REPORT TO CONGRESS

NOAA Chesapeake Bay Office Biennial Report to Congress Fiscal Years 2017–2018

Developed pursuant to: NOAA Authorization Act, 15 U.S.C. 1511d

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THE NOAA AUTHORIZATION ACT (15 U.S.C. 1511d)
INCLUDED THE FOLLOWING LANGUAGE:

The Office shall . . . ***(7)*** *submit a biennial report to the Congress and the Secretary of Commerce with respect to the activities of the Office and on the progress made in protecting and restoring the living resources and habitat of the Chesapeake Bay, which report shall include an action plan consisting of—*
(A) *a list of recommended research, monitoring, and data collection activities necessary to continue implementation of the strategy described in paragraph (2) [develop and implement a strategy for the National Oceanic and Atmospheric Administration that integrates the science, research, monitoring, data collection, regulatory, and management responsibilities of the Secretary of Commerce in such a manner as to assist the cooperative, intergovernmental Chesapeake Bay Program to meet the commitments of the Chesapeake Bay Agreement]; and*
(B) *proposals for—*
(i) *continuing any new National Oceanic and Atmospheric Administration activities in the Chesapeake Bay; and*
(ii) *the integration of those activities with the activities of the partners in the Chesapeake Bay Program to meet the commitments of the Chesapeake 2000 agreement and subsequent agreements.*

THIS REPORT RESPONDS TO THIS REQUIREMENT.

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I. Executive Summary

During Fiscal Years (FY) 2017 and 2018, the National Oceanic and Atmospheric Administration (NOAA) Chesapeake Bay Office, working with partners, has made progress toward achieving the goals of the 2014 Chesapeake Bay Watershed Agreement. Specifically, the NOAA Chesapeake Bay Office (NCBO) supported:

- **Oyster restoration in Virginia and Maryland.** NCBO funded reef construction, tracked and monitored restoration project success, mapped river bottoms to identify potential restoration sites, and led Bay-wide restoration planning and coordination efforts.
- **Collaborative efforts to use science to ensure sustainable Bay fisheries.** NCBO led a team of interjurisdictional fisheries managers and experts to produce annual blue crab management reports, convene fisheries science symposiums, and examine fish habitat issues. NCBO also provided fisheries science grants to researchers to help inform management on several ecologically and economically valuable fish and shellfish species.
- **Weather, oceanographic, and water-quality data about the Chesapeake Bay.** NCBO operates the Chesapeake Bay Interpretive Buoy System, a near-real-time network of observations stations that tracks the Bay's changing weather, oceanographic, and water quality conditions. This data was disseminated to the public via mobile applications, a website, and phone number. In FY 2018, NCBO selected a new, smaller buoy hull design that will be easier to maintain and is working to rebuild the system, replacing the original buoys with this platform.
- **Science education for students and professional development for teachers.** NCBO provided grant funding for Bay watershed education and professional development for thousands of students and teachers in the region through the Bay-Watershed Education and Training (B-WET) Chesapeake program. NCBO also provided science education to regional educators through workshops planned and implemented by the NOAA Environmental Science Training Center.
- **Place-based community engagement.** "Envision the Choptank" is a robust community conservation partnership in the Choptank River area in Maryland, site of a NOAA Habitat Focus Area designed to enhance oyster habitat as well as populations of striped bass and river herring. NCBO led efforts to develop a common agenda for the partnership focused on conserving natural resources, restoring habitat and clean water, engaging communities, and strengthening and expanding the partnership.
- **Climate resiliency planning throughout the Bay watershed.** NCBO led efforts to better incorporate climate change issues and considerations into the Chesapeake Bay Program by developing climate change indicators and decision support tools for Bay fisheries and wildlife managers.

II. Introduction

This report describes the activities of the NOAA Chesapeake Bay Office for FY 2017 and 2018 under the NOAA Authorization Act, 15 U.S.C. 1511d. This Act established the NOAA Chesapeake Bay Office, which is a division of the Office of Habitat Conservation within the National Marine Fisheries Service.

NOAA has been a partner in the Chesapeake Bay Program since 1984. In 2014, NOAA and its Federal and state partners signed the Chesapeake Bay Watershed Agreement[1], including 10 goals supporting the restoration and protection of the Bay watershed and guiding the work of the Chesapeake Bay Program.

In order to fulfill its mission and respond to regional stakeholder needs, NCBO is focused on achieving the 2014 Chesapeake Bay Watershed Agreement[2] goals relating to sustainable fisheries, vital habitats, environmental literacy, and climate resiliency, as well as supporting monitoring efforts to track progress toward these goals.

III. Oyster Restoration

Restoring oysters is critical to restoring the health and productivity of the Chesapeake Bay. Oysters provide habitat for several important species, clean the Bay's waters, and make up one of the region's most valuable fisheries. Over the past 2 years, NCBO has taken several actions to support the Chesapeake Bay Watershed Agreement goal of restoring oyster habitat and populations in 10 Bay tributaries by 2025. When these restoration projects are completed, together they would make up the largest sanctuary restoration project of its kind in the Nation.

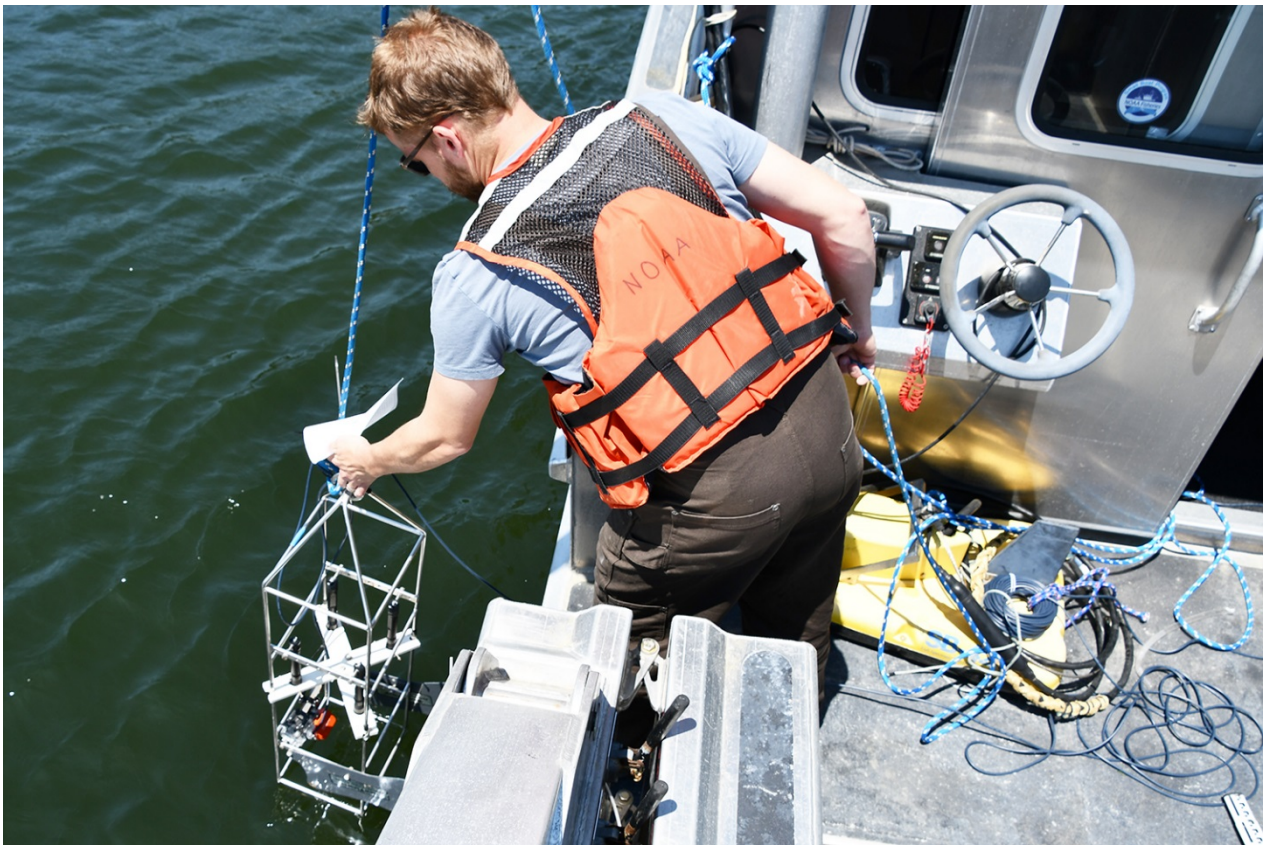
Advancing Oyster Restoration in Maryland and Virginia. In FY 2017 and 2018, the NOAA Chesapeake Bay Office supported oyster restoration in select tributaries in Maryland and Virginia by:

- Mapping river bottoms with sonar to identify the most promising restoration sites;
- Monitoring restoration project success;
- Planning and coordinating restoration by chairing restoration workgroups in both states;
- Facilitating restoration siting and tracking collective restoration progress by creating and maintaining habitat geodatabases using GIS; and
- Funding reef construction, including the production and planting of juvenile oysters to stock reefs.

These efforts leveraged significant resources from Federal, state, and local governments, as well as from non-governmental organizations, increasing the scope and scale of oyster restoration Bay-wide. For example, in Harris Creek, NOAA invested $832,000 in 2015, leveraging a combined $6.6 million from the U.S. Army Corps of Engineers and Maryland Department of Natural Resources in additional oyster restoration work.

Mapping and Monitoring to Guide Restoration. NCBO acoustic seafloor mapping provides high detail and accuracy, enabling restoration specialists to site oyster projects efficiently and effectively. In FY 2017 and 2018, these surveys contributed to the creation of draft restoration blueprints for the Lynnhaven and Piankatank Rivers in Virginia.

[1] https://www.chesapeakebay.net/what/what_guides_us/watershed_agreement
[2] https://www.chesapeakebay.net/documents/FINAL_Ches_Bay_Watershed_Agreement.withsignatures-HIres.pdf



NCBO's habitat analysis team surveys oyster restoration sites before and after restoration work to help track progress.

NCBO's largest survey by area in FY 2018 included more than 21 square kilometers of river bottom in the Lower York River in Virginia and identified the best sites for future restoration efforts. In FY 2018, NCBO also created a geodatabase of habitat and other important spatial information for the St. Mary's River in Maryland to facilitate restoration planning efforts.

In FY 2017 and 2018, NCBO scientists used sonar equipment to survey restored reefs in Harris Creek, Little Choptank River, and Tred Avon River oyster sanctuaries in Maryland and the Piankatank River in Virginia. These monitoring surveys have shown that 98 to 100 percent of reefs meet restoration standards and provide a basis for evaluating changes over time and contribute to an assessment of the ecological value of the new reefs.

NCBO Support of Oyster Restoration in Targeted Tributaries in FY 2017 and 2018

Targeted Tributary	**Restoration Action**
Harris Creek (MD)	Restoration completed in 2015, first tributary in Maryland. NCBO conducted monitoring surveys during FY 2017–2018.
Tred Avon River (MD)	NCBO funded in-water restoration work and conducted monitoring surveys during FY 2017–2018.

Little Choptank River (MD)	NCBO funded in-water restoration work and conducted monitoring surveys during FY 2017–2018.
St. Mary's River (MD)	Restoration planning underway. NCBO created an oyster habitat geodatabase in FY 2018.
Manokin River (MD)	Restoration planning underway.
Lafayette River (VA)	Restoration completed in FY 2018, first tributary in Virginia. NCBO funded restoration work in FY 2017.
Lynnhaven River (VA)	NCBO funded in-water restoration and completed draft restoration blueprint in FY 2018.
Piankatank River (VA)	In-water restoration ongoing. Draft restoration blueprint completed by NCBO in FY 2018. NCBO conducted monitoring surveys during FY 2017–2018.
Great Wicomico River (VA)	Some previous restoration work. Restoration planning underway.
Lower York River (VA)	Restoration planning underway. NCBO mapped more than 21 km^2 of habitat in FY 2018 and created habitat geodatabase.

Continuing Activities

Over the next 2 years, NCBO will work with partners to develop oyster restoration plans for the remaining targeted tributaries in both Maryland and Virginia (St. Mary's, Manokin, Lower York, and Great Wicomico); continue to provide habitat mapping products (all targeted tributaries); and contribute funding for reef restoration projects in select tributaries.

IV. Sustainable Fisheries and Science

Sustainable fisheries and healthy fish habitats are key components of a restored Chesapeake Bay. In support of the Chesapeake Bay Watershed Agreement, NCBO leads the Sustainable Fisheries Goal Implementation Team (Fisheries GIT); conducts and supports research on key Bay fish and shellfish species; and maps the critical habitat of endangered sturgeon.

Supporting Sustainable Bay Fisheries. NCBO leads the Fisheries GIT[3], which coordinates ecosystem-based approaches to management across jurisdictions for key species including oysters, blue crabs, and striped bass and their habitats and food web interactions. The Fisheries GIT is comprised of state resource managers, scientists, and other experts from around the Chesapeake Bay watershed.

During FY 2017 and 2018, NCBO led the Fisheries GIT by:

[3] https://www.chesapeakebay.net/who/group/sustainable_fisheries

- Coordinating the production of annual Chesapeake Bay Blue Crab Advisory Reports, which concluded in 2017 and 2018 that female blue crabs were not being overfished;
- Analyzing the effects of invasive blue and flathead catfish by convening a 2017 symposium for fisheries managers and scientists to discuss options to mitigate the spread of these non-native species while expanding their harvest; and
- Obtaining new funding in 2018 to assess factors influencing fish habitat function in the Bay, including the effects of developed shorelines on those habitat areas. High-quality habitats are needed to support spawning, feeding, and nursery areas important to the health and productivity of fish such as striped bass and other key species.

Providing Science to Inform Fisheries Management. The NCBO fisheries science grant program helps inform management on topics related to ecologically and economically valuable species. NCBO works with fishery managers and scientists to identify research necessary to inform living marine resource management decisions. In FY 2017 and 2018, NCBO awarded $900,000 in six grants through the competitive Chesapeake Bay Fisheries Research Program to support research examining issues relating to forage species, black sea bass, and summer flounder.

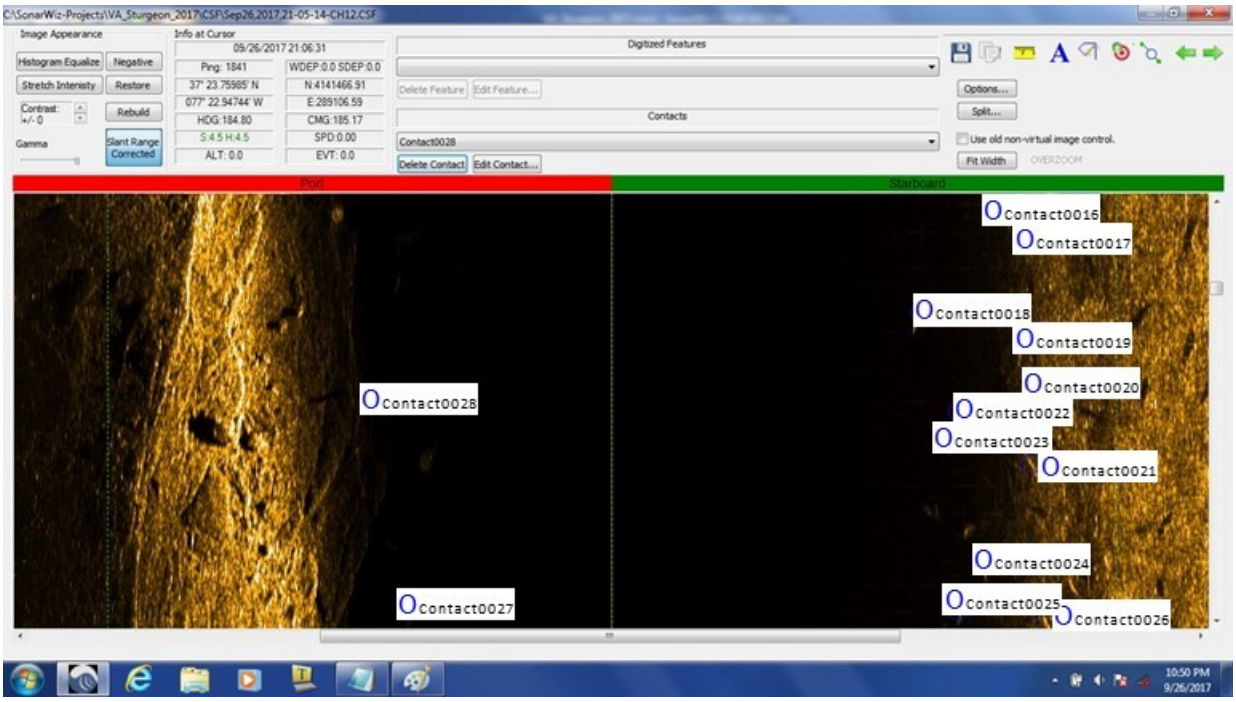
Forage species are smaller species that are essential as food for important commercial and recreational fish species, like striped bass. In FY 2017, NCBO provided funding support to the Virginia Institute of Marine Science (VIMS) and the Smithsonian Environmental Research Center (SERC) to study how changes in Chesapeake Bay habitat areas and environmental conditions affect forage fish populations.

Black sea bass and summer flounder are Federally managed species that are highly sought after by recreational and commercial fishermen. In FY 2018, NCBO supported research by VIMS, SERC, and the Coonamessett Farm Foundation to examine how fish habitat areas in the Bay and the ocean, in addition to changes to oceanographic conditions and prey species, can affect the black sea bass and summer flounder fisheries.

Quantifying Ecosystem Benefits of Restored Oyster Reefs. NCBO is working with several researchers in the region and conducting its own field study to quantify the ecosystem services, or benefits, provided by restored reefs. The construction of large-scale oyster restoration projects to meet the Chesapeake Bay Watershed Agreement oyster goal provides an unprecedented opportunity to conduct this type of research. Many of the restored reefs where research is underway are young, providing scientists new insight into how reefs develop and mature and how their benefits to the ecosystem evolve over the years. While data analysis continues, scientists have noticed some preliminary results at and near restored reefs, including:

- Enhanced nitrogen removal (improved water quality);
- Increased oyster biomass;
- Increased density and biomass of macrofauna (used as food by fish and crabs);
- Evidence of fish successfully foraging on reefs;
- New seagrass colonization;
- Measurable reduction in water column particulates leading to improved clarity; and
- Projected improvement in the blue crab fishery.

Mapping Endangered Sturgeon Habitat. During FY 2017 and 2018, NCBO used sonar to map spawning habitat for Atlantic sturgeon. The Chesapeake Bay distinct population segment of Atlantic sturgeon was declared endangered by NOAA in 2012. In 2017, the NOAA Office of Protected Resources used sturgeon habitat mapping data collected by NCBO in 2015 to inform the designation of critical habitat for Atlantic sturgeon in the Chesapeake Bay (*Federal Register*/Vol. 82, No. 158, p. 3961). NCBO researchers conducted additional studies in Virginia tributaries in 2018 to test the ability of sonar technology to image, identify, and enumerate Atlantic sturgeon. This technique could be a new approach to monitoring Atlantic sturgeon and their habitat use.



Scientists from NCBO applied new technologies, including sonar capabilities, to track endangered sturgeon.

Continuing Activities

Over the next 2 years, NCBO will continue to lead the Fisheries GIT to coordinate Bay fisheries management of key species like the blue crab. In addition, NCBO expects to disseminate the results of important ongoing research into forage habitat, Federally managed species like black sea bass and summer flounder, and the ecosystem services that restored oyster reefs can provide. This research will improve marine resource management and public policy decision-making.

V. Chesapeake Bay Interpretive Buoy System

The NOAA Chesapeake Bay Interpretive Buoy System (CBIBS) is a network of observing platforms providing near-real-time, continuous data on the Bay's meteorological, oceanographic, and water-quality conditions. CBIBS data, both current and archived, are available to the public at http://www.buoybay.noaa.gov, via a toll-free phone number (1-877-BUOY-BAY), and on free mobile applications as well as via automated solutions that enable direct delivery of CBIBS data.

Through a partnership with the National Park Service, CBIBS buoys help to mark and interpret certain points along the Captain John Smith Chesapeake National Historic Trail.

Keeping People Informed of Changing Bay Conditions. CBIBS data are used by a variety of agencies and constituencies, including the National Weather Service (providing improved marine forecasts); the U.S. Coast Guard (making operational decisions on appropriate gear for different Bay conditions); harbor pilots (considering winds, waves, and currents for their work); and scientists (assessing the health of the Bay using information collected about a broad array of ecosystem conditions). Commercial shipping and recreational boaters also rely on CBIBS data for safe navigation. During FY 2017 and 2018, NCBO staff continued outreach efforts to constituents including educators, scientists, commercial fishermen, recreational anglers, and racing sailors to increase their use and understanding of CBIBS data.

NCBO buoy technicians perform routine maintenance on one of the observing platforms in the NOAA Chesapeake Bay Interpretive Buoy System.

Revitalizing the Chesapeake Bay Interpretive Buoy System. NCBO deployed the first CBIBS buoys in 2007. After 10 years of exposure to the often harsh marine environment, the CBIBS buoys and their various components began to display wear and tear. As a result, NCBO selected a new, smaller buoy hull design in FY 2018 and is working to rebuild the system, replacing the original buoys with this platform. The compact design of the smaller buoy allows for more flexible and cost-effective maintenance and will deliver the same quality data. Whereas the larger buoys required NCBO to contract with large vessels to deploy and retrieve the buoys, the new buoys can be deployed, maintained, and retrieved from on board NCBO's vessels, saving time and money.

Amplifying Ocean Acidification Research. In early 2018, the NOAA Ocean Acidification Program and other partners launched a new buoy to track carbon dioxide levels in the air and water as well as pH levels in the water. This buoy is located near the NOAA CBIBS First Landing buoy at the mouth of the Chesapeake Bay to enable collaboration with existing observations on weather, water conditions, and water quality. Data from the two buoys will help scientists analyze how concentrations of atmospheric carbon dioxide and ocean acidification affect the Chesapeake Bay and its valuable shellfish. CBIBS supports additional ocean acidification research by partnering with academic institutions to host sensors on existing CBIBS buoys.

Supporting Fisheries and Water Quality Research with Onboard Sensors. Each CBIBS buoy includes an acoustic telemetry receiver – a sensor that records when fish with acoustic tags swim near the buoys. This tracking data are paired with information from CBIBS about water temperature, salinity, and dissolved oxygen and then used by scientists who study fish movements, migrations, and habitat use. CBIBS acoustic receivers have detected more than 9,000 unique tagged animals, including more than 150 Federally endangered Atlantic sturgeon. Data from CBIBS about tagged fish is delivered to the Mid-Atlantic Telemetry Observing System (MATOS), a comprehensive data warehouse for telemetry along the East Coast that was developed with support from NCBO.

Telemetry projects using data acquired by CBIBS buoys include research on Atlantic sturgeon, striped bass, cownose rays, blue catfish (invasive in the Chesapeake Bay), stingrays, horseshoe crabs, common carp, and four species of shark. A number of these research efforts have committed to using MATOS as a data management tool.

CBIBS sensors are also used by scientists studying changes in Chesapeake Bay water quality. Data from CBIBS buoys help researchers validate computer models used to forecast the potential for oyster diseases such as Vibrio bacterial infections, which can have negative effects on both human health and oyster aquaculture efforts. In addition, scientists who track hypoxia in the Bay (low-oxygen water conditions that affect fish and shellfish) use data from the buoys – including dissolved oxygen observations – to forecast hypoxia events.

Continuing Activities

Over the next 2 years, NCBO will test and deploy the new CBIBS buoy with the first deployments scheduled for spring 2019. During the winter of 2019, NCBO will meet with users and partners to ensure buoys will be deployed in optimal locations and are outfitted with sensors needed to develop data services and products, especially those related to fish and water-quality habitat goals.

VI. Environmental Literacy

Since 2002, NCBO has been a driving force behind a coordinated regional approach to environmental literacy and has worked to advance policies, partnerships, and programs at all levels. Programs such as the NOAA Bay Watershed Education and Training (B-WET) Program support a range of educational policies and programs that facilitate productive and lasting citizen

involvement in the stewardship of the Chesapeake Bay watershed. NCBO works in close consultation with the NOAA Office of Education (the NOAA office that is appropriated B-WET funding) to tailor the B-WET Program in the Chesapeake Bay watershed in a way that supports national goals while also advancing local priorities.

Supporting Bay Watershed Education for Students. An important part of the NCBO environmental literacy strategy is to build toward providing environmental literacy for all students in all school districts in the region. NCBO works with state departments of education, local school districts, and their partners to embed environmental literacy content and teaching approaches into standards and curricula. This ensures equity and sustainability over time. In FY 2018, NCBO focused Chesapeake B-WET on establishing meaningful watershed educational experiences – "MWEEs" – in new locations, including a push to increase programs in Pennsylvania. In FY 2017 and 2018, Chesapeake B-WET awarded approximately $5,190,000 in 19 new grants and supported 29 continuing awards. The FY 2017 and 2018 awards will affect more than 75,000 students and 2,000 teachers, bringing the total that NOAA has served since 2002 to more than 700,000 students and 25,000 teachers.

Programs supported by B-WET grants serve as models for other school districts on how to create comprehensive environmental literacy programs in partnership with a broad range of public and private entities. The lessons learned from the B-WET program are also broadly shared with the national, regional, and state education communities to showcase how the strategic use of any environmental education funding program can influence broader policies and initiatives.

Watershed students learn about Chesapeake Bay species during a NOAA Chesapeake B-WET-funded field experience.

Striving to Reach Every Student. The mid-Atlantic is home to the Nation's most advanced multistate effort to embed environmental education into K-12 schools. NCBO plays a key role in coordinating this work among state and Federal agencies and other partners to ensure continued focus on the environmental literacy commitments of the Chesapeake Bay Watershed Agreement.

At the heart of creating and sustaining this regional vision for environmental literacy are the school districts that are responsible for developing and implementing curriculum, student programming, and teacher professional development. To support district efforts to train teachers in environmental education best practices, NCBO led the development of a series of videos and online courses about MWEEs. NCBO also worked with the education departments of the Chesapeake Bay watershed states and the District of Columbia to administer a survey to better understand school district engagement in environmental literacy. Survey results indicated that while most school districts are committed to providing MWEEs, they continue to need financial support and technical assistance to establish a comprehensive and systemic approach to environmental literacy. This will be a strong focus of NCBO's work in the coming years.

Providing Cutting-Edge Science to Educators. The NCBO-run NOAA Environmental Science Training Center in Oxford, Maryland, offers training and in-depth experiences to advance the abilities of educators who teach in settings other than traditional schools to convey the latest science and best practices to the teachers, students, and public they work with. During FY 2017 and 2018, the Center offered six rigorous, multiday workshops in Maryland, Virginia, and Delaware on topics such as commercial fishing and communities, invasive species, and using data in the classroom. To reach a broader audience, the Center also placed an emphasis on the development of web-based training programs, completing online courses focused on the Next Generation Science Standards, climate change, and using NOAA and related science data in the classroom.

Continuing Activities

NCBO will continue to expand with the goal of embedding environmental literacy programming into school districts throughout the watershed. To this end, NCBO will use data and information from its school district survey – along with data on environmental justice and environmental sensitivity – to identify high-priority areas for using B-WET, Environmental Science Training Center programming, and technical assistance.

VII. Place-Based Initiatives

NOAA's Habitat Focus Areas (HFA) concentrate resources and effort in regions of national, historic, and ecological significance. The Choptank River HFA[4], located in Maryland and Delaware, includes critical habitat for spawning striped bass and river herring, historically abundant oysters, and a long legacy of commercial fishing and agriculture. But the health of the Choptank is under increasing threat from a growing human population, and land development affects key habitats, including oyster reefs. NOAA's implementation plan for the Choptank HFA includes three objectives: habitat restoration and protection, integrating science to inform

[4] https://www.habitatblueprint.noaa.gov/habitat-focus-areas/choptank-river-complex-maryland/

management, and community engagement. NOAA's interest in the Choptank is driven by a significant Federal investment in oyster restoration (see Restoring Oysters section for details regarding ongoing work in Harris Creek, Little Choptank and Tred Avon Rivers, all located in the Choptank HFA).

NOAA scientists explore how fish use different habitat types in the Tred Avon River, a tributary of the Choptank River.

Building a Choptank Community Partnership. In support of the Choptank HFA, NCBO has worked with state and local governments, nonprofits, and county school districts to form a collaborative called "Envision the Choptank." The group finds solutions that support healthy and productive oyster reefs and restore fishable, swimmable waters to the Choptank River. The partnership integrates local knowledge and values with the latest science and technology to target work in places where it will be the most effective and long lasting for improving the Choptank River watershed.

In FY 2017 and 2018, this initiative engaged more than 70 stakeholders and nearly 800 residents across the Choptank River watershed to develop a common agenda for the partnership. This partnership supports ongoing restoration work, while being responsive to broader community priorities such as family health, local economic growth, and maintaining a rural landscape and culture. Specifically, the common agenda focuses on conserving natural resources, restoring habitat and clean water, engaging communities, and strengthening and expanding the partnership. Over the past 2 years, the Envision the Choptank partnership also implemented a pilot project focused on agricultural and residential best management practices funded through a National Fish and Wildlife Foundation grant and worked with the Town of Easton to design a

stream restoration directly upstream from the oyster restoration occurring in the Tred Avon River.

NCBO has also worked with the school districts in Caroline, Dorchester, and Talbot Counties to provide training and resources to teach about the ongoing oyster restoration and related issues and to encourage strategic thinking about the integration of environmental literacy programming into school district curriculum and planning.

Continuing Activities

In FY 2018, the U.S. Army Corps of Engineers' Chesapeake Bay Comprehensive Water Resources and Restoration Plan identified the Middle Peninsula (specifically, the Piankatank and York Rivers and Mobjack Bay) in Virginia, as well as the Choptank River as special focus areas for restoration efforts. NCBO is already involved in oyster restoration in both locations, which sets up a potential opportunity to apply the lessons learned from the Choptank HFA to the Middle Peninsula. In the coming years, NCBO will explore opportunities to engage partners on broader restoration and coastal resiliency objectives in the region.

VIII. Climate Resiliency

The 2014 Chesapeake Bay Watershed Agreement includes a goal to increase the resiliency of the Chesapeake Bay watershed – including its living resources, habitats, public infrastructure, and communities – to adverse impacts from changing environmental and climate conditions. This requires careful monitoring and assessment of these impacts and application of this knowledge to policies, programs, and projects. To this end, over the past 2 years, NCBO led efforts to better incorporate climate change issues and considerations into the Chesapeake Bay Program.

In FY 2017 and 2018, through an arrangement with the Environmental Protection Agency, NCBO employed a climate change coordinator to lead a Climate Resiliency Workgroup. This coordinator worked with Chesapeake Bay Program partners on a range of climate change issues and management needs, including the development of climate change indicators and measures for the Chesapeake Bay Program and a "climate-smart" framework and decision-support tool to ensure that climate is considered by subject-matter experts in areas such as fisheries and wildlife management. In addition, in 2017 the workgroup published a report, *Monitoring and Assessing Impacts of Changes in Weather Patterns and Extreme Events on Best Management Practice Siting and Design,* to help inform and guide the work of Chesapeake Bay Program partners.

Continuing Activities

Over the next 2 years, the climate work of the Chesapeake Bay Program will build a resiliency strategy focused on issues such as climate change impacts on stormwater and green infrastructure best management practices, shoreline condition and response, inland and urban flooding, and stream health condition. Partners plan to create a prioritized list of climate science and research needs for the Chesapeake Bay Program; promote the availability and accessibility of climate and other related science data and information through the development of a Chesapeake Bay watershed climate data and mapping repository; support a social marketing

assessment to understand barriers to implementing living shorelines; and refine climate modeling to inform restoration and protection efforts.

Some locations around the Chesapeake Bay watershed—such as downtown Annapolis—now experience more frequent "nuisance flooding."

IX. Conclusion

During FY 2017 and 2018, NCBO, consistent with its mission as established by the NOAA Authorization Act (15 U.S.C. 1511d.), has:

- Advanced Chesapeake Bay oyster restoration;
- Facilitated sustainable Bay fisheries;
- Monitored the Bay's changing weather and water-quality conditions;
- Helped to identify endangered species and their habitat;
- Supported Bay watershed education for thousands of students and teachers;
- Built a community conservation partnership in the Choptank river region; and
- Increased climate resiliency planning efforts in the watershed.

Moving forward, NCBO will continue to focus on achieving the 2014 Chesapeake Bay Watershed Agreement goals relating to sustainable fisheries, vital habitats, environmental literacy, and climate resiliency, as well as support monitoring efforts to track progress toward these goals.