

Final Evaluation Findings

Maryland Coastal Management Program

September 2014 to July 2020

And

Chesapeake Bay–Maryland National Estuarine Research Reserve

February 2011 to July 2020

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Table of Contents

Summary of Findings.....	1
Program Review Procedures.....	4
Program Administration	6
Overview	6
Federal Consistency	6
Management Plan.....	8
Coastal Training Program.....	8
Facilities	9
Staffing	11
Resilience	11
State Legislation, Plans, and Policies	11
Community Resilience Program.....	12
Building the Next Generation and Workforce Capacity	17
Habitat Resilience	20
Coastal Resiliency Assessment.....	23
Reserve Data for Resilience	23
Public Access	26
Evaluation Metrics	27
Maryland Coastal Program Evaluation Metrics: 2018-2023.....	27
Maryland Coastal Program Evaluation Metrics: 2012-2017.....	30
Chesapeake Bay National Estuarine Research Reserve Evaluation Metrics: 2017-2022	35
Chesapeake Bay National Estuarine Research Reserve Evaluation Metrics: 2012-2017	37
Conclusion.....	41
Appendix A: Response to Written Comments	42

Summary of Findings

The Coastal Zone Management Act requires the National Oceanic and Atmospheric Administration (NOAA) to conduct periodic evaluations of the performance of states and territories with federally approved coastal management programs and national estuarine research reserves. This evaluation examined the operation and management of the Maryland Coastal Management Program and Chesapeake Bay-Maryland National Estuarine Research Reserve administered by the Maryland Department of Natural Resources, the designated lead agency, for the periods of September 2014 to July 2020 and February 2011 to July 2020, respectively. Where the Maryland Coastal Program and Chesapeake Bay-Maryland Reserve have worked together, the findings refer to the Maryland Chesapeake and Coastal Service. The evaluation focused on two target areas: resilience and program administration.

The findings in this evaluation document will be considered by NOAA in making future financial award decisions concerning the Maryland Coastal Management Program and Chesapeake Bay-Maryland National Estuarine Research Reserve. The evaluation came to these conclusions:

Program Administration

Necessary Action: The Maryland Coastal Program must ensure that the designated agency for implementing federal consistency is the single point of contact for receiving any federal consistency correspondence and issuing federal consistency determinations and certifications. The language on any state website needs to clearly state that the Maryland Department of the Environment is the lead reviewing agency for all Coastal Zone Management Act federal consistency reviews. Or, if the state wants to make the Department of Natural Resources the single state federal consistency agency, then it must propose such a change to NOAA and develop the applicable state directives or agreements to do so.

Recommendation: The Maryland Coastal Program is encouraged to update the list of federal actions for review under federal consistency and submit the revised list to NOAA for approval and incorporation into the state's federally approved program.

Necessary Action: The Chesapeake Bay-Maryland Reserve must (a) work closely with the Office for Coastal Management to develop and submit a timeline for management plan approval three months from issuance of the final findings that addresses both the reserve's and Office for Coastal Management's tasks, and (b) complete the final management plan by the agreed-upon date in the approved timeline.

Necessary Action: The Chesapeake Bay-Maryland Reserve must staff the role of the Coastal Training Program coordinator by December 30, 2021 and meet the requirements of the Coastal Training Program Coordination task in its annual federal assistance award by fiscal year 2021 (October 2021 to September 2022) to maintain federal funding for a Coastal Training Program in fiscal year 2022 (October 2022 to September 2023). Funding decisions for fiscal year 2022 funds will be made between March and May 2022. The reserve must report on this necessary action semi-annually through September 2022 and thereafter report annually.

Recommendation: The Chesapeake Bay-Maryland National Estuarine Research Reserve is encouraged to continue to pursue opportunities to provide facilities at Monie Bay to increase its attractiveness as a research site and provide a place to engage with the local community. In addition to working with the department's Engineering and Construction Unit to advance the progress on design and obtain necessary match for future procurement, acquisition and construction (PAC) funding, the reserve could explore options to partner with a university to create a field station or look at alternative land parcels that are at a higher elevation to site facilities.

Resilience

Accomplishment: The Maryland Coastal Program developed and launched a successful five-year initiative, Resiliency through Restoration, and has funded and provided technical support for 16 community projects that are demonstrating how nature can enhance the resilience of local communities, economies, and natural resources.

Accomplishment: The Chesapeake and Coastal Service has worked in partnership with the Deal Island community to incorporate the community's culture and history into the identification and development of projects to improve the community's resilience.

Accomplishment: The Chesapeake and Coastal Service's creation of the innovative Maryland Climate Leadership Academy has helped build the knowledge and skills of Maryland's workforce, created a community of practice for sharing knowledge and ideas, and is preparing communities to successfully implement new Resilience Finance Authorities.

Accomplishment: The Chesapeake Bay-Maryland Reserve's education program Shoring Up Resiliency through Education (SURE) is engaging students in understanding how their environment, science, and cultural heritage work together to strengthen community and is serving as an education model regionally and nationally.

Accomplishment: The Chesapeake and Coastal Service improved the efficiency and effectiveness of habitat restoration and reducing costs through the development of the BUILD tool to increase the use of dredged material in habitat restoration projects and developing standardized monitoring protocols that can be used to assess restoration effectiveness and impacts.

Accomplishment: The Maryland Coastal Program has significantly improved public access in the state, including through its support of the designation of the Mollows Bay-Potomac River National Marine Sanctuary and through the creation of 133 miles of state-designated water trails.

Recommendation: The NOAA Office for Coastal Management encourages the Maryland Coastal Program to continue to pursue opportunities to fund and support resilience projects, including those that use nature to enhance the resilience of local communities, economies, and natural resources.

Recommendation: The NOAA Office for Coastal Management recommends the Chesapeake Bay-Maryland Reserve build on its success in developing monitoring protocols for habitat resilience projects and work with partners to expand the development and use of standardized monitoring protocols in the state and region to inform future investments.

Recommendation: The NOAA Office of Coastal Management encourages the Chesapeake Bay-Maryland Reserve to complete its habitat maps.

This evaluation concludes that the State of Maryland is successfully implementing and enforcing its federally approved coastal management program, adhering to the terms of the federal financial assistance awards, and addressing coastal management needs identified in section 303(2)(A) through (K) of the Coastal Zone Management Act. This evaluation also concludes that the State of Maryland's operation and management of the Chesapeake Bay-Maryland National Estuarine Research Reserve, including education, research, and interpretative activities, is adhering to the programmatic requirements of the National Estuarine Research Reserve System.

Program Review Procedures

The National Oceanic and Atmospheric Administration (NOAA) evaluated the Maryland Coastal Management Program and Chesapeake Bay National Estuarine Research Reserve-Maryland in fiscal year 2020. The evaluation team consisted of Carrie Hall, evaluation team lead; John Kuriawa, liaison, Chesapeake region; Chelsea Combest-Friedman, acting director, NOAA Regional Integrated Sciences and Assessments program; Tancred Miller, Policy and Planning Section chief, North Carolina Coastal Management Program; and Rachael Phillos, manager, Delaware National Estuarine Research Reserve. The support of Maryland Coastal Management Program and Chesapeake Bay-Maryland National Estuarine Research Reserve staff members was crucial in conducting the evaluation, and this support is most gratefully acknowledged.

NOAA sent a notification of the scheduled evaluation to the director of the Maryland Department of Natural Resources, published a notice of “Intent to Evaluate” in the *Federal Register* on June 16, 2020, and notified members of Maryland’s congressional delegation. The coastal management program posted a notice of the public meeting and opportunity to comment in *The Baltimore Sun* on July 10, 2020.

As part of the evaluation process, a review of relevant information was conducted including annual federal financial assistance award reports, the previous evaluation findings, and information provided by the programs documenting how they are implementing their programs and addressing the programmatic requirements of the Coastal Zone Management Act. A survey of stakeholders was conducted, and NOAA National Estuarine Research Reserve sector leads were interviewed.

The information review and survey results informed the identification of two target areas for the evaluation: resilience and program administration. A virtual site visit was conducted, and the evaluation team held all meetings by video conference and met with staff members and with stakeholders and program staff members about the target areas. In addition, a virtual public meeting was held on Wednesday, July 22, at 12:00 p.m. Eastern, to provide an opportunity for members of the public to express their opinions about the implementation of the program. Stakeholders and members of the public were also given the opportunity to provide written comments. A summary of the written comments received and the NOAA Office for Coastal Management’s responses are included in Appendix A. NOAA then developed draft evaluation findings, which were provided to the Maryland Department of Natural Resources for review, and the department’s comments were considered in drafting the final evaluation findings.

Where the Maryland Coastal Program and Chesapeake Bay-Maryland Reserve have worked together the findings refer to the Maryland Chesapeake and Coastal Service. Final evaluation findings for all coastal management programs and national estuarine research reserves highlight the programs’ accomplishments in the target areas and include recommendations, which are of two types:

Necessary Actions address programmatic requirements of the Coastal Zone Management Act or its implementing regulations at 15 C.F.R., Part 921 and Part 923. Necessary actions must be carried out by the date specified. Failure to address necessary actions may result in a future finding of non-

adherence and the invoking of interim sanctions, as specified in the Coastal Zone Management Act § 1458(c) and 1461(f).

Recommendations are actions that the office believes would improve the program but which are not mandatory. The state is expected to have considered the recommendations by the time of the next evaluation or dates specified.

Program Administration

Overview

The Maryland Coastal Program and Chesapeake Bay-Maryland National Estuarine Research Reserve are managed through the Chesapeake and Coastal Service in the Maryland Department of Natural Resources. The coastal program and reserve successfully implement their programs and operate as an integrated team to address priority coastal management issues. This evaluation focuses on the programs' efforts to address coastal resilience and program administration.

The programs are national leaders in developing and implementing state policies to improve climate resilience. The programs have been successful and creative in building the capacity of local governments and other coastal decision makers to develop plans and policies and implement on-the-ground projects to build resilience. The programs excel at being conveners and collaborators, bringing together federal, state, and regional technical resources and funding to address state and local coastal resilience. The programs strive to be at the forefront of science and policy and are described by their partners as creative and innovative problem solvers, and incubators of ideas.

Program staff are trusted and valued for their technical support and knowledge. Stakeholders and partners praised staff during the evaluation, and described their experiences working with the staff: "staff are always ready to assist to address a host of needs;" "knowledge of staff is invaluable [their] coordination is so valuable;" "more engaged than any other funder I work with . . . they work closely with us to add ideas and solutions and expertise and insights and get in the field with us;" "funding and technical assistance is invaluable . . . highly qualified and keep up on advancements;" "proud to partner with them;" and "they serve as a connector within the agency."

Federal Consistency

The coastal program worked with program partners to develop a program change submission with updated policies from Maryland Department of the Environment and Department of Natural Resources' Forest Service and Critical Area Commission to ensure that the updated policies were accurate and complete. The program change was submitted to NOAA in July 2020 and was approved in October 2020.

In 2013, the State of Maryland and U.S. Department of Defense signed an innovative memorandum of understanding (MOU) to streamline federal consistency review. The MOU provides a framework for the U.S. Department of Defense branches to understand the information required, and a list of project types that do not warrant a full consistency review, for example, routine maintenance operations, was developed. The MOU has resulted in improvements in U.S. Department of Defense compliance and state reviews. However, during this evaluation, we have identified that there still remain challenges, primarily due to staff turnover within the department. Continued engagement is needed by NOAA, U.S Department

of Defense, and Maryland program staff to ensure mutual understanding of the federal consistency review process, the MOU, and its benefits. The NOAA Office of Coastal Management encourages Maryland program staff to develop a process for engaging regularly with the U.S. Department of Defense to ensure that staff are knowledgeable regarding the federal consistency review process, the MOU, and its benefits, and to work with NOAA in this effort.

The Maryland Department of the Environment is currently the designated state agency that implements federal consistency for the state. The Maryland Department of the Environment and Department of Natural Resources work closely together to implement federal consistency for the State of Maryland. The language on the Maryland Department of the Environment and Department of Natural Resources websites, and the federal consistency process in effect at the time of the site visit, does not reflect that the Department of the Environment is the state's designated sole point of contact for submissions and is responsible for issuing all federal consistency decisions. The Department of Natural Resources and Department of the Environment need to work together to clarify the state's federal consistency process and ensure that the state is meeting all federal regulations, particularly that there is a single point of contact for federal consistency reviews.

The code of Federal Regulations 15 CFR § 930.6 states:

(a) A designated State agency is required to uniformly and comprehensively apply the enforceable policies of the State's management program, efficiently coordinate all State coastal management requirements, and to provide a single point of contact for Federal agencies and the public to discuss consistency issues....

(b) The State agency is responsible for commenting on and concurring with or objecting to Federal agency consistency determinations and negative determinations (see subpart C of this part), consistency certifications for federal licenses, permits, and Outer Continental Shelf plans (see subparts D, E and I of this part), and reviewing the consistency of federal assistance activities proposed by applicant agencies (see subpart F of this part). The State agency shall be responsible for securing necessary review and comment from other State, regional, or local government agencies, and, where applicable, the public. Thereafter, only the State agency is authorized to comment officially on or concur with or object to a federal consistency determination or negative determination, a consistency certification, or determine the consistency of a proposed federal assistance activity.

Necessary Action: The Maryland Coastal Program must ensure that the designated agency for implementing federal consistency is the single point of contact for receiving any federal consistency correspondence and issuing federal consistency determinations and certifications. The language on any state website needs to clearly state that the Maryland Department of the Environment is the lead reviewing agency for all Coastal Zone Management Act federal

consistency reviews. Or, if the state wants to make the Department of Natural Resources as the single state federal consistency agency, then it must propose such a change to NOAA and develop the applicable state directives or agreements to do so.

Since the virtual evaluation site visit, the Maryland Department of Natural Resources and Department of Environment have been working together and made progress on clarifying online language, response procedures, and contact information to address this finding.

The coastal program list of federal actions subject to federal consistency review includes outdated information. The coastal program should update the list and submit the list to NOAA for approval and incorporation into the state's federally approved program. The approved federal consistency list of federal actions should also be posted on the state's federal consistency website(s).

Recommendation: The Maryland Coastal Program is encouraged to update the list of federal actions for review under federal consistency and submit the revised list to NOAA for approval and incorporation into the state's federally approved program.

Management Plan

All national estuarine research reserves are required by the Coastal Zone Management Act as detailed in 15 C.F.R. 921.33 to have five-year management plans. The reserve's 2008-2012 management plan is out-of-date. The reserve provided NOAA a thorough boundary change analysis and a partially completed draft management plan for feedback in October 2019. NOAA is evaluating the boundary change analysis, but has not yet provided comments on the management plan, as a complete draft plan was expected before year end 2020.

Necessary Action: The Chesapeake Bay-Maryland National Estuarine Research must (a) work closely with the Office for Coastal Management to develop and submit a timeline for management plan approval three months from issuance of the final findings that addresses both the reserve's and Office for Coastal Management's tasks, and (b) complete the final management plan by the agreed-upon date in the approved timeline.

Coastal Training Program

The Coastal Training Program plays a valuable role in the reserve system, providing training and technical assistance for local and regional decision makers on how to use science, including reserve research and monitoring data, to inform decision-making. In addition, the coordinators help engage coastal decision makers in the design of research projects so that research results can be used by decision makers. As explained in the National Estuarine Research Reserve System's *Coastal Training Program Performance Monitoring Manual*, as part of their participation in the Coastal Training Program, reserves are expected to provide a minimum of five trainings per year. The reserve met this goal in only four of the nine years covered by this evaluation: fiscal years 2011, 2012, 2014, and 2015. Between fiscal years 2016 and 2020, the reserve held three training events.

For much of the evaluation period, the reserve had a half-time Coastal Training Program coordinator whose time was split with the coastal program. Although the reserve did not always meet its training requirements, the part-time coordinator was very engaged with providing technical assistance, helping local communities build coastal resilience and creating innovative programs such as the Climate Academy discussed later in the findings. The coordinator's efforts were highly praised by stakeholders.

The past few years, including the present, the reserve has been without a Coastal Training Program coordinator and functional Coastal Training Program. A number of local and state stakeholders cited the value of having a Coastal Training Program coordinator and their hope to see the position filled. A Coastal Training Program coordinator could further the state's investment in climate resilience by serving as a bridge between researchers and decision makers. This could ensure that state and local decision makers have the knowledge and capacity to integrate the latest research into their decision-making and help the reserve be well-positioned to compete successfully for grants, including National Science Collaborative grants, which require projects to be designed with the extensive engagement of end users.

The Coastal Training Program has struggled with the balance of providing trainings and technical assistance; a revived program should include meeting the minimum performance goals in the National Estuarine Research Reserve System's *Coastal Training Program Performance Monitoring Manual*. The reserve has been unable to obtain a full-time state position for a coastal training coordinator but has developed a plan and is exploring opportunities to fill this role, including through a contract position or a split position with another organization.

Necessary Action: The Chesapeake Bay-Maryland Reserve must staff the role of the Coastal Training Program coordinator by December 30, 2021 and meet the requirements of the Coastal Training Program coordination task in its annual federal assistance award by fiscal year 2021 (October 2021 to September 2022) to maintain federal funding for a Coastal Training Program in fiscal year 2022 (October 2022 to September 2023). Funding decisions for fiscal year 2022 funds will be made between March and May 2022. The reserve must report on this necessary action semi-annually through September 2022 and thereafter report annually.

Since the virtual evaluation site visit, the state remains under a hiring freeze. The reserve has worked with departmental leadership to provide additional staff capacity to complete the required stakeholder needs assessment and is exploring strategies to achieve Coastal Training Program requirements in the longer-term.

Facilities

The reserve has three components: Monie Bay, whose land is owned by the state and managed by the department's Wildlife and Heritage Service as part of the Deal Island Wildlife Management Area; Otter Point Creek, which includes Harford County landowners and the Izaak Walton League; and Jug Bay, where Anne Arundel County Department of Recreation and Parks manages its county-owned property on the east side of the Patuxent River, and the Maryland-

National Capital Park and Planning Commission and Prince George's County own and manage the Jug Bay Natural Area portion of the larger Patuxent River Park on the west side of the river. The reserve and its implementing partners provide facilities for education, training, stewardship, and research, but there are gaps. The reserve is one of only three nationally that does not have facilities for overnight accommodation. The reserve at Monie Bay also does not have wet lab space adequate for sample analysis, or a place for engaging with the community.

The previous evaluation findings (2011) strongly encouraged the reserve to work with state and local partners to identify opportunities to develop facilities at Monie Bay to increase its attractiveness as a research site and provide a place to engage with the local community. The reserve is seeing an increased interest from researchers who want to conduct research in Monie Bay. At times, the researchers can use state park accommodations, but this is not always feasible. In 2011, through Maryland's Program Open Space, the department acquired a 37-acre property, Drawbridge Farm, with the intention of providing direct access to Monie Bay and infrastructure for a field station. The site had existing structures, including a farmhouse that was intended to serve as the field station. Unfortunately, the farmhouse was deemed uninhabitable because of mold, an aging electrical system, and lack of egress. Despite the condition of the building, the reserve still uses the farmhouse kitchen as a wet lab and the bathroom facilities because of lack of other local options.

In 2017, the reserve received a Procurement, Acquisition, and Construction (PAC) grant to begin work on safety and access improvements at the Monie site and the design of a new field station. The reserve, coastal program, and Coast Smart Council partnered with the University of Maryland School of Architecture to develop a graduate-level design studio for architecture students. The students were asked to complete their first real-world project and develop climate-resilient design concepts for a field station at the Monie Bay component of the reserve that fit the National Estuarine Research Reserve System standards for dorms, lab, and meeting spaces; achieve energy efficiency with a goal towards net-zero; and adhere to the state's Coast Smart Construction guidelines. The students developed 17 individual concepts, which were summarized in the report *Monie Bay Field Station: Charting a Way Forward* (<https://bit.ly/2GwoxvT>). The reserve developed a bid proposal based on the designs provided by the graduate students; however, due to the challenges of building in a vulnerable area, the quotes came in too high to proceed.

In the past year, Anne Arundel County decided to work with the reserve to do a PAC proposal for a hybrid camp and field site at Jug Bay that would include cabins, a bath house, meeting room, and office space, in addition to a mobile dorm unit that could also be used to host researchers at Monie Bay. These facilities will be a valuable addition to the reserve, but the reserve would still benefit from having permanent facilities at Monie Bay.

Recommendation: The Chesapeake Bay-Maryland National Estuarine Research Reserve is encouraged to continue to pursue opportunities to provide facilities at Monie Bay to increase its attractiveness as a research site and provide a place to engage with the local community. In addition to working with the department's Engineering and Construction Unit to advance the

progress on design and obtain necessary match for future procurement, acquisition and construction (PAC) funding, the reserve could explore options to partner with a university to create a field station or look at alternative land parcels that are at a higher elevation to site facilities.

Staffing

The coastal program and reserve have high-performing staff who are successfully building the state's resilience. As the needs and interests of communities and stakeholders continue to grow, the programs will be challenged if they continue to operate with existing staff levels. As discussed above, filling the Coastal Training Program coordinator position would provide the reserve with opportunities to better link research with coastal community information and technical assistance needs. In addition, the reserve must manage monitoring and research activities across three sites. The future addition of facilities at Monie Bay will help with this challenge, but having an additional staff member would also help. The Chesapeake and Coastal Service has undertaken a number of new initiatives during the evaluation period and continues to address increasing climate-change impacts in an increasing number of jurisdictions. It is a challenge for the coastal program to fill this gap with the existing staff resources. The Department of Natural Resources and Chesapeake and Coastal Service are encouraged to consider priority staffing needs and to seek opportunities to strengthen the program's ability to implement their programs that will improve the state's resilience.

Resilience

The coastal program and reserve continue to be national leaders in building coastal resilience. The programs have led and supported state efforts to develop and implement legislation, plans, policies, and regulations that improve coastal resilience and provide leadership and coordination support for a number of coastal hazards and climate councils and workgroups.

State Legislation, Plans, and Policies

The coastal program and reserve's efforts have laid the groundwork for state legislative and regulatory changes to improve the state's climate resilience, including:

- In 2014, new Critical Area Commission regulations were adopted, covering state development activities to address sea level rise and wetland migration areas and further protect wildlife corridors and potential wetland migration areas.
- In 2014, legislation established a Coast Smart Council for the purposes of adopting specific Coast Smart siting and design criteria to address impacts associated with sea level rise and coastal flooding on future capital projects. Program staff continue to coordinate this council and staff it for the chair, the department's secretary.
- In 2015, the Maryland Commission on Climate Change was codified into law. The purpose of the commission is to advise the governor and general assembly "on ways to mitigate the causes of, prepare for, and adapt to the consequences of climate change." The department secretary chairs the Adaptation and Resiliency Work Group, and the Chesapeake and Coastal Service staffs the work group.

- In 2015, the Maryland Coast Smart Construction Program was established and the Maryland State Finance and Procurement Codes were updated to require that if a state capital project includes the construction of a structure or reconstruction of a structure with substantial damage, the structure shall be constructed or reconstructed in compliance with the siting and design criteria established by the Coast Smart Council.
- In 2018, legislation passed that extended the work of the Coast Smart Council to include local projects funded by the state; changed the vulnerability assessment standards from 100-year flood to Category 2 storm surge; addresses saltwater intrusion; and requires that local jurisdictions experiencing nuisance flooding develop a plan to address the nuisance flooding.

The Chesapeake and Coastal Service has also strengthened its relationship with the Federal Emergency Management Agency and the state hazard mitigation officer to improve hazard planning and implementation. In 2016, the Coastal Training Program coordinator and other department staff members worked with the state hazard mitigation officer on the development of the state's hazard mitigation plan. The Chesapeake and Coastal Service also works across state agencies and with local governments to develop strong projects and align grant funding to mitigate vulnerability to hazards. The Coastal Training Program coordinator also held a series of Federal Emergency Management Agency Community Rating System training events to help local governments participate effectively in the program. An additional example of an improved relationship is that the Chesapeake and Coastal Service co-funds a floodplain manager position with the Maryland Emergency Management Agency.

Community Resilience Program

The coastal program manages Maryland's Community Resilience Program, which leverages state and federal funding and technical assistance for local communities to address coastal hazards and build climate resilience through three programs:

1. **Coast Smart Communities**, supported by funding from NOAA, helps communities understand and plan for coastal impacts, such as storm surge, shoreline erosion, sea level rise, and nuisance flooding. During the evaluation period, over 28 projects were completed in 16 coastal communities.
2. **Green Infrastructure Resilience** supported by the U.S. Environmental Protection Agency helps local communities understand and plan for stormwater and riparian flooding hazards and implement on-the-ground projects such as low-impact-development techniques to address stormwater.
3. The **Resiliency through Restoration Initiative**, launched in 2017, is a five-year initiative supported by state capital funds to seed new ideas and approaches to demonstrate how nature can enhance the resilience of local communities, economies, and natural resources. The success of the Deal Island Peninsula Partnership, discussed below, helped catalyze state support for this new initiative. Maryland's coastal resiliency assessment was used to help identify projects. The initiative is providing funding and technical assistance to support 16 on-the-ground community projects that address coastal and inland flooding. The projects cover a

breadth of restoration techniques, including marsh restoration and enhancement, dune restoration, natural shoreline stabilization, beneficial use of dredged material, island restoration, stream restoration, and green stormwater practices. The reserve developed a monitoring protocol and strategy and is overseeing monitoring of select sites to document results and is training others on the monitoring protocols.

Accomplishment: The Maryland Coastal Program developed and launched a successful five-year initiative, Resiliency through Restoration, and has funded sixteen community projects that are demonstrating how nature can enhance the resilience of communities, economies, and natural resources.

Recommendation: The NOAA Office for Coastal Management encourages the Chesapeake and Coastal Service to continue to pursue opportunities to fund and support resilience projects, including those that use nature to enhance the resilience of communities, economies, and natural resources.

Throughout the evaluation period, the coastal program and reserve have continued to expand the scope of their work and capabilities to help communities address climate resilience. The coastal program provides extensive technical assistance and training, and works on building partnerships and networks to strengthen local communities and regional initiatives. The Coastal Training Program coordinator in particular has worked intensively with communities to support resilience efforts. The coastal program also funds positions outside its agency to support much-needed technical assistance for local communities and other partners. In 2009, the coastal program began supporting two watershed specialists in the coastal zone who cover an additional nine counties and two million people through the Urban Waters Partnership. The watershed specialists initially focused on Total Maximum Daily Loads and are now also helping communities address nuisance flooding. The watershed specialists were cited in the public meeting as providing exceptional technical assistance to local governments and nongovernmental organizations to build capacity and implement projects. Feedback at the public meeting included: “our watershed restoration specialist, he rocks our world;” “in last six years since we started . . . 200 projects completed;” the coordinator “helps me see things differently, helped with grants and identifying problems;” and “having a watershed restoration specialist has helped get on-ground projects done . . . have completed sixty residential best management practices.” In addition, the coastal program supports the three Eastern Shore regional planners through the Maryland Department of Planning who assist smaller municipalities with their planning efforts, including helping communities build resilience.

The coastal program and reserve have worked to align their capacity and community and habitat resilience work. A key part of this process was having a shared Coastal Training Program coordinator/coastal hazard planner position for several years. Coastal inundation, habitat migration, and restoration projects that provide community resilience are common challenges and vulnerabilities across many of the state’s coastal communities and within reserve boundaries. One of the most significant outcomes of this program alignment and partnership is the Deal Island model, discussed under the community example section below, of a comprehensive and intensive approach to collaborating with a coastal community.

In 2015, the Chesapeake and Coastal Service began working across divisions to expand the scope of its Community Resilience grants to include a more watershed-level approach to address resilience and the threats associated with increased precipitation with climate change. Chesapeake and Coastal Service staff are now working closely to pair coastal and inland flooding on requests for proposals. In 2019, the state passed House Bill 1427 (2019), Chapter 442, requiring local jurisdictions that were dealing with nuisance flooding to develop a plan to address the flooding by October 2020. The Chesapeake and Coastal Service undertook an extensive effort to implement the legislation and developed guidance for communities and is working with partners to assist communities in the development and approval of the plans.

Recently, the coastal program created a grants gateway at the request of local governments who found it challenging to determine what types of grants were best suited for their needs. Applicants can now go to a single point of entry when seeking technical and financial support for projects that foster healthy ecosystems, communities, and economies that are resilient in the face of change.

Stakeholders the evaluation team met with identified several areas the coastal program and reserve might be able to provide valuable assistance. Stakeholders reported that it would be helpful if the coastal program could help determine what precipitation projections should be used for planning purposes and where interested in a tool to visual flood risk across the state under current and future conditions. Stakeholders also noted that there were opportunities to update regulations that have not yet caught up with the storm events that cities were experiencing, and the coastal program could be of assistance with that effort. Stakeholders also stated there was a need for streamlining permitting for resilience projects that were being constructed for public benefits. The coastal program has undertaken efforts to improve permitting by funding additional Maryland Department of the Environment staff members to process permits. The coastal program is well positioned to use its collaboration and facilitation capabilities to bring parties together to look for opportunities to streamline permitting for restoration projects. The reserve's research and habitat monitoring data could inform the development of an effective streamlined permitting process. The coastal program may wish to look at other ongoing efforts, for example the San Francisco Bay Conservation and Development Commission has recently undertaken an effort to bring together federal, state, regional, and local agencies involved in permitting in the Bay area to look for opportunities to streamline habitat restoration permitting.

Example: Deal Island

The reserve and coastal program have invested significant resources into working with the Deal Island community to improve resilience over the past eight years. In 2012, with funding from a National Estuarine Research Reserve Science Collaborative grant, the reserve and the University of Maryland worked with the community to understand how different management practices impact marsh and community resilience in the area. The team, including two sociologists, integrated economic, anthropological, and ecological research through the use of collaborative research projects focused on heritage, flooding and erosion, and wetland restoration.

The Deal Island Peninsula Partnership, a network of community members, researchers, government representatives, and nongovernmental organizations was formed and continued after the project ended. Through the Integrated Coastal Resiliency Assessment, a flood vulnerability study of the peninsula now and into the future was developed. The partnership engaged in community-based mapping to identify local areas of concern regarding flooding and erosion and then conducted collaborative field assessments. These activities were used to identify key social and environmental risks and develop a list of priority issues. Two top priorities were the Deal Island Shoreline and Marsh enhancement project. Support for the Deal Island Shoreline and Marsh enhancement project is being provided by the Chesapeake and Coastal Service, and funding is coming from the state's Resiliency through Restoration Program to increase resilience of the Deal island community and habitats to coastal storms, flooding, erosion, and sea-level rise. A NOAA Coastal Management Fellow also created a story map (<https://maryland.maps.arcgis.com/apps/Cascade/index.html?appid=d08a4893d76949459deffb35a516ea5b>) of Monie Bay and the Deal Island Peninsula to highlight reserve investments in research, education, and the community over the past five years. The story map has also been used in a lesson with Teachers on the Estuary, and the education coordinator has worked with teachers to apply this tool in the classroom.

Accomplishment: The Maryland Coastal Management Program and Chesapeake Bay-Maryland National Estuarine Research Reserve have worked in partnership with the Deal Island community to incorporate the community's culture and history into the process of identification and development of projects to improve the community's resilience.

Through its work with the Deal Island community, the programs built a successful, albeit resource-intensive, process for working with a rural community to build resilience that is based on social science. The NOAA Office of Coastal Management encourages the Maryland Coastal Program and Chesapeake Bay-Maryland National Estuarine Research to build on lessons learned while working with the Deal Island community to develop a streamlined framework for expansion of the initiative to other communities while maintaining project quality. They are encouraged to share the framework nationally.

The Chesapeake and Coastal Service has been a leader among the national coastal zone management programs in incorporating social science into resilience efforts. The Maryland Coastal Program and the Chesapeake Bay-Maryland Reserve are encouraged to continue to pursue innovative methods of incorporating social science into resilience efforts, as well as its efforts to address equity issues.

The Chesapeake and Coastal Service has supported a significant number of projects and partners over the evaluation period. A few additional examples are highlighted below.

- A congregation of a historic church in Annapolis is working with the coastal program to install a living shoreline in a project that will engage school programs and other local partners. The congregation has wanted to do the project for over 15 years, and the

coastal program was able to provide them with the materials to document risk and “get them over the hump” to implement the project. Due to covid-19, the project proponents are looking to the coastal program for assistance with modifying their outreach plan to engage stakeholders virtually during the pandemic.

- The Greater Baltimore Wilderness Coalition is focused on improving the quality of life for residents through increased collaboration between agencies, nonprofits, and jurisdictions on matters such as resiliency, biodiversity, and equity across 39 communities. In the past year, the coalition, with the assistance of the coastal program, has hosted two Nature City forums where information was shared on resiliency, green infrastructure, equity, and public health; received a National Fish and Wildlife Foundation grant to develop a regional resiliency mapping tool; developed a biodiversity toolkit; and with the Hispanic Access Foundation developed a children’s outdoor bill of rights. According to a stakeholder, the “department has been a key foundational partner” and provided broader opportunities to connect at the state level and find funding. Green infrastructure efforts in Baltimore have been used by Cecil County decision-makers to inform their efforts as they look to revamp their green infrastructure.
- The Low Impact Development Center received support for its work in Prince George’s County. The center is assisting and helping coordinate green infrastructure work across the county’s 27 municipalities. The county conducted a study modeling current and future stormwater and identified various retrofit opportunities in the City of Hyattsville. The center helped the city use the study results and implement low-impact development projects to address stormwater. The center was able to incorporate lessons learned from Hyattsville when doing a similar project in the City of Mt Rainier.
- The coastal program worked closely with a community in Baltimore, with an average income of \$25,000, 20 percent homeownership, and 400 vacant lots. Staff helped the community develop a green community master plan, green thumb club, and private-public partnerships to support the community. The initiative included a broad array of activities, including housing counseling, real estate planning, community outreach, and a returning citizen program. The coastal program helped the community see the potential of blighted vacant lots and leverage funding for community green space. Staff supported community efforts to design and build Archway Park, a new gateway to the community. Coastal program staff members also helped the community obtain funding through the National Fish and Wildlife Foundation for a Nature Play Space between two houses, and to develop a maintenance plan. A stakeholder cited the coastal program staff members’ technical assistance as “invaluable” in working through many challenges.
- The coastal program partnered with the Partnership for Action Learning in Sustainability (PALS) at the University of Maryland Center for Smart Growth to create an umbrella contract to reach five small communities to streamline the contracting process for small communities. The projects allow undergraduate and graduate students to tackle real-world projects and bring innovative ideas and the latest research and practices to small communities. For example, students and faculty have helped address stormwater and flooding through developing a system for tracking inspections and stormwater outfalls.

Building the Next Generation and Workforce Capacity

Maryland Climate Leadership Academy

The Maryland Climate Leadership Academy was launched in 2018, in partnership with the Association of Climate Change Officers. The creation of the academy was driven by the Coastal Training Program coordinator. The academy is designed to build the capacity of state and local government agencies, infrastructure organizations such as ports and utilities, and the private sector to integrate climate considerations into decision-making, implement Coast Smart Construction Infrastructure Siting and Design Guidelines, and build resilience. Stakeholders noted that the academy has increased the confidence of state and local staff members to find climate information and funding opportunities, and to incorporate resilience into their work. The academy provides formal training and skill development and a chance for participants to network with professionals in the state. Over 450 professionals have participated. Below are two examples of the academy's impact.

Example: Maryland Department of Transportation

The Maryland Department of Transportation has at least 10 staff members who have graduated from the Maryland Climate Leadership Academy with the knowledge and skills to consider climate and resilience in planning and decision-making. This training has helped the department implement the 2018 Coast Smart legislation, which added sea level rise and coastal flooding considerations for siting and design criteria for future capital projects, such as highway facilities. Staff members were able to apply their academy training to develop new guidance addressing the legislation and also in their participation in the Commission on Climate Change and Maryland adaptation plan update. They are able to apply their training to look at ways to make critical infrastructure more resilient and to identify the tools and data needed going forward. The training also helped shift perceptions, and staff members are now more focused on considering conditions 50 years into the future and what the agency can do to better mitigate and plan to optimize transportation investments. The academy has also given staff members the knowledge and tools to discuss with senior leadership the advantages of investing in resilience. For example, the academy provided information on how major bond rating agencies are giving higher bond ratings for large capital projects that consider climate change leading to lower overall project costs.

Example: Charles County

In Charles County, the county administrator facilitated bringing a Maryland Climate Leadership Academy session to the local community college, and now over 30 county employees across county government agencies including finance, building, planning, transportation, and parks and recreation have a strong baseline of knowledge. The administrator cited the ability of the academy to help "level the playing field" for smaller counties and governments and provide staff with climate information and skills to incorporate into their work. The administrator brought together over 10 of these employees to develop a resilience strategy for the county with four prongs: adaptation, mitigation, building capacity, and telling our story. The county has since developed an action plan. The administrator noted that in 2019, the county met with the

major bond rating agencies, and they were very interested in how the county was addressing two major threats: cybersecurity and climate change. S&P Global Ratings (formerly Standard and Poor's), in particular, asked hard questions about the county's resilience. The one-page summary S&P Global Ratings Report for the county gives the county a AAA bond rating and the rationale states "Very strong management . . . We view the county's proactive and multipronged approach to climate change as indicative of the management team's overall long-term planning strategy . . . The county is also partnering with the Maryland Climate Leadership Academy to credential local government officials; more than twenty county staff members are enrolled." The county's efforts to take advantage of the academy and to build capacity to address climate change is positively impacting its access to lower interest rates, further improving the county's financial resilience. The county is now well-positioned to take advantage of new state legislation to create a Resilience Finance Authority to fund implementation of the action plan.

Accomplishment: The Chesapeake and Coastal Service's creation of the innovative Maryland Climate Leadership Academy has helped build the knowledge and skills of Maryland's workforce, created a community of practice for sharing knowledge and ideas, and is preparing communities to successfully implement new Resilience Finance Authorities.

Fellowships

The reserve and coastal program have invested in building the next generation of coastal managers, educators, and scientists and have benefited from their efforts to complete key projects. For example, a Chesapeake Bay Conservation Corps fellow (2018-2019) worked closely with Otter Point Creek Alliance to identify early childhood education as a gap in reserve programming. To address this issue, the fellow wrote two grant applications, and obtained funding through the Chesapeake Bay Trust. The fellow managed her capstone project from start to finish, from managing the budget to on-the-ground construction. The fellow created a natural discovery area with nature-based opportunities for play and implemented an "all hands day" to create a natural discovery area at the Anita C. Leight Estuary Center. The fellow also had the opportunity to work with students in the community and developed and implemented lessons for the Shoring Up Resiliency through Education Program (further discussed below) during the program's pilot year. The evaluation team met with several past fellows who are now coastal managers, educators, and scientists in Maryland and the Mid-Atlantic who credit their fellowships and the support of the coastal program and reserve as making them very competitive in the job market. Additional examples of fellows and their contributions to coastal program and reserve programming are discussed throughout the findings.

K-12 and General Public Education

Education is integrated into coastal program and reserve activities, with topics ranging from infusing historical and environmental messaging into public access maps and signage, to incorporating monitoring and restoration into K-12 programming. Two of the reserve education program's unique niches are public access and civic engagement. As a multi-component reserve, the partners do much of the on-the-ground education, and the education coordinator

focuses on coordination among partners and priorities. The education coordinator's position is located in the department's education unit.

The reserve's education program has had a long-standing partnership with Somerset County School District, the smallest school district in Maryland. The reserve has provided a wetlands and wildlife field day for 4th graders since 1993 and is now working with the children of parents who attended while they were in school. Recently, the education program has built on this success and created a new program, Shoring Up Resiliency through Education (SURE). This program is designed to support the county public schools in providing Systemic Meaningful Watershed Education Experiences in elementary, middle, and high school (grades 5, 6, and 9), as called for in the Chesapeake Bay Watershed Agreement (2014).

SURE was developed to engage students in understanding how environment, science, and cultural heritage work together to strengthen community. Students are introduced to topics through interactions with local experts identified through the Deal Island Partnership who can tell personal stories of how aspects of local culture and livelihood are now and will be in the future affected by changing environmental conditions. Students engage in classroom and field experiences, collecting and analyzing data on local conditions such as weather and water quality, and culminating in student-led stewardship to address resilience.

The SURE program also includes professional development and in-person trainings and field investigations and ongoing support. An informal community of practice has been created to advance climate change literacy for formal and informal educators. The reserve is also working with teachers to move to virtual engagement as well. The education program conducts a Teachers on the Estuary workshop every year, and the NOAA Chesapeake Bay Office has been a strong partner. In 2019, the education coordinator coordinated with the Delaware National Estuarine Research Reserve, NOAA Chesapeake Bay Office Eastern Shore Training Center, and Delaware Sea Grant to conduct a Teachers on the Estuary workshop focusing on climate science, communications, resources, and solutions.

SURE was described by a teacher as "eye opening on so many levels" and as changing behaviors in a faith-based community that had not previously been talking about climate change. The evaluation team met with representatives from both NOAA and Maryland Coastal Bays Program, who stated that they had used the SURE programming as a model for national educational programming and programs elsewhere in the state. NOAA has also worked with the reserve's education coordinator to share this model within NOAA and beyond.

Accomplishment: The Chesapeake Bay-Maryland Reserve education program Shoring Up Resiliency through Education (SURE) is engaging students in understanding how their environment, science, and cultural heritage work together to strengthen community and is serving as an education model regionally and nationally.

Opportunities

The evaluation team also heard from partners and stakeholders about other opportunities for building on the reserve and coastal program's work, including the following:

- The department's website could be improved to make it easier to find educational resources, particularly for someone just getting into teaching. With many teachers now teaching in a virtual environment, this could have a large impact.
- When the reserve's education program conducts its next market analysis, there is an opportunity to look at what the reserve and NOAA can work on together.
- Partners are looking forward to working with the reserve and coastal program on how to communicate solutions and opportunities concerning climate change and adaptation.
- Currently, only three counties in the state have an equity officer. There is an opportunity to both expand the number of jurisdictions that have equity officers and engage with these officers to increase citizen buy-in to address climate impacts, ensure that resilience efforts have equitable outcomes, and bring resources to address impacts to the most underserved communities.

Habitat Resilience

The coastal program manages the state's Green Infrastructure Resilience program, funded through the state's Chesapeake and Atlantic Coastal Bays Trust Fund. The fund advances Chesapeake Bay restoration by funding the most effective nonpoint pollution control projects. The projects can be viewed online at

<https://maryland.maps.arcgis.com/apps/MapSeries/index.html?appid=f7adba8f56924bc58a95d2fac56ec954>. The coastal program works on a variety of habitat projects with trust funds.

Although the projects are focused on reducing nitrogen, phosphorus, and sediment going into the Bay, many also have co-benefits for wildlife, habitat, and resilience. The Chesapeake and Coastal Service has been a national leader in living shorelines for two decades. The NOAA Office for Coastal Management encourages the Chesapeake and Coastal Service to pursue opportunities to share its successes and lessons learned regarding living shorelines through the National Coastal Zone Management Program and National Estuarine Research Reserve System and other venues.

The coastal program provided state trust funding and technical support for an initiative with The Nature Conservancy and U.S. Fish and Wildlife Service to complete a large-scale wetland restoration project, over 3,500 acres, on the Pocomoke River that included working with many different private landowners. The coastal program's funding was key in enabling The Nature Conservancy to have the capacity to hire a staff person to work on-the-ground with landowners over seven years. He was able to spend extensive time working with landowners building trust and walking them through the project's implications and getting their buy-in to the project. He was also able to oversee the permitting and construction. By partnering with a nonprofit, landowners had the choice of enrolling in a federal program or working with a nonprofit to place their land under easement. The project is being adaptively managed, and the area is now

more resilient, as the area is able to handle increasing tidal flows. The project was also designed to improve public access through water trails, and the development of a map, guide, and signage provide interpretive cultural and ecological information. As a partner described, “it is a great partnership, we have all found our niche and key roles and we are working across the Chesapeake Bay to recreate this type of partnership in other states because it is such a benefit.”

Partners noted a number of challenges and opportunities going forward:

- They suggested an increased focus on hydrology to increase resilience and water quality.
- Partners noted the challenges of engaging landowners and having the capacity to conduct valuable outreach and technical assistance.
- There are also opportunities to look at innovative techniques on agricultural lands and to develop incentives for landowners to implement practices such as saturated buffers.
- There are opportunities to develop more standardized monitoring protocols to relate findings across projects and extrapolate findings across landscapes, and there was concern that the Bay was starting to lose U.S. Geological Survey monitoring stations.
- Conduct research to answer key questions about the success of projects, for example, looking at whether a project reduces flooding.
- Currently, modeling is being done in the upper Potomac looking at water storage, but more information would be helpful.
- More information is also needed on mitigation, such as looking at when a freshwater system moves from being a contributor to CO₂ to storing CO₂.

Beneficial Reuse

The Chesapeake and Coastal Service initiated efforts to move from opportunistic efforts to use material dredged from state-jurisdictional waterways as a cost-cutting solution to shoreline restoration to further evaluating the use of dredged material as a strategy to increase coastal resilience and more systematically aligning restoration and dredging projects to save on costs and provide new opportunities for future habitat restoration.

The coastal program and reserve partnered to develop a successful proposal for a Coastal Management Fellow (2017-2019) to develop a departmental policy to promote beneficial use of dredged material to improve coastal resilience and cost efficiency. The fellow was mentored by coastal program and reserve staff members, ensuring a strong connection between data and decision-making. The fellow developed guidance and drafted a policy, “Dredged Material Placement on Resources Managed by the Department of Natural Resources,” to promote the use of dredged material in a beneficial application.

The fellow conducted an extensive intra-agency engagement effort and led the development of the Beneficial Use: Identifying Locations for Dredge (BUILD) tool and ArcGIS layer available in the Maryland Coastal Atlas that enables the spatial identification of beneficial use of dredged material opportunities. BUILD allows project planners and dredgers to proactively identify sources of dredged material and restoration projects and serves as the “craigslist” of dredged material.

At the same time, the reserve partnered with seven other reserves to obtain a Science Collaborative grant to investigate application rates of sediment in marsh enhancement projects. The reserve biologist, stewardship coordinator, and NOAA fellow provided field support and ground-truthed beneficial-use models. The study site, located in Deal Island Management Area and adjacent to Monie Bay reserve boundaries, subsequently became a pilot site for a pending thin layer placement project with the U.S. Army Corps of Engineers. A Thin Layer Placement Guide (<https://bit.ly/3842OH2>) was developed, which staff plan to use to inform future projects in Maryland. The state was also able to save \$1.4 million on the restoration cost at Ferry Point Park in Kent Island, which was part of the impetus for the development of the BUILD tool to identify an opportunity for beneficial reuse of dredged material. The BUILD tool complements the Resiliency through Restoration Initiative, and is expected to result in many future opportunities to enhance coastal habitat and maintain navigable waterways while saving on costs.

Monitoring Guidance

The reserve developed a set of core monitoring metrics and protocols along with a consistent time frame (pre-project to 3 years following) for resiliency through restoration projects to better understand how, and if, projects are meeting the goal of building resilience. The challenge was to find a way to develop a protocol that could be applied consistently across different types of projects so data can be comparable. The reserve conducted a review of existing examples and found that there were not many available. The monitoring metrics and protocols that were developed are a resource for other entities in Maryland, the reserve system, and nationally. The reserve's biologist has conducted training for state staff members. The metrics and standardized protocols will provide comparable data for lessons learned to inform future efforts to build coastal resilience. Going forward, the reserve is working with partners to host and display the data.

This effort addressed a previous recommendation (2015) for the coastal management program to work with partners to encourage long-term monitoring of the effectiveness of living shoreline and resilience projects. Multiple partners noted that the state and conservation community would benefit from developing standardized protocols to relate findings across ongoing monitoring efforts in the state that could inform landscape-level decisions. Standardized monitoring protocols could help inform where to focus funding and effort, and demonstrate whether projects are successfully meeting their goals. The reserve is uniquely positioned to bring its expertise to assist with such a state- or regional-level effort and to work with the National Estuarine Research Reserve System to look nationally at opportunities for developing standard protocols to allow for better comparison and understanding across projects. There is also a unique opportunity to look across the Mid-Atlantic reserves, which have the advantage of multi-component sites, to be able to use standardized monitoring data to assess restoration impacts and other big-picture questions, such as those associated with ocean acidification.

Accomplishment: The Chesapeake and Coastal Service improved the efficiency and effectiveness of habitat restoration and reduced costs through the development of the BUILD tool to increase the use of dredged material in habitat restoration projects and developed standardized monitoring protocols that can be used to assess restoration effectiveness and impacts.

Recommendation: The NOAA Office for Coastal Management recommends the Chesapeake Bay-Maryland Reserve build on its success in developing monitoring protocols for habitat resilience projects and work with partners to expand the development and use of standardized monitoring protocols in the state and region to inform future investments.

Coastal Resiliency Assessment

The coastal program completed work on Maryland's Coastal Resiliency Assessment in 2016. The assessment is a landscape-level spatial analysis and modeling effort that identifies where natural habitats provide the greatest potential risk reduction for coastal communities. The coastal program then worked with the department's Land Acquisition and Planning to update the Program Open Space Stateside Scorecard to include coastal resiliency data as part of the evaluation of parcels being considered for acquisition by the state. This work was further expanded upon the completion of a coastal program-led parcel-evaluation tool that displays real-time data about the habitat and other key resources located on parcels under consideration for protection.

In 2018, the coastal program began working with Salisbury University's Eastern Shore Regional GIS Cooperative to develop a GIS-based vulnerability assessment of state recreational lands, including state parks, state forests, Wildlife Management Areas, and Fishery Management Areas. This assessment utilized climate change-related GIS data, infrastructure data, and ecological data to identify and understand vulnerabilities and impacts to state lands, including long-term impacts to recreational use, water access, infrastructure, and ecosystem management. The coastal program successfully competed for a 2020-2022 NOAA Coastal Management Fellow to assist in a second phase of the project, focused on developing Resilience Action Plans for three different land units managed by the department. The project will result in new technical guidance and best practices on climate adaptation for the management of public lands that can serve as a model for state and local land managers. This work marked a shift in work to integrate climate risk into department land planning that has expanded the Chesapeake and Coastal Service's ability to assist the department in leading by example.

Reserve Data for Resilience

The reserve has established sentinel sites for climate change (SSAM-1) at both Jug Bay and Monie Bay. Monie Bay is coming online in 2020 as a secondary System-Wide Monitoring Program station to increase accessibility of this data set. In addition, the reserve has a partnership with the National Geodetic Survey to set up benchmarks in the bay. The reserve has continued its emergent vegetation monitoring and submerged aquatic vegetation (SAV)

monitoring to contribute to the baseline knowledge of its systems. The reserve has updated its SAV protocol recently to better align with the department's and National Estuarine Research Reserve System's protocols. The reserve biologist participates in the Chesapeake Bay Program SAV workgroup, which is working to increase community scientist SAV monitoring bay-wide through the SAV Watchers program and to establish SAV sentinel sites within the research community to provide more rigorous long-term data at strategic locations. Otter Point Creek will be one of these sentinel sites.

The reserve's System-Wide Monitoring Program sites represent some of the longest-standing continuous monitoring sites in Maryland. Reserve stations have been in place since 2003, while many of the state's monitoring stations move around. The reserve works closely with partners, including the department's Resource Assessment Service, University of Maryland Center for Environmental Science, and Anne Arundel County to help manage the monitoring requirements for the three sites. The reserve's data are accessible through the Maryland Eyes on the Bay, as well as the National Estuarine Research Reserve System Central Data Management Office. This data "library," along with three unique field research sites, attracts a wide range of requests for access from researchers, including researchers from universities in Maryland and across the U.S. and state and federal government. In addition, the data are used by stakeholders, such as a local county that uses the data to monitor snow levels, which inform funding to counties for snow-removal activities. Although the reserve works to make the data available, there are opportunities to work with potential user groups, such as farmers and local governments, to advertise the availability of the data and develop products to improve decision-making for saltwater intrusion and sea level rise issues.

Due to monitoring requirements at three sites and the travel time and lack of facilities at Monie Bay, reserve staff members are challenged to find the time to complete all monitoring activities and to analyze the data and develop products. The reserve has relied opportunistically where it can on the ability to work with partners to analyze the data and develop products. The reserve has also been working on completing its System-Wide Monitoring Program habitat maps, but they are not yet complete. The reserve is encouraged to work with partners to analyze the data and develop products that can be used to increase understanding of changes in the Chesapeake Bay and inform decision-making.

Recommendation: The NOAA Office of Coastal Management encourages the Chesapeake Bay-Maryland Reserve to complete its habitat maps.

Below are three examples of how reserve data is being used to improve community resilience.

Example: Sentinel Site Cooperative

The Chesapeake Bay Sentinel Site Cooperative is a bay-wide partnership with coastal managers, decision makers, and community liaisons and a collection of ecosystem-based study sites with a focus on measuring the impacts of sea level rise. The cooperative's coordinator highlighted the importance of the partnerships and, in particular, the partnership with the reserve, stating that "active staff at the reserve make all the difference." Partners are working together to apply the

science produced at sentinel sites to coastal management and resilience efforts. The reserve was a founding member and with the coastal program helped fund the cooperative's first full-time coordinator. The reserve manager serves on the cooperative's management team; the research coordinator is part of the Sediment Elevation Table (SET) workgroup and has worked on a SET mapping effort to georeference sampling stations throughout the tidal marshes of the Chesapeake Bay; the education coordinator serves on the newer outreach group. The Coastal Training Program coordinator brought coastal hazard planning and sector expertise to the cooperative, working across the partnership to deliver a water level technical training. The reserve also provided extensive assistance in planning a marsh summit, bringing together scientists and coastal decision makers to share science and perspectives. The summit was viewed as a great success by attendees and has informed the development of multiple research proposals that have now been funded. For example, a discussion at the summit led the research coordinator at Delaware National Estuarine Research Reserve to realize that some people saw marsh migration through the lens of forest encroachment. The Delaware reserve is now hosting a 2020 Davidson Fellow who will be researching forest encroachment.

Example: Changing Chesapeake

The reserve partnered with the NOAA National Centers for Coastal Ocean Science, University of Maryland Center for Environmental Science, and Virginia Chesapeake Bay National Estuarine Research Reserve to analyze 114 years of meteorological data and System-Wide Monitoring Program data, and document trends. The analysis found clear evidence that physical climate changes are well underway and species and habitats are responding to those changes. As part of the project, reserve staff members worked with a contractor to display the data and tell the story of the data. Reserve staff members grew their science communications skills, and the project improved the reserve's ability to translate and communicate System-Wide Monitoring Program data for multiple stakeholders, such as educators, students, and resource managers. The education coordinator also uses the study as part of the Teachers on the Estuary curricula and has incorporated this work into climate communications training that the coordinator conducts in the region. The content has also been made part of a new climate change chapter in an online textbook for students from middle school through college and as a desktop reference for environmental managers, *The Chesapeake Bay Ecosystem Atlas* (<http://www.chesapeakeedata.com/Atlas/>). A postdoctoral researcher from the Maryland Center for Environmental Science who worked on the project also went on to become the research coordinator for the Delaware National Estuarine Research Reserve.

Example: Offshore Renewable Energy

The coastal program manager serves on the management board of the Mid-Atlantic Regional Council on the Ocean and works with its partners from New York to Virginia to implement the Mid-Atlantic Regional Ocean Action Plan. The region shares priorities, including climate change adaptation and offshore renewable energy. The coastal program helped secure and manage nearly \$5 million of state, Coastal Zone Management Act, and other federal funding to advance five critical ocean environmental studies related to marine mammals, sea turtles, birds, black sea bass, and benthic habitats. At the end of 2019, the coastal program began work to fund and leverage an additional \$2 million for projects advancing technology and understanding about

marine mammal acoustic detection, including one project aimed at detection of the critically endangered North Atlantic Right Whale. The results of these studies, available on the Mid-Atlantic Ocean Data Portal, provide a baseline of data and inform wind energy development offshore.

Public Access

In 2016, the department moved the state Clean Marina and Waterway Improvement Programs and portions of the Integrated Policy and Review Unit to the Chesapeake and Coastal Service. This new alignment has brought new opportunities to the coastal program to implement locally relevant coastal public access projects. The coastal program's Public Access, Water Trails, and Recreation Planning Program works with project partners to plan, develop, and promote public water access sites and water trails that provide water-based recreation opportunities for people to enjoy. Maryland is experiencing a big increase in non-motorized boating. To address this need, the public access program provided technical and design assistance to local governments and project partners. Over a five-year period from 2014 to 2019, this resulted in approximately 133 miles of state-designated water trails and eight new water trail maps and guides. The Chesapeake and Coastal Service also developed an improved water access site database, the Maryland Online Water Access Guide (<https://dnr.maryland.gov/boating/pages/water-access/boatramps.aspx>), and continues to make updates and improvements to this resource. These efforts also support the implementation of the Chesapeake Bay plan goal of 300 new access sites by 2025.

The Chesapeake and Coastal Service is working to improve access across user groups and ensure equitable access. The service worked with the University of Maryland School of Public Health to develop the Park Equity Analysis, an online GIS tool that evaluates underserved populations and their proximity to park space. The tool helps implement the coastal program's 309 Strategy, "Data to Decision Making," with a goal of integrating spatial and scientific data into state and local decision-making processes. The coastal program recently initiated a project with Morgan University to complete an access survey looking at where access is most needed and to identify areas that don't have the capacity to apply for grant funding. The coastal program also successfully competed for a Coastal Zone Management Act Projects of Special Merit grant starting in fall 2020 to expand safe and equitable access for Latinx users, the state's fastest-growing user group, at Maryland State Parks.

Below are two examples of public access projects.

Example: Monie Bay Water Trail

The reserve has long struggled to provide public access to the Monie Bay component of the reserve. To address this issue, the reserve's 2013-2014 Chesapeake Conservation Corps volunteer worked with staff to plan a network of three water trails to give visitors the opportunity to experience firsthand the rich ecology of this mesohaline estuary. The trails are identified with clear way-finding signs, and an online map can be printed or viewed by smartphone. An interpretive document to educate visitors on the local ecology and maritime

history of Monie Bay and Deal Island was created. The trails have been featured in Somerset County’s Trail Mix website. The project also provided a valuable experience to a rising professional—planning, designing, and implementing a site enhancement project.

Example: Mallows Bay-Potomac River National Marine Sanctuary

The Chesapeake and Coastal Service played a crucial role in the designation of Mallows Bay-Potomac River National Marine Sanctuary, the first new marine sanctuary in 20 years. The Chesapeake and Coastal Service serves as a sanctuary co-manager alongside NOAA, Maryland Historical Trust, and Charles County. The coastal program served as the department point of contact and, along with reserve staff, worked in partnership with NOAA’s Office of National Marine Sanctuaries, Maryland Historic Trust, Charles County, and numerous community partners throughout the nomination and designation process. In partnership with NOAA and Charles County, the service helped enhance tourism and recreational opportunities through the development of interpretative water and hiking trails in Mallows Bay Park, expanding traditional media and social media opportunities, and communication with congressional interests and major outdoor recreation partners. The Chesapeake and Coastal Service also partnered with the National Marine Sanctuary Foundation to deploy and maintain a new water-quality buoy to provide real-time information for multiple user groups and to enable a baseline of scientific record to understand changes and inform resiliency and adaptation strategies.

Accomplishment: The Maryland Coastal Program has significantly improved public access in the state, including through its support of the designation of the Mallows Bay-Potomac River National Marine Sanctuary and through the creation of 133 miles of state-designated water trails.

Evaluation Metrics

Beginning in 2012, state coastal management programs and national estuarine research reserves began tracking their success in addressing three evaluation metrics specific to their programs. The evaluation metrics include a five-year target and provide a quantitative reference for each program about how well it is meeting the goals and objectives it has identified as important to the program.

In 2017, reserves began a new five-year period and set targets specific to their programs for three performance measures chosen from existing national performance measures. In 2018, coastal programs began a new five-year period and set targets specific to their programs for two performance measures from the existing Coastal Zone Management Performance Measurement System and the coastal hazards performance measure.

Maryland Coastal Program Evaluation Metrics: 2018-2023

METRIC 1: COASTAL HAZARDS

Goal: Improve the resilience of Maryland’s coastal communities to the effects of increased flooding and other climate impacts.

Objective: By 2023, assist municipal, county and other local government partners and communities to prepare for the impacts of coastal flooding and climate change through increases in adaptation action.

Strategy: Maryland communities face a number of climate- and coastal hazard-driven risks throughout its coastal zone. The damages and impacts resulting from flood events present a substantial threat to communities, infrastructure and natural resources throughout the state. Since 2007, Maryland has experienced four hurricane and flood events warranting Presidential Disaster Declarations, resulting in more than \$95 million in federal public assistance. The Maryland Coastal Program has forged partnerships with local and state partners to (1) assess and understand risks and impacts, (2) plan strategies that integrate hazards in updated or new planning processes, and (3) implement projects or actions that reduce risk. Maryland will support initiatives to build community-level resilience through a variety of programs, policies or projects. The cumulative metric total will reflect the complementary nature of state and local programs, policies and projects necessary to build meaningful resilience. During the next five-years, Maryland Coastal Program is focusing on substantive projects where staff can engage in more long-term partnership building and/or technical assistance opportunities as opposed to providing funding resources on a one-time basis.

The Maryland Coastal Program anticipates during the five years that a) 2 state-level policies and plans completed; b) 15 local-level policies and plans completed; c) 0 projects completed at the state-level; and d) 8 projects completed at the local-level to reduce future damage from coastal hazards with assistance from coastal program funding or staff.

Performance Measure: Number of a) state-level policies and plans completed; b) local-level policies and plans completed; c) projects completed at the state-level; and d) projects completed at the local-level to reduce future damage from coastal hazards with assistance from Maryland Coastal Program funding or staff.

Target: Between 2018 and 2023, twenty-five (25) a) state-level policies and plans completed b) local-level policies or plans completed, c) projects completed at the state-level and d) projects completed at the local-level to reduce future damage from coastal hazards with assistance from Maryland Coastal Program funding or staff.

Results:

Year 1:	4 (2 state-level policies and plans; 1 state-level project; 1 local-level project.)
Year 2:	4 (1 local-level policies and plans; 3 local-level projects)
Total to Date:	8 (2 state-level policies and plants; 1 state-level project; 1 local level policy or plan; 4 local-level projects)

Discussion: The coastal program is slightly behind in meeting its target but is putting significant effort and resources towards ongoing projects and the development of policies and plans which should result in the program being on pace to meet or exceed the target by year five.

METRIC 2: COASTAL HAZARDS

Goal: Increase the awareness of and knowledge about climate impacts across Maryland and its communities to enable informed adaptation action.

Objective: By 2023, deliver science- and best practice-based training to municipal, county, state and other partners to increase the level of awareness of climate impacts and inform adaptation-related decision making and planning.

Strategy: Maryland communities face a number of climate- and coastal hazard-driven risks throughout its coastal zone. The damages and impacts resulting from flood events present a substantial threat to communities, infrastructure and natural resources throughout the state. Since 2007, Maryland has experienced four hurricane and flood events warranting Presidential Disaster Declarations, resulting in more than \$95 million in federal public assistance. The Maryland Coastal Management Program has forged partnerships with local and state partners to (1) assess and understand risks and impacts, (2) plan strategies that integrate hazards in updated or new planning processes, and (3) implement projects or actions that reduce risk. Maryland will support initiatives to build community-level resilience.

The Maryland Coastal Management Program is continuing to focus on offering a few high quality coastal hazards trainings yearly. Previously in 2017, a unique opportunity arose to support the Deal Island Peninsula Partnership, significantly increasing the trainings that year. A similar opportunity is not expected in the next five-year time period.

Performance Measure: Number of training events related to Coastal Hazards offered by the Coastal Zone Management Program

Target: Between 2018 and 2023, fifteen training events related to Coastal Hazards offered by the Coastal Zone Management program.

Results:

Year 1:	3 coastal hazard training events
Year 2:	4 coastal hazard training events
Total to Date:	7 coastal hazard training events

Discussion: The coastal program is on track to exceed its goal for coastal hazards training events. These coastal hazard trainings help support the coastal program's resilience efforts and in year two supported the development of the state's new nuisance flood plan requirement for local governments.

METRIC 3: COASTAL HABITAT

Goal: Enhance coastal habitat¹ conservation through acquisition and easement.

¹ Tidal (Great Lake) Wetlands; Beach and Dune; Near-shore Habitat; and Other Habitat Types. Acres of coastal habitat reported by Maryland's Coastal Program are only broken out by two types and so are currently represented in tidal or Great Lakes wetlands (#8a) and other habitat (#8g).

Objective: By 2023, increase acres of conserved coastal habitat across Maryland’s coastal zone to protect wildlife habitat and coastal water quality, provide public access, and enhance long-term habitat resilience goals.

Strategy: Maryland’s coastal zone has diverse landscapes and coastal habitats that provide wildlife habitat and water quality protection benefits. Public lands also oftentimes offer public access opportunities on land and to the water. The Coastal Management Program supports work to record conservation easements, target state acquisition priorities and provides guidance on the specific coastal resources, habitats and priorities that would be addressed or realized with every conservation opportunity pursued. The state coastal program, working with its partners, will provide information and feedback to acquisition and easement partners to conserve coastal habitat for multiple benefits.

The performance of these programs are variable based on both funding and staffing, and during the 312 evaluation term for this metric, both programs are working through staffing changes. In 2014, Maryland Environmental Trust had 3 staff dedicated to identifying and acquiring conservation easements, currently they have 1 staff person in this role. It is expected that going forward this partnership will focus on 1 staff member who will identify and record easements and 1 staff member that will focus on effectively monitoring and stewarding their easements to ensure that they meet their easement goals and coastal protection benefits. While this may result in decreased acreage of habitat protected, there is anticipated to be heightened monitoring and stewarding of currently protected habitat. Program Open Space is currently down 4 staff positions, and while the coastal program expects to fill those positions, progress may be affected in the coming years.

Performance Measure: Number of acres of coastal habitat protected by acquisition or easement with assistance from Maryland Coastal Program funding or staff.

Target: From 2018 to 2023, 15,000 acres of coastal habitat protected through acquisition or easement with assistance from Maryland Coastal Program funding or staff.

Results: Year 1: 3,597 acres
Year 2: 6,042 acres

Total to Date: 9,630 acres

Discussion: The coastal program is on track to exceed, its target for coastal habitat protected. The coastal program is successfully protecting coastal habitat throughout the state’s coastal zone.

Maryland Coastal Program Evaluation Metrics: 2012-2017

The goals and objectives were developed for this project and are derived from the Maryland Chesapeake and Coastal Service’s Managing for Results metrics.

METRIC 1

Goal: Accelerate the recovery of coastal resources through improved water quality.

Objective 1.1: Annually reduce coastal non-point source pollution from entering Chesapeake, coastal and ocean waters.

Strategy: Without clean water, the value of Maryland’s coasts would be vastly diminished. Good water quality is essential for life and necessary for fishing, shellfishing, boating, swimming, and most of the other activities that draw people to Maryland’s Chesapeake Bay and Atlantic coast. Pollution from sources of nitrogen, phosphorous and sediment, which include agriculture, urban/suburban runoff, vehicle emissions and many other sources, is currently the biggest pollution problem in our coastal waters and has disrupted the balance of our coastal and terrestrial ecosystems. Overcoming this barrier will require Maryland’s Chesapeake and Coastal Service (CCS) staff to work with local and federal partners to administer funding through new and innovative approaches that leverage the funds to the greatest extent possible, target the funds to the most cost effective locations and practices, engage the community at large, and hold everyone accountable. Implementation of best management practices (BMPs) is key in helping to reduce nonpoint source pollution impacts. With the Chesapeake Bay Program’s regional Bay Model to help estimate nutrient and sediment reduction and the State’s on the ground monitoring efforts, we are able to show how much nonpoint source pollution we are reducing on an annual basis. The State is committed, through the BayStat process, to assuring that we continue to reduce our nonpoint source pollution into our coastal waters.

The approach for meeting this goal and target is in the Annual Report to the Maryland General Assembly, “Chesapeake and Atlantic Coastal Bays Trust Fund SFY 2013 Annual Workplan” [https://dnr.maryland.gov/ccs/Publication/TrustFund_WP2012-YearFour_FY12_FY13.pdf], which also provides a detailed look at specific projects and their nutrient and sediment reduction impacts.

Performance Measure: Number of pounds of Nitrogen, Phosphorus, and Sediment prevented from entering Chesapeake, Coastal and ocean waters as a result of financial and technical assistance from Maryland CCS.

Target: 3.1million pounds of Nitrogen, 140,000 pounds of Phosphorus, and 22.3 million pounds of Sediment prevented from entering Chesapeake, coastal and ocean waters as a result of financial and technical assistance from Maryland Chesapeake and Coastal Service over the five-year reporting period.

Results in pounds:

Time	Nitrogen	Phosphorus	Sediment	Total
Year 1	1,337,478	53,962	185,004,636	186,396,076
Year 2	1,576,706	104,624	367,169,000	368,850,330
Year 3	2,104,961	165,179	370,729,321	372,999,461
Year 4	1,678,254	168,531	370,730,485	372,577,270
Year 5	1,410,443	54,127	1,212,800	2,677,370
TOTAL	8,107,842	546,423	1,294,846,242	1,303,500,507

Discussion: The coastal program invested significant funds and technical assistance into

reducing pollution entering the Chesapeake Bay and greatly exceeded its targets. There is variability in what the program can achieve each year due primarily to funding and ability to find landowners who are willing partners in pollutant reduction efforts.

METRIC 2

Goal: Reduce Maryland’s vulnerability to future storm-events, shoreline changes and sea level rise.

Objective 2.1: Increase the number of State agencies and local governments prepared for the impacts of future storm-events, shoreline changes and sea level rise.

Strategy: With more than 7,000 miles of shoreline and intense coastal development, Maryland’s coastal communities, public infrastructure and vital facilities are particularly vulnerable to the effects of coastal hazards, especially as accelerated sea level rise and increased storm frequency and intensity amplify the effects of coastal flooding and shoreline erosion, reaching areas previously unaffected. Almost 70 percent of Maryland’s shoreline experiences chronic erosion, up to 60 percent of some counties lie within the 100-year floodplain, and low-lying coastal areas have seen twice the global rate of sea level rise in the last century. Projected population growth and accompanying development in coastal areas, compounded by the anticipated impacts from climate change, make adaptation a high priority as more people, infrastructure and natural resources will be at risk.

The State of Maryland has recently begun implementing strategies to reduce vulnerability and build resilience within our natural and human communities. By integrating and institutionalizing adaptation planning into coastal management decision-making frameworks, Maryland will reduce the vulnerability of the State’s people, property and natural resources to the effects of coastal hazards and climate change. Through the CoastSmart Communities Initiative, the Chesapeake and Coastal Service has worked to establish a foundation of risk and vulnerability assessments, policy and program development projects, and a suite of resources that support local governments in coastal hazard mitigation and climate change adaptation efforts. Chesapeake and Coastal Service staff will work to ensure continued progress and expand the resources available through the CoastSmart program in order to help Maryland’s 114 coastal communities (16 counties, 98 coastal municipalities) prepare for future storm events, shoreline change and sea level rise. In addition, technical and financial assistance may be made available to the following state agencies who have contributed their strategies to enhance Maryland’s resilience to the consequences of climate change: Maryland Department of Transportation (MDOT), Maryland Department of Planning (MDP), Maryland Historical Trust (MHT), Maryland Insurance Administration (MIA), Department of Housing and Community Development (DHCD), Maryland Emergency Management Agency (MEMA), Maryland Department of Health and Mental Hygiene (DHMH), Maryland Department of Agriculture (MDA), Maryland Department of the Environment (MDE), University of Maryland, Maryland State Highway Administration (SHA), Maryland Port Authority (MPA), and Maryland Department of General Services (DGS). Further details of how these agencies are contributing to Objective 2.1 are contained in the 2011 Greenhouse Gas Emissions Reduction Act of 2009 (GGRA) Draft Plan (Chapter 8: Adaptation) [<http://www.mde.state.md.us/programs/air/climatechange/pages/air/climatechange/index.as>]

px]. An updated plan is expected to be available in late 2012.

The approach for meeting this goal and target is described in Maryland's Coastal Zone Management Act § 309 Assessment and Strategy 2011-2015 under Coastal Hazards and Climate Change Adaptation Planning.

Performance Measure: Cumulative number of Maryland state agencies and coastal communities who incorporate sea level rise and climate change considerations into planning and management strategies as a result of financial and technical assistance from Maryland Chesapeake and Coastal Service over the five-year reporting period.

Target: 10 Maryland state agencies and coastal communities incorporate sea level rise and climate change considerations into planning and management strategies as a result of financial and technical assistance from Maryland Chesapeake and Coastal Service over the five-year reporting period.

Results:	Year 1:	2 state agencies and coastal communities
	Year 2:	2 state agencies and coastal communities
	Year 3:	4 state agencies and coastal communities
	Year 4:	9 state agencies and coastal communities
	Year 5:	4 state agencies and coastal communities
	Total:	21 state agencies and coastal communities

Discussion: The coastal program more than doubled its original target. The coastal program, as discussed extensively in the findings has invested significant staff and financial resources into improving the state's resilience, for example through its grants program and the creation of the Climate Academy which have helped coastal communities and state agencies incorporate sea level rise and climate change considerations into planning and management strategies.

METRIC 3

Goal: Reduce Maryland's vulnerability to future storm-events, shoreline changes and sea level rise.

Objective 2.2: Preserve and restore the protective functions of near shore marsh, beach, dune, and wetland habitats to reduce vulnerability.

Strategy: Maryland's people, wildlife, land and public investments are at risk due to expected consequences of climate change including sea level rise, increased storm intensity, extreme drought and heat waves, and intensified wind and rainfall events. Due to its geography and geology, the Chesapeake Bay region is ranked the third most vulnerable to sea level rise, behind Louisiana and Southern Florida. Historic tide records show that sea level increased approximately one foot in the Chesapeake Bay over the last one hundred years. As a consequence of climate change, sea level is likely to rise at least twice as fast as it did during the 20th century, resulting in potentially 1-foot rise by 2050 and between 2-3 feet of rise by 2100. In order to address these impacts, the Chesapeake and Coastal Service has developed new land conservation strategies to help preserve the long-term survival of coastal wetlands that provide natural storm surge buffering to communities as well as critical habitat for aquatic and

terrestrial species. Targeting lands that may enable the inland retreat of our coastal and nearshore wetlands for restoration or protection can help the State maintain the long-term ecological functions of storm surge buffering, carbon sequestration, water filtration, wildlife habitat, recreation and others that wetlands provide.

Chesapeake and Coastal Service staff will work with partners to advance the restoration and enhancement of critical near shore marsh, beach, dune, and wetland coastal habitats through:

- providing technical assistance to local governments, restoration professionals and coastal communities;
- targeting, directing and funding coastal habitat restoration projects;
- incorporating Maryland Blue Infrastructure and sea level rise inundation; considerations into habitat restoration, conservation and acquisition programs;
- using Maryland’s GreenPrint and Blue Infrastructure datasets to assess how habitat can be better targeted for protection or enhanced management of coastal habitats, including mitigation or adaptation for impacts of climate change;
- providing assistance to state and local partners in making decisions and plans for future development, conservation and restoration of coastal resources while reducing vulnerability to future storm events, shoreline change and sea level rise;
- strengthening the effectiveness of Maryland’s land trusts to permanently protect private land increasing habitat quality and quantity; and
- assisting local land trusts with conservation acquisitions in fee simple, bargain sales and conservation buyer transactions, along with donated easements.

Meeting this goal and target will require a continued opportunistic approach, strong collaboration and strategic leveraging of expertise and resources between Maryland Coastal Zone Management, the Chesapeake Bay National Research Reserve Program, Chesapeake and Coastal Service’s Habitat Conservation and Restoration Division, Maryland Environmental Trust, and the Department of Natural Resource’s Land Acquisition and Planning Division and other federal, State, and local partners.

Performance Measure: Number of square feet of near shore habitat created or protected as a result of financial and technical assistance from Maryland Chesapeake and Coastal Service over the five-year reporting period.

Target: 750,000 square feet of near shore habitat created or protected as a result of financial and technical assistance from Maryland Chesapeake and Coastal Service over the five-year reporting period.

Results:	Year 1:	53,155
	Year 2:	32,080
	Year 3:	44,977
	Year 4:	115,124
	Year 5:	33,645
	Total:	278,981

Discussion: The coastal program did not meet its target. Land acquisition and restoration are opportunistic activities depending on willing landowners and grants submitted.

Chesapeake Bay National Estuarine Research Reserve Evaluation Metrics: 2017-2022

METRIC 1

Goal: Improve the scientific understanding of the Reserve components and their watersheds through the development and application of Reserve research, data, and tools.

Objective: Reserves, coastal researchers, and component sites will increase their collaborative research to address the needs of decision-makers and stakeholders.

Strategy: Maintain and strengthen partnerships with research institutions to conduct research and advance estuarine science at reserves.

The Chesapeake Bay National Estuarine Reserve-Maryland is a multi-component Reserve and as such, is situated to address multiple management issues facing the Chesapeake Bay watershed. Examples include land use pressure and toxics at Otter Point Creek, invasive species at Jug Bay, and sea-level rise, subsidence, and salt water intrusion at Monie Bay. The success to advancing the science on the wide swath of issues with a small core staff is through research partnerships. Using existing professional relationships with core staff, the Davidson Fellowship, and National Estuarine Research Reserve System Science Collaborative, the target is to maintain the current track record of 4 research projects per year. More specifically the goal will be to have at least one active project per reserve component annually to ensure that a wide variety of management needs are being addressed. As a secondary benefit to this strategy, stronger institutional relationships will help to elevate the visibility of the reserve program in Maryland, an ongoing struggle of this program due to the wealth of research opportunities on Chesapeake Bay issues.

Tracking: The research database collects information by calendar year (not cooperative agreement cycle). It is noted that the reserve’s research sector is in the process of further defining what should be included in the research database.

Performance Measure: From 2018 to 2022, the annual number of research projects being conducted or coordinated by the Chesapeake Bay-Maryland National Estuarine Research Reserve within the Maryland Chesapeake Bay reserve system.

Target: From 2018 to 2022, 4 research projects being conducted or coordinated annually, by the Chesapeake Bay-Maryland National Estuarine Research Reserve within the Maryland Chesapeake Bay reserve system.

Results: Year 1: 4 research projects conducted
 Year 2: 4 research projects conducted
 Year 3: 4 research projects conducted

Total to Date: 4 research projects conducted annually

Discussion: The reserve is on track to meet its target. In the future, ongoing efforts to expand research facilities at Jug Bay and Monie Bay should open opportunities to increase the number of research projects conducted annually.

METRIC 2

Goal: Advance environmental appreciation and scientific literacy, allowing for science-based decisions that positively affect estuaries, watershed, and their communities.

Objective: Coastal decision-makers and environmental professionals understand and are able to apply science-based tools, information, and planning approaches that support resilient estuaries and coastal communities.

Strategy: Provide training and technical assistance to ensure communities understand what constitutes a resilient community and how to implement strategies that increase resilience. In 2011, the Chesapeake and Coastal Service reorganized resulting in the alignment of Chesapeake Bay-Maryland National Estuarine Research Reserve's management, research, stewardship, and coastal training sectors under the state's Coastal Zone Management Program. This alignment opened up new opportunities for focusing research and training efforts towards state-wide coastal management issues, but was not without its growing pains. Over the years, staffing and Departmental priorities have challenged the Coastal Training Program, but recognizing the value to the reserve system as well as the impact the program could make with guidance from the Maryland Coastal Program, Chesapeake Bay-Maryland National Estuarine Research Reserve intends to rebuild the program to reach a target goal of 6 trainings/year by 2022. Ideally this would be done with a dedicated staff position as Coastal Training Program Coordinator, but in the interim could be achieved through partnerships and contractual support.

Performance Measure: By 2022, number of training events delivered by the Chesapeake Bay-Maryland National Estuarine Research Reserve Coastal Training Program

Target: By 2022, 6 trainings events delivered by the Chesapeake Bay-Maryland National Estuarine Research Reserve Coastal Training Program.

Results:

Year 1:	2 training events
Year 2:	1 training event
Year 3:	0 training events

Total to date: 3 training events

Discussion: The Coastal Training Program coordinator staff position was unfilled the past two years, and only a couple of training program events were held. The findings include a necessary action to fill the coordinator role and implement a training program in order to maintain funding for implementing a program. With a new training program coordinator on board the reserve should be able to meet the year 5 target of 6 trainings.

METRIC 3

Goal: Advance environmental appreciation and scientific literacy, allowing for science-based decisions that positively affect estuaries, watershed, and their communities.

Objective: Citizens will increase their awareness of the Reserve system and ability to improve stewardship of estuaries, coastal watersheds, and their communities.

Strategy: Support and staff Research Reserve/Component programming and materials that increases the understanding of estuaries.

In addition to the National Estuarine Research Reserve System Strategic plan, this metric also aligns with Chesapeake Bay-Maryland National Estuarine Research Reserve's strategic plan to improve the visibility of the reserve program in the State. Affiliated with local county parks or large wildlife management areas, visitors to our components don't often know they are also visiting a National Estuarine Research Reserve. By choosing a performance measure related to public presentations (25people/event; 5 events/year) , Chesapeake Bay-Maryland National Estuarine Research Reserve will a) have a stronger presence at the site level through existing outreach opportunities such as Jug Bay Wetland's Sanctuary's "Soup and Science Program;" b) further the strategy identified in metric 1 by sharing existing research, education, and programmatic efforts to spark additional partnerships; and c) promote professional development for staff through public speaking and poster sharing opportunities at the local through national scale.

Performance Measure: From 2017 to 2022, the number of people reached through public presentations by Chesapeake Bay-Maryland National Estuarine Research Reserve.

Target: From 2017 to 2022, 625 people reached through public presentations by Chesapeake Bay-Maryland National Estuarine Research Reserve.

Results:

Year 1:	71 people reached through public presentations
Year 2:	167 people reached through public presentations
Year 3:	558 people reached through public presentations

Total to Date: 796 people reached through public presentations

Discussion: The reserve has already exceeded its target in the first three years. The reserve was able to significantly grow the number of people reached through public presentations in year three during a time when the reserve moved to operating in a virtual education environment due to covid-19.

Chesapeake Bay National Estuarine Research Reserve Evaluation Metrics: 2012-2017

METRIC 1

Goal: Increase the use of science and Reserve sites to address management issues. (Chesapeake Bay-Maryland National Estuarine Research Reserve Management Plan Goal 2)

Objective: By 2017, scientists, resource managers, and the general public will have access to NERRS and Chesapeake Bay-Maryland National Estuarine Research Reserve datasets and

science products, and the Chesapeake Bay scientific community will use data, tools and techniques generated through National Estuarine Research Reserve System and Chesapeake Bay-Maryland National Estuarine Research Reserve. (Chesapeake Bay-Maryland National Estuarine Research Reserve Management Plan Objective 2.2)

Strategy: The reserve’s research and monitoring program will make available online a reserve research compendium, site profiles, management plan, research reports and publications, SWMP and other research and monitoring data, and other relevant materials that may be useful to scientists, resource managers, and the general public. See Chesapeake Bay-Maryland National Estuarine Research Reserve 2008 Management Plan, p. 65. Datasets are water quality data, weather data, submerged aquatic vegetation (SAV) data, emergent vegetation data, and surface-elevation table data.

Performance Measure: From 2012-2017, number of monitoring data sets made available online annually (within one year of data collection) on the Centralized Data Management Office web page, the Eyes on the Bay web page, or the Department of Natural Resource’s Chesapeake Bay-Maryland National Estuarine Research Reserve web page.

Target: From 2012-2017, five monitoring data sets available online annually (within one year of data collection) on the Centralized Data Management Office web page, the Eyes on the Bay web page, or the Department of Natural Resource’s Chesapeake Bay-Maryland National Estuarine Research Reserve web page.

Results:	Year 1:	5 data sets available
	Year 2:	5 data sets available
	Year 3:	5 data sets available
	Year 4:	5 data sets available
	Year 5:	5 data sets available
	Total:	5 data sets were available each year.

Discussion: The reserve’s three System-Wide Monitoring Program stations data sets for Jug Bay, Otter Point Creek, and Monie Bay have been available on Eyes on the Bay.

METRIC 2

Goal: Enhance peoples’ ability and willingness to make informed decisions and take responsible actions that affect Maryland’s coastal communities and ecosystems. (Chesapeake Bay-Maryland National Estuarine Research Reserve Management Plan Goal 3)

Objective: By 2017, students and teachers will have an increased estuarine and environmental literacy. (Chesapeake Bay-Maryland National Estuarine Research Reserve Management Plan Objective 3.1)

Strategy: The reserve’s education program will work with schools and teachers to help them provide meaningful Chesapeake Bay watershed education experiences (MWEEs) for students. A MWEE must include rigorous academic learning standards, promote a sense of wonder, and nurture a sense of community that will connect students to the Bay and move them to take

action toward its protection and restoration. See Chesapeake Bay-Maryland National Estuarine Research Reserve 2008 Management Plan, pp. 77, 78, and 80. Many Maryland teachers do not feel adequately trained to provide MWEEs. Chesapeake Bay-Maryland National Estuarine Research Reserve’s “Data on the Estuaries” teacher professional development addresses that training need and helps prepare teachers to provide meaningful watershed education experiences.

Performance Measure: From 2012-2017, number of K-16 teachers who are trained annually in Chesapeake Bay-Maryland National Estuarine Research Reserve’s “Data on the Estuaries” teacher professional development programs.

Target: From 2012-2017, 15 K-16 teachers trained annually in Chesapeake Bay-Maryland National Estuarine Research Reserve’s “Data on the Estuary” teacher professional development programs.

Results:	Year 1:	20 teachers trained
	Year 2:	32 teachers trained
	Year 3:	29 teachers trained
	Year 4:	44 teachers trained
	Year 5:	17 teachers trained
	Total:	28.4 teachers trained on average per year

Discussion: The reserve exceeded its target every year, and for several of the years was able to hold two Teachers on the Estuary trainings during the summer that included Data on the Estuaries.

METRIC 3

Goal: Enhance peoples’ ability and willingness to make informed decisions and take responsible actions that affect Maryland’s coastal communities and ecosystems. (Chesapeake Bay-Maryland National Estuarine Research Reserve Management Plan Goal 3)

Objective: By 2017, coastal decision-makers will receive knowledge, information, and skills to improve coastal management. (Chesapeake Bay-Maryland National Estuarine Research Reserve Management Plan Objective 3.3)

Strategy: Provide trainings that encourage coastal decision-makers to use science-based information in decision-making. The Chesapeake Bay is the largest and most productive estuary in the U.S., and in response to concerns about the quality and productivity of the Bay, Maryland passed the Critical Area Act in 1984. The Act identifies the critical area as all land within 1,000 feet of the Mean High Water Line of tidal waters or the landward edge of tidal wetlands and all waters of and lands under the Chesapeake Bay and its tributaries. Maryland’s coastal decision-makers can significantly affect the critical area and should use science-based information in their decision-making. See Chesapeake Bay-Maryland National Estuarine Research Reserve Management Plan 2008-2012, p. 94, and the Chesapeake Bay-Maryland National Estuarine Research Reserve Coastal Training Program Strategy 2012-2017.

Performance Measure: From 2012-2017, number of workshops held annually focused on management of the critical area; living shorelines; sustainable communities; sea level rise and climate change; or watershed management.

Target: From 2012-2017, 6 workshops held annually focused on management of the critical area; living shorelines; sustainable communities; sea level rise and climate change; or watershed management.

Results:	Year 1	11 workshops
	Year 2	2 workshops
	Year 3	6 workshops
	Year 4	6 workshops
	Year 5	3 workshops

Total: Target met 3 of 5 years.

Discussion: The reserve met the target three out of five years. For the past few years, the reserve has not had an active Coastal Training Program coordinator. A program recommendation is included in the findings encouraging the Chesapeake and Coastal Service to fill the role of the coordinator.

Conclusion

For the reasons stated herein, I find that the State of Maryland is successfully implementing and enforcing its federally approved coastal management program, adhering to the terms of the federal financial assistance awards, and addressing coastal management needs identified in section 303(2)(A) through (K) of the Coastal Zone Management Act. This evaluation also concludes that the State of Maryland's operation and management of the Chesapeake Bay-Maryland National Estuarine Research Reserve, including education, research, and interpretative activities, is adhering to the programmatic requirements of the National Estuarine Research Reserve System.

These evaluation findings contain three necessary actions and five recommendations. The necessary actions are mandatory and must be completed by the dates given. Recommendations must be considered before the next regularly scheduled program evaluation but are not mandatory at this time. Recommendations that must be repeated in subsequent evaluations may be elevated to necessary actions.

This is a programmatic evaluation of the Maryland Coastal Management Program and Chesapeake Bay-Maryland National Estuarine Research Reserve, which may have implications regarding the state's financial assistance awards. However, it does not make any judgment about or replace any financial audits.

signed by Jeffrey Payne
Jeffrey L. Payne, Ph.D.
Director, NOAA Office for Coastal Management

dated February 8, 2021
Date

Appendix A: Response to Written Comments

Annette Rolfes, Volunteer
Anita C. Leight Estuary Center

I am writing this email to show my appreciation for all that CBNERR does for my community and the Anita C. Leight Estuary Center (ACLEC). I have been a member of the Otter Point Creek Alliance (OPCA) since 2006 and have seen firsthand the benefits gained by the partnership between these two amazing organizations. My home is located along the Bush River portion of Otter Point Creek in the Estuary, approximately 2 miles from Leight Center. My family and I have been active volunteers at Leight Center since moving back to Harford County in 2001. Living so close to the water's edge, we have become acutely aware of the problems facing our Estuary, from pollution, to water quality degradation, to wildlife and habitat loss.

The partnership between CBNERR, ACLEC, OPCA, and the Izaak Walton League is a strong one that has such far reaching benefits, I'm not sure I'll be able to properly define or explain their importance. CBNERR supports not only the educational programming provided at ACLEC, but also provides funding through Harford County to support the salaries of our wonderful Park Manager and our custodian. Harford County has faced a difficult time the last several years, dealing with policy changes regarding part-time employees. The contracts awarded to OPCA through CBNERR have supported programs, helped us purchase much needed supplies and equipment, and supported our staff at a time when, without this support, many programs and staff would have been cut. CBNERR funding has allowed OPCA to supplement our part-time staff, and also allowed us to expand educational programming. Without the funding and support provided by CBNERR and our friends at the National Estuarine Research Reserve Association (NERRA), we would have been lost.

CBNERR partnered with OPCA and ACLEC to tackle the massive project of retrofitting the parking lot at ACLEC to make it a more environmentally friendly surface and reduce the No.1 pollution problem we face, Storm Water Run-off. CBNERR funded all our interpretive signage around the grounds last year. The updated signage has turned a simple stroll around the property into a highly educational experience. CBNERR provides boat support for student field trips and other volunteer events, as needed whenever needed.

CBNERR provides support staff for our largest outreach programs, supporting community stewardship, at the Annual Halloween Hike and the Annual Wade-in. Both events draw huge community support! Our Halloween event averages 400+ visitors each year, and our Wade-in (celebrating 23yrs) is a close second, at ~250 visitors. CBNERR staff participates in the annual Marsh Clean-up event at the Bosely Conservancy partnering with ACLEC, OPCA, and the Izaak Walton League, resulting in the removal of tires and other large debris that would otherwise just continue to pollute the waterways of the Estuary.

As an active volunteer I have witnessed firsthand the joy on the faces of the children (and the adults) that participate in the educational programming that is funded in part by CBNERR. The

Stewardship program has contributed to the development of our local students/residents, taking their love of nature, and turning them into true environmental warriors, with an appreciation for the environment and a determination to leave this world a better place than they found it. You can't put a price tag on that!

CBNERR has done so much for ACLEC, for OPCA, for my family, for the residents of Harford County, and MOST importantly for the Estuary.

NOAA Office for Coastal Management Response: The NOAA Office for Coastal Management thanks Annette Rolfes for providing comments. No response required.

**Mark Scallion, Center Director
Pickering Creek Audubon Center**

We've partnered with the education coordinator on a number of climate change communications workshops over several years. As for partnerships it has been one of our best because it has felt truly collaborative and mutually beneficial as opposed to many partnerships which can be one sided. The education coordinator has brought a wealth of professional knowledge and skills to the programs we've conducted together and they would have not been nearly as beneficial to the audiences we worked with if she were not present. We appreciate the expertise offered by CBNERR and the great work they are doing.

NOAA Office for Coastal Management Response: The NOAA Office for Coastal Management thanks Mark Scallion for providing comments. No response required.

**Kathy Baker-Brosh, PhD
President, Otter Point Creek Alliance
Former Research Naturalist at ACLEC**

I'm writing from the Otter Point Creek component of the Chesapeake Bay National Estuarine Research Reserve System - Maryland, in support of our relationship with our CBNERR team. As the past Research Naturalist at this component and the current president of the "friends of" group, I want to express my thankfulness to our CBNERR team for their enrichment of our programming, especially research programming. Our volunteers enjoy helping CBNERR staff with surveys of fish, marsh plants, and bay grasses. The community engagement that results helps people understand the importance of the resources the bay provides and the care and conservation needed to keep the system healthy.

In addition, they help us with our own research events such as OPC's BioBlitz, and provide access to equipment for monitoring water quality and plankton. They are a huge support, both financially and as mentors, for our college and high school research interns and part-time naturalists.

A member of the CBNERR team visits our center weekly, interacting with staff and volunteers. We would like to have more time with them than just one day a week, but realize they divide their time between the three centers in Maryland. They always make themselves available to us via phone, email, and Zoom.

We are thankful to have the research relationship with the great folks at CBNERR. Their involvement makes the freshwater tidal marsh at Otter Point Creek more than just a place for local recreation; it is a place to study and learn about the creatures and habitats of this important community in the Chesapeake Bay network.

NOAA Office for Coastal Management Response: The NOAA Office for Coastal Management thanks Dr. Kathy Baker-Brosh for providing comments. No response required.

**Paul Orlando, Superintendent
Mallows Bay National Marine Sanctuary**

Thank you for the opportunity to provide comments to support the Maryland Coastal Management Program. Since 2014, the Program – primarily through Chesapeake and Coastal Services – has been a valued partner in the designation of the Mallows Bay-Potomac River National Marine Sanctuary (MPMNS) in September 2019. Specifically:

- Advocated alongside community coalitions to develop a nomination for NOAA to consider and designate a national marine sanctuary focused on a collection of WW-I era ships and related maritime heritage assets.
- Partnered with NOAA and Charles County MD to co-develop all documents required by NEPA, including draft and final EIS, draft and final rulemaking, and draft and final management plan. Ensured Federal consistency.
- Partnered with NOAA and Charles County MD to conduct NEPA-required public scoping and public comment meetings on the proposed sanctuary and alternatives. Reviewed public comments and guided responses related to natural resource management. Co-lead dialog with constituent groups related to natural resources (e.g., commercial and recreational fishing) to ensure consistency with ongoing state programs.
- Partnered with NOAA and Charles County MD to support literally dozens of programs and activities that increase public awareness and engagement related to the sanctuary, including but not limited to: developing interpretative products, hosting K-12 outdoor education programs, facilitating site characterization and related science programs, and community stewardship events.
- Partnered with NOAA and Charles County MD to enable recreational opportunity and enhance tourism through development of interpretative water trails and companion hiking trails in Mallows Bay Park, expanding traditional and social media opportunities, and communication with Congressional interests and major outdoor recreation partners.

- Partnered with the National Marine Sanctuary Foundation to deploy and maintain a new water quality buoy to provide real-time information for multiple user groups and to enable a baseline of scientific record to understand changes and inform resiliency and adaptation strategies.
- As of September 2019, acts as a sanctuary co-manager alongside NOAA, Maryland Historical Trust and Charles County MD as defined by a Memorandum of Agreement. Works alongside to develop and enable critical sanctuary start-up operations, including creating a sanctuary advisory council, understanding infrastructure requirements, and reviewing and supporting management plan priorities and programs.

We look forward to continuing the partnership with the Maryland Coastal Program to implement the sanctuary management plan.

NOAA Office for Coastal Management Response: The NOAA Office for Coastal Management thanks Paul Orlando for providing comments. No response required.

Stephen M. Bunker
Friends of Mallows Bay/Potomac

I serve as the head of the Friends of Mallows Bay/Potomac National Marine Sanctuary. The Mallows Bay/Potomac NMS is the newest National Marine Sanctuary having been designated in 2019. The Mallows Bay/Potomac NMS has one of the largest collection of shipwrecks in the Western Hemisphere with nearly 200 known shipwreck vessels with some dating back to the Civil War and beyond. The largest group of ships is the “Ghost Fleet” of over 100 wooden steamships built as part of the U.S. engagement in World War I.

The process for designation of the sanctuary took about 5 years and involved a number of government partners. In this effort, the Maryland Department of Natural Resources took the lead for the State of Maryland and the Coastal Management Program took the lead for DNR. Staff from the Coastal Management Program were an integral part of the process from the very beginning. From the initial scoping meetings, through the development of the Environmental Impact Statement, and on to the Management Plan for the Sanctuary, the Coastal Management Program was there to represent the State of Maryland in this nationally important effort to preserve this site. Their participation was critical to the designation process.

In addition to this important work, I had the opportunity to interact with the Coastal Management Program in my previous job in its effort to improve Maryland’s resilience to sea level rise in the face of climate change. This is extremely important work for a state which is very vulnerable to the impacts from sea level rise.

NOAA Office for Coastal Management Response: The NOAA Office for Coastal Management thanks Stephen M. Bunker for providing comments. No response required.

James D. Crudup, Sr.
Mayor, Town of Eagle Harbor, MD

I was unable to participate in the Public Meeting relative to the Maryland Coastal Management Program and the Chesapeake Bay Maryland National Estuarine Research Reserve Performance Evaluation, but I still wanted to make sure our Town acknowledges the excellent support we have received from DNR under these programs. Over the past few years, the Town of Eagle Harbor MD has been fortunate enough to receive two Grants under the program. The process for receiving the Grants works extremely well and the DNR personnel assigned to manage the Grants are top notch. We couldn't have asked for a more professional team of individuals.

When it comes to recognition, it is often risky to name individuals because inadvertently, someone is missed; however, while there maybe others, I can't restrain myself from at least identifying the following DNR personnel for Outstanding Service above and beyond the call of duty. The Town of Eagle Harbor recognizes: Steven Bryant, Sasha Land, Nicole Carlozo, and Bhaskar Subramanian.

Eagle Harbor is a small Town with very sparse resources and often in need of County and State support; therefore, it is reassuring to know there are staff at DNR who are customer focused and more than willing to ensure that services are delivered in a professional manner regardless of Town importance or size. Please share this letter recognizing the outstanding support from DNR staff with those mentioned as their support is and has been greatly appreciated.

NOAA Office for Coastal Management Response: The NOAA Office for Coastal Management thanks Mayor James D. Crudup for providing comments. No response required.

Susan B. M. Langley, PhD
Maryland Historical Trust
Maryland Department of Planning

The Maryland Historical Trust (MHT) and Maryland State Historic Preservation Office (MD SHPO) commends the Maryland Department of Natural Resources' Coastal Zone Management (CZM) Program and applauds its staff members for their professionalism and collegiality, both in addressing compliance considerations and in partnering on projects of interest and benefit to the people of Maryland, the Region, and the Nation.

For more than six years, the staff of the CZM Program proved able and enthusiastic partners as we worked together with NOAA and Charles County to realize the successful establishment of the Mallows Bay-Potomac River National Marine Sanctuary (MPNMS). They have provided, and continue to make, valuable contributions in all areas of education and outreach from paddling tours to maps and posters, and at public meetings and events.

The CZM Program has played a leading role in the development of the Climate Change Action

Plan for Maryland and has been very generous in sharing data and information that facilitates planning and management by the MD SHPO for archaeological historic cultural resources and properties from the perspectives of flooding, sea level rise, ocean acidification and other related effects. Another successful endeavor involved the cooperative development, with NOAA and other State agencies, of the shared concerns of emergency response planning for marine debris.

The MHT/SHPO appreciates the opportunity to express its appreciation and praise for the CZM Program of Maryland's Department of Natural Resources. If you have any questions, please feel free to contact me.

NOAA Office for Coastal Management Response: The NOAA Office for Coastal Management thanks Dr. Susan Langley for providing comments. No response required.