific Island Regional Office](#) (PIRO), the Hawai'i Academy of Science organized interactive virtual science fairs for sixth through 12th grade students. Starting in April, more than 6,000 students engaged in the Hawai'i State Science and Engineering fair, which was hosted on the [Student Corner](#) website. Hawai'i Academy of Science and PIRO also put together a teacher workshop that showcased NOAA data, tools, and information that students can use in their science fair projects. NOAA's portion of the Student Corner gives students additional ideas for science fair projects and serves as a forum where students can contact NOAA Fisheries PIRO to ask questions. As a result, some students have found NOAA mentors for their projects as well. These science fairs will continue to be virtual throughout the 2021 school year.

- The [National Weather Service](#) created a new [webpage](#) to provide educational resources that the public can access in one place. Students and parents can easily navigate through this resource collection to learn more about science and safety through [Weather 101](#) classes and hear from hurricane specialists through [Hurricanes at Home](#). To make some of these resources more inclusive and accessible, many offices offered them in English, Spanish, and American Sign Language.
- NOAA's [National Severe Storms Laboratory](#) created a video series called [Weather Briefly](#). The series teaches viewers about tornadoes, hail, lightning, flooding, and damaging winds — each in less than three minutes. Collectively, the series has received over 2,400 views on YouTube.
- To help inspire kindergarten through eighth grade students to explore STEAM (science, technology, engineering, art, and math) fields, the [University of Oklahoma Cooperative Institute for Mesoscale Meteorological Studies](#) (OU CIMMS) created the new educational video series, [OU CIMMS Science Classes](#). The videos are taught by CIMMS researchers and highlight basic weather concepts, like snow, clouds, and how storms form. Each video has an interactive element using household supplies or worksheets that viewers can complete from home. The series has reached more than 265 students since July 2020.



- NOAA's Office of Education transitioned internships to a virtual format while NOAA facilities were closed. This allowed 147 undergraduate scholars from the [Ernest F. Hollings Undergraduate Scholarship Program](#) and the [José E. Serrano Educational Partnership Program with Minority Serving Institutions Undergraduate Scholarship Program](#) to conduct NOAA-mission research, network, and learn new skills from their homes. During the 10-week summer internships, 180 NOAA employees across the agency served as mentors to guide students through research activities and the development of presentations. Despite the inability to conduct their internship at NOAA facilities and share in-person experiences with their cohort, scholars were still able to have valuable experiences.



This year, the NOAA scholars had to complete and present their internship project findings virtually. Here, Hollings scholar Hannah Neumiller (left) shows her summer workspace and EPP/MSI scholar Jezella Peraza (right) poses before her presentation. (Courtesy of Hannah Neumiller and Jezella Peraza)



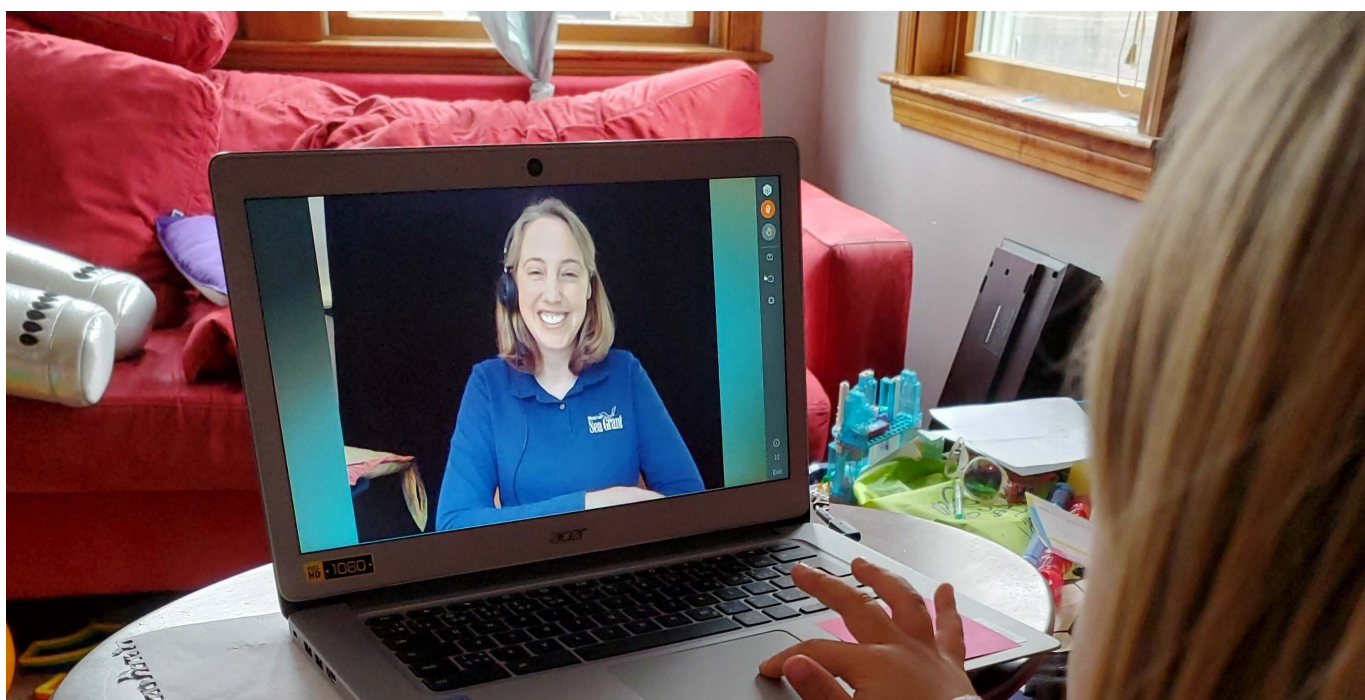
## Live webinars connect students to experts from their laptops

NOAA supported and expanded exciting live webinar series to allow for more audience engagement. The examples we highlight below describe webinars that help students explore the Earth from their homes.

- This year, NOAA's [Office of National Marine Sanctuaries](#) (ONMS) led innovative programs to connect the public with the National Marine Sanctuary System while travel was restricted, inspiring interest in and future visits to our nation's public waters. The [National Marine Sanctuaries Webinar Series](#) saw a 610% increase in interest, attracting thousands of live viewers (7,682). ONMS also expanded their virtual presence for students through a partnership with [Exploring by the Seat of Your Pants](#). In total, 47 distance-learning programs attracted 17,474 live participants.
- Since April 2020, [NOAA Ocean Today](#) and the NOAA Studio have been producing a monthly "Every Full Moon Watch Party" for middle school students, their teachers, and the general public. Each hour-long live show focuses on a different ocean topic, ranging from deep ocean exploration to marine debris, building upon the Ocean Today video collections. The show is hosted by Symone Barkley of the National Aquarium and includes a mix of live and pre-produced content, interactive polls, and Q&A with experts. Over 1,400 teachers and students tuned in for nine live watch parties, and the shows are archived online to continue serving as resources for educators long after they have aired.



- [Sea Grant](#) programs across the country developed new online resources and enhanced existing ones for educators, parents, and students. For example, Woods Hole Sea Grant's new [NOAA Live 4 Kids!](#) webinars reached 5,200 live participants over the country and world. Similar programming was created by Michigan Sea Grant ([H.O.M.E.S. at Home series](#)) and Florida Sea Grant ([Bite-Sized Science webinars](#)). Sea Grant programs also developed and distributed independent learning resources, such as Oregon Sea Grant's [STE\(A\)M UNPLUGGED activity kits](#), and shared online educational resources through Sea Grant's new [Education at Home](#) webpage, which received over 3,000 views from March through October 2020.



The NOAA Live! 4 Kids webinar series started in the spring of 2020 in response to COVID-19 school closures, giving students in second through eighth grade an opportunity to learn directly from NOAA experts. (Lindsey Williams)

## NOAA Education programs offer flexibility to their grantees to better adapt to changes

The COVID-19 pandemic changed the way that NOAA's partners and grantees could engage with the public. The NOAA Education community helped their grantees pivot to develop innovative new ways to reach their audiences through virtual settings.



The Smart Communities Task Force for the village of Homer, New York, accepts the Climate Smart Communities Bronze Certification from New York State Department of Environmental Conservation Commissioner Basil Seggos. With support from NOAA's Environmental Literacy Program, youth leaders in Homer and Saranac Lake have provided valuable contributions, unique skills, and leadership to help their respective communities take action on climate change. (The Wild Center)

- In response to the COVID-19 pandemic, many NOAA [Environmental Literacy Program](#) grantees switched to virtual models to continue their community resilience education programs. For example, the [Nurture Nature Center](#) held its first virtual youth summit, where youth across the Lehigh Valley networked and discussed climate change solutions. Other activities also were transitioned to an online environment, such as virtual public forums and distance learning programs for educators and students. These activities enabled these

projects to continue to help communities build the environmental literacy necessary for resilience to extreme weather, climate change, and other environmental hazards.

- NOAA [Bay Watershed Education and Training](#) (B-WET) program supported institutions that engage youth and educators, particularly those from marginalized communities, in hands-on experiential learning through [Meaningful Watershed Educational Experiences](#) (MWEEs). B-WET developed guidance to help 160 active grantees adapt programming to continue to address MWEE goals while being responsive to guidelines and restrictions imposed in response to the pandemic. Alternative approaches for B-WET grantees include virtual field experiences and programming that can be conducted at home or in students' neighborhoods. For example, the [At Home with the Bay](#) virtual field trip series by Galveston Bay Foundation, a Gulf of Mexico B-WET grantee, allows students to learn watershed concepts at home through engaging environmental education lessons that include conservation crafts and talking with a bay biologist. Priorities for future funding opportunities will be responsive to the needs of the environmental education community during and after the pandemic.



A student volunteer conducts a plankton tow in April 2020 for the "At Home with the Bay" plankton video. Part of a video series by Galveston Bay Foundation, a Gulf of Mexico B-WET grantee, to share watershed concepts with students at home due to COVID-19. (Mariah Waters, Galveston Bay Foundation)

# Acknowledgments

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## 2020 NOAA Education Council

The NOAA Education Council represents and coordinates education efforts across the agency. The following member programs provided materials for this report to highlight the breadth of NOAA Education.

### Council Chair

Louisa Koch

### Council Vice Chair

Christos Michalopoulos

### Bay Watershed Education and Training (B-WET)

Bronwen Rice, Jacqueline Laverdure

### Climate Program Office

Frank Niepold

### Marine Debris Program

Emma Tonge, Alexandria Brake

### National Environmental Satellite, Data, and Information Service

Ryann Agbasi, Rafael DeAmeller

### National Marine Fisheries Service

Kate Naughten, Bart Merrick

### National Ocean Service

Bruce Moravchik

### National Sea Grant College Program

Brooke Carney, Joshua Brown, Linda Chilton

### National Weather Service (NWS)

Mary Fairbanks

### NOAA Teacher at Sea Program

Jennifer Hammond

### NWS Warning Coordination Meteorologists

Faith Borden, Kerry Jones

### Office for Coastal Management

Nancy Cofer-Shabica

### Office of Education – Higher Education

Natasha White

### Office of Education – K-12 and Informal Education

Carrie McDougall, Sarah Schoedinger

### Office of National Marine Sanctuaries

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### Office of Ocean Exploration and Research

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### On the cover

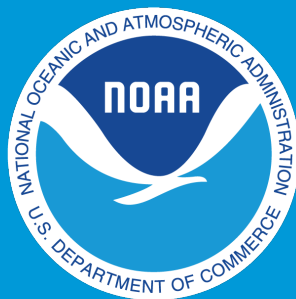
*Top left:* Students from New Orleans, Louisiana, measure dissolved oxygen at Pontchartrain Beach as part of the Pontchartrain Conservancy's Gulf of Mexico Bay Watershed Education and Training grant project. (Dinah Maygarden, University of New Orleans)

*Top center:* A student immerses herself in one of America's underwater treasures through a virtual reality (VR) video of Channel Islands National Marine Sanctuary in VR goggles. (Claire Fackler, NOAA Office of National Marine Sanctuaries)

*Top right:* Instructor Michelle Stowell gives a thumbs up during a day camp held at Sea Rock State Park. Stowell and Lindsay Carroll are educators with Oregon Sea Grant's marine education program. They and other team members created a series of hybrid summer camps for students that included sending campers supplies by mail, holding activities online, and wrapping up the week-long camp with a day at the beach. (Courtesy of Oregon Sea Grant)

*Bottom left:* In early January 2020, Bajan students toured the NOAA Ship *Ronald H. Brown* to learn about the international ATOMIC campaign. The island of Barbados served as the hub for ATOMIC operations, and science tours allowed local students to meet visiting scientists and discuss weather research. (Cindy Sandoval, NOAA Fisheries)

*Bottom right:* Volunteer Madur Dwarakanath (left) talks about seashells and rocks on display with guests at the Visitor Center in the Hatfield Marine Science Center in Newport, Oregon. The public education wing of the Hatfield Marine Science Center, which is run by Oregon Sea Grant, has over 150,000 visitors annually. (Casey Henley, Broken Banjo Photograph)



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