

Albemarle - Pamlico

National Estuary Partnership



2019 – 2020 Annual Progress Report

October 1, 2018 – September 30, 2019

*U.S. EPA Cooperative Agreement CE 00D20614
EPA Region IV*

www.apnep.org



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This report contains descriptions and progress on work associated with Cooperative Agreement CE-0D20614 from October 1, 2019 to September 30, 2019. Financial reporting will be reported in the individual Federal Financial Reporting Form (SF-425).

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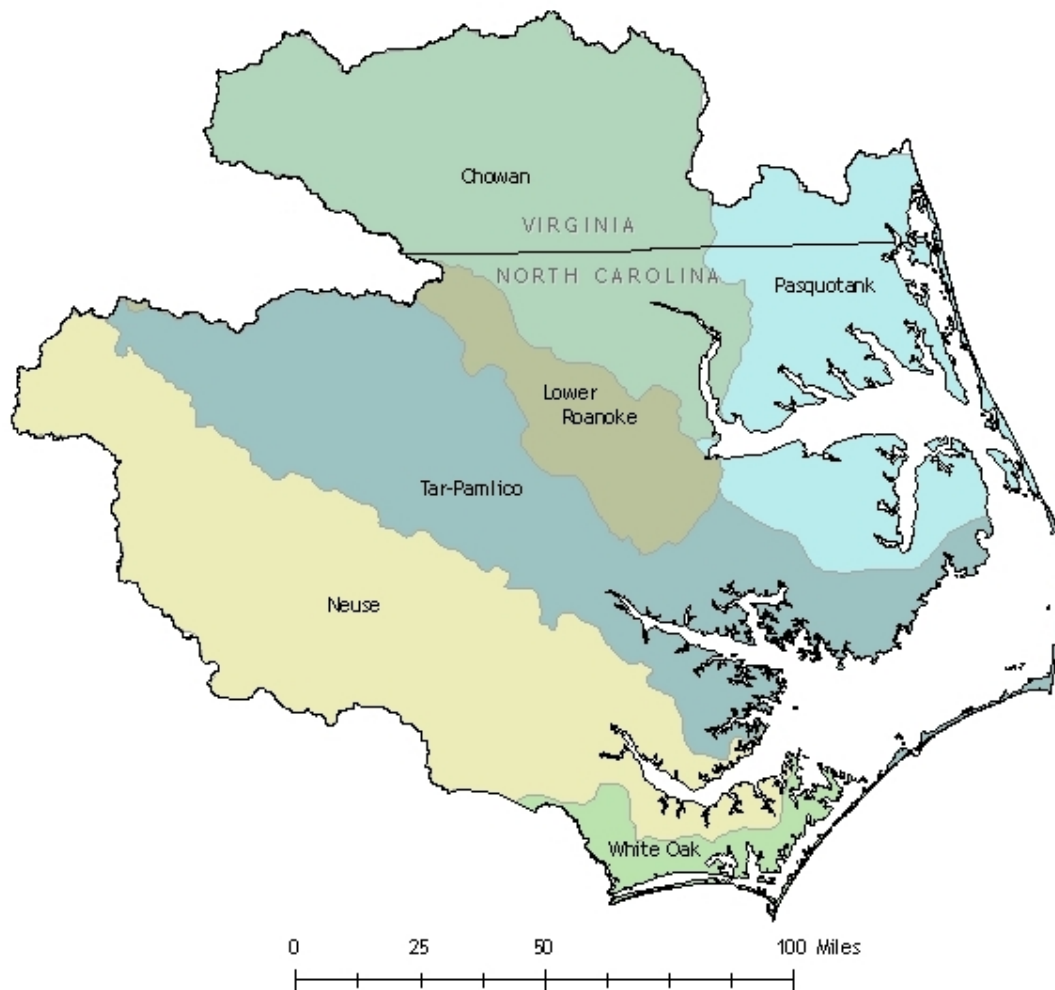
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INTRODUCTION

The Albemarle and Pamlico Sounds comprise the nation's largest lagoonal estuarine system. The system is composed of eight sounds and five major river basins draining over 30,000 square miles of watershed in North Carolina and Virginia. The sounds, rivers, creeks, wetlands and terrestrial areas provide habitat for an abundance of animal and plant species. People depend on the system for residential and resort development, food, recreation, mining, forestry, agriculture, business, and industry.

The Albemarle-Pamlico National Estuary Partnership (APNEP) is a component of the U.S. Environmental Protection Agency's (EPA) National Estuary Program (NEP). It was one of the first programs established under amendments to the Clean Water Act in 1987. The initial Comprehensive Conservation and Management Plan (CCMP) was ratified by the Governor of North Carolina and approved by the EPA in November 1994. The APNEP Policy Board approved a revised CCMP and submitted to the EPA in March 2012. The 2012-2022 CCMP advances an ecosystem-based management (EBM) paradigm and is intended as a practical, cost-effective and equitable approach to managing the valuable resources within the Albemarle-Pamlico region.



The APNEP Ecosystem-Based Management Approach

Ecosystem-based management (EBM) is based on the tenet that managing natural resources from a systems perspective increases the likelihood of success by forging more effective connections among humans, nature, science, and management actions. Before 2012, APNEP worked with limited resources to integrate and implement EBM concepts and tools within the program and with its local, state, and federal partners, albeit in a piecemeal fashion. Given the relative complexity and increased resources required up front to implement EBM in full, APNEP staff began actively working toward a paradigm change in 2008 with the APNEP Policy Board, advisory committees, and partners.

This activity culminated in March 2012 with the adoption of a new CCMP based on EBM principles to replace the original 1994 CCMP. As implementation of this Work Plan begins, APNEP anticipates completing the development of its ecosystem indicators and monitoring strategy to support the new EBM-based CCMP. With a new CCMP established for a ten-year planning horizon, this work plan includes a proposal to support activities of the CCMP Implementation Workgroups for actions that support the desired ecosystem and management outcomes.

Ecosystem-Based Management (EBM) is a management approach¹ that:

- Is concerned with the ecological integrity that sustains both human and natural resources systems.
- Integrates ecological, social, and economic goals and recognizes humans as key components of the ecosystem.
- Considers ecological, not just political, boundaries.
- Addresses systems and the complexity of natural processes and uses adaptive management to reduce risks related to decisions and actions.
- Engages multiple stakeholders in a collaborative process to define problems and find solutions providing mutual benefit.

¹ http://www.ebmtools.org/about_ebm.html

AUTHORITY

Federal Water Pollution Control Act

Congress established the National Estuary Program (NEP) in 1987 to improve the quality of *Estuaries of National Significance*. The Federal Water Pollution Control Act (33 U.S.C. 1251 *et seq.*), Section 320 directs EPA to develop plans for attaining or maintaining water quality in an estuary. This includes protection of public water supplies; the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife; allowance of recreational activities in and on water; and control of point and nonpoint sources of pollution to supplement existing controls of pollution. Each program establishes a Comprehensive Conservation and Management Plan (CCMP) to meet the goals of Section 320.

Comprehensive Conservation and Management Plan

In 1987, Congress designated the Albemarle-Pamlico Estuarine System as *Estuary of National Significance* and thus began a comprehensive study effort, entitled the Albemarle-Pamlico Estuarine Study (APES). The result of this process was the APNEP CCMP. The initial CCMP was developed over a seven-year period by representatives from private and public sectors, including government, industry, business, environmental interest groups, and municipal officials. The plan is a guide for environmental stewardship of the Albemarle-Pamlico estuarine system. The CCMP reflects the input of people from the region that will be affected by the plan's recommendations. The CCMP seeks to balance the need for economic growth in region with the need to secure the environmental future of the region. Approved on March 14, 2012, the new CCMP replaces the original 1994 document.

North Carolina Governor's Executive Order #26

On November 9, 2017, North Carolina Governor Roy Cooper issued Executive Order # 26: *Albemarle-Pamlico National Estuary Partnership*. This Executive Order was developed after more than two years of program review and ecosystem assessment and the development of a new CCMP. This Executive Order replaced Executive Order #133 (2012) and provided the operational advisory framework for the partnership office and support for the EBM approach. The current Executive Order will expire on November 9, 2025 pursuant to N.C. Gen. Stat. § 147-16.2. A copy of the Executive Order #26 is available [on the NC Governor's website](#).

APNEP Office

The APNEP Office coordinates and facilitates the implementation and advancement of the CCMP, the APNEP mission, and the activities of the Leadership Council and Advisory Committees. The APNEP Office serves as a conduit for information between the Leadership Council, Advisory Committees, state and federal agencies, local governments, tribes, academia, and the public. The main office is located within the NC Department of Environmental Quality in Raleigh, North Carolina, with additional program personnel in Washington and Beaufort, North Carolina. The Virginia Department of Environmental Quality also provides support through a position in, Virginia. Under the direction of the Leadership Council, APNEP staff are pursuing a new host within the University of North Carolina System.



Leadership Council

This Leadership Council is the main advisory body for APNEP and the Management Conference. It was established by a North Carolina Governor's Executive Order to advise, guide, evaluate and support the CCMP implementation process, advance the CCMP and its management actions, and to ensure the highest level of collaboration, coordination and cooperation among state and federal agencies, local governments, the public and various interest groups. The Leadership Council consults with the advisory committees and the APNEP Office for recommendations pertaining to implementation of CCMP actions at the regional and local levels, and the coordination and development of research and monitoring priorities. A major duty of the Leadership Council is to evaluate the relevance of the CCMP and to make recommendations to address emerging issues that may affect the significant natural resources of the Albemarle-Pamlico estuarine system. The Leadership Council, in cooperation with the APNEP Office, develops an annual report, budget and work plan.

Science and Technical Advisory Committee

A Science and Technical Advisory Committee (STAC) was established to provide independent advice to the Leadership Council and the Implementation Advisory Committee on scientific and technical issues, including ecosystem assessment and monitoring, in support of CCMP implementation. The revised STAC held its first meeting during November 2012 in Manteo, North Carolina.

Implementation Advisory Committee

An Implementation Advisory Committee will be established to work with the Leadership Council to execute the actions necessary to implement the CCMP. The Implementation Advisory Committee will be comprised of representatives from the action teams (formerly known as implementation workgroups), each of which will advance a discrete set of related CCMP actions. Members of the Implementation Advisory Committee will serve as liaisons to agencies, organizations, and other workgroups regarding CCMP implementation. Information on the Implementation Advisory Committee and each of the action teams may be found [on the APNEP website](#). Currently the committee consisting of leadership of the Science and Technical Advisory Committee and Leadership Council accomplishes the role of the Implementation Advisory Committee in choosing projects for funding as needed.

Action Teams

APNEP has established and is currently establishing a number of Action Teams focused on implementing the objectives and actions in the CCMP. Action Teams are responsible for developing the outputs associated with each action deemed necessary to achieve desired ecosystem outcomes. Action Team membership is open to any interested party. Details on the Actions Teams may be found [on the APNEP website](#).

KEY ACCOMPLISHMENTS 2018-19

APNEP is one of 28 National Estuary Programs (NEP) established under Section 320 of the 1987 Clean Water Act (CWA) Amendments. From a programmatic standpoint, APNEP accomplishments in 2018-2019 included additional state funds awarded to support the Partnership's mission.

The additional funds resulted in increased activities that support implementation of the Comprehensive Conservation and Management Plan (CCMP). APNEP secured funds to purchase a new research and sampling boat, completed boat-based submerged aquatic vegetation (SAV) surveys, and in partnership with NC Department of Transportation completed aerial photographs of SAV for mapping purposes.

APNEP Management Conference Meetings

- In February, APNEP's Leadership Council met to begin discussions of long-term Partnership focus and direction that will continue into 2020. Kirk Havens, Assistant Director of the Center for Coastal Resources Management and Director of the Coastal Watersheds Program at the Virginia Institute of Marine Science, will complete his term as Leadership Council Chair on December 31, 2019. Holly White, Principal Planner for the Town of Nags Head, will serve as Chair for the 2020 calendar year.
- The APNEP Science and Technical Advisory Committee (STAC) met on December 5, 2018, and April 30, 2019. December's STAC meeting focused on a discussion of issues related to mariculture as an emerging industry in North Carolina's sounds, while the April meeting focused on planning and prioritization of components of APNEP's forthcoming monitoring strategy for the region.

CCMP Implementation Action Teams

- Eight of the twelve action teams have met since June of 2018, with some meeting multiple times. The teams have been convened to implement APNEP's CCMP. In addition, all of the Monitoring and Assessment Teams have met to prioritize indicators for the APNEP region.

Scientific and Technical Initiatives

- APNEP has been a leader in recognizing the value of North Carolina's submerged aquatic vegetation (SAV) resource since the early 2000's and continues to facilitate an SAV Team to coordinate monitoring, mapping, and outreach efforts in the state. By September 2019, the Team had finalized the 2013-2014 SAV map and it was published on DEQ's ArcGIS Online data repository as well as on APNEP's website. In addition, data was collected for creation of a third map of the estuary's SAV during the summer of 2019.
- An initial plan for an SAV communications campaign in the Albemarle-Pamlico region has been completed by a Master's Thesis student from the UNC-Chapel Hill School of Journalism with the guidance of APNEP staff. This campaign will be utilized in 2019 and 2020 to further build knowledge and appreciation of this resource in the state.
- APNEP continues to provide funding to the Division of Marine Fisheries Recreational Water Quality Monitoring Program for the continuation of water quality monitoring near recreational areas. The bacterial concentration data are used to inform the public about



health dangers of water contaminants. The program’s educational campaign informs the public about how bacteria enter coastal waters and what actions they can take to help prevent it.

- NC Sea Grant / APNEP Fellowship in Estuarine Research: APNEP, in coordination with NC Sea Grant, jointly fund a graduate student fellowship to conduct applied research within the North Carolina boundaries of the APNEP management boundary. Fellows must conduct research that addresses focus areas identified in the NC Sea Grant Strategic Plan and management actions identified in the APNEP Comprehensive Conservation and Management Plan.

Communications and Outreach

- APNEP’s new website was unveiled in March 2019 and is being improved on an ongoing basis. The new site is mobile-friendly and built with improved accessibility for those with visual, hearing, or motor impairments. It includes updated and refreshed information about what makes APNEP unique as well as the value the Partnership brings to the Albemarle-Pamlico region. Featured on the new site is an interactive map of 2012-2019 funded projects, increased and up-to-date information about current initiatives, and improved integration with APNEP’s social media platforms.
- APNEP staff worked with partners from the Virginia Beach-based nonprofit Lynnhaven River Now as well as other Virginia-based environmental organizations to organize a “Southern Watersheds Workshop” for Virginia teachers located in the river basins that flow into Albemarle Sound. The workshop was held at Back Bay National Wildlife Refuge in July 2019.
- The APNEP-supported Summer Teacher Institute, a multi-day environmental and outdoor education professional development opportunity for the region’s educators, has reached approximately 20-25 teachers each year since its inception in 2004. Long-term support for these programs has enabled them to become collaborative initiatives that involve many regional, state, and local partner organizations, to refine and improve upon their outreach strategies, and to gather relatively long-term data on program efficacy and impact.
 - The UNC Institute for the Environment’s EXPLORE NC program, which included the Teacher Institute as part of a year-long watershed-wide professional development experience in 2018-2019, had up to 50 contact hours per teacher per year and significantly increased teacher knowledge of local ecosystems and watershed science, confidence in using the outdoors to teach required curriculums, and self-efficacy beliefs in teaching outdoor science.
- Long-term APNEP support for the NC Museum of Natural Science’s Shad in the Classroom program has resulted in the initiative reaching approximately 30 educators each year since 2011, and through those educators over 1000 students each year. From 2010 (when APNEP began funding the program) to 2019, Shad in the Classroom has been able to grow from 13 classrooms to approximately 30 classrooms across the region.

Water Quality and Quantity Improvement Projects

Core to APNEP’s mission as a program authorized by the Clean Water Act is protecting and restoring the Albemarle-Pamlico region’s waters, and in 2018-2019 the Partnership funded or facilitated a number of projects in support of this goal, including:



- **Research:** Through APNEP’s Ecological Flows Action Team, the Partnership supported the completion of an assessment of existing ecological flows data for the region. Determination of ecological flows, which support sustainable human and natural communities, has been difficult for the Albemarle-Pamlico region due to data gaps and the tidal influence of the sounds. This assessment has given the Ecological Flows Team vital data to identify next steps towards the eventual determination of regional ecological flows.
- **Planning:** APNEP funded several projects in the region to assist communities in planning for better stormwater management. Through Sound Rivers Inc.’s College Campus Stormwater Impact and Needs Assessment, six college campuses in the Tar-Pamlico and Neuse river basins developed comprehensive reports that identify priority areas for BMP implementation and accompanying educational materials. The LID Stormwater Strategy Development project with the River City Community Development Corporation and NC Coastal Federation enabled LID designs to be incorporated into a housing development for veterans and special needs individuals in Elizabeth City, NC.
- **Monitoring:** Through support for Sound River’s Swim Guide program and NC Division of Marine Fisheries’ Recreational Water Quality Monitoring program, APNEP is expanding the collection of water quality data for our region and prioritizing public health. Both programs monitor water quality with the primary goal of alerting local communities to potentially hazardous conditions, and the Swim Guide program has the added benefit of operating through citizen scientists, providing an additional educational and outreach benefit.

Partnership-Building and Regional Coordination

- APNEP continues to lead the Coordination Committee of the Virginia Alosa Task Force (VATF) on an ongoing basis to encourage coordination of VATF members from Virginia and North Carolina on monitoring and management of anadromous fish in interjurisdictional waters.
- APNEP organized, sponsored, and facilitated complimentary sessions at the March 2019 NC Water Resources Research Institute (WRI) Conference. The WRI Conference brought together NC- and VA-based resiliency experts and practitioners to share knowledge, lessons learned, and best practices across state lines. Partners included the Virginia and North Carolina Sea Grant, North Carolina Coastal Federation, Division of Coastal Management, and the City of Virginia Beach.
- Since facilitation of an MOU between the NC Department of Environmental Quality, NC Department of Natural and Cultural Resources, and Virginia Secretary of Natural Resources in 2017, APNEP has been working to implement this Memorandum through strengthened partnerships and targeted initiatives. In the past year APNEP helped to organize the North Landing River and Albemarle Sound Estuarine Symposium in Virginia Beach, which fostered partnerships between Virginia and North Carolina stakeholder groups on environmental issues in the states’ shared river basins.
- Completion of Sound Rivers Swim Guide Website and App, now Swim Drink Fish, results were disseminated to the public from weekly bacterial monitoring during the summer. Citizen scientists were trained using a sampling SOP and data was compiled for 22 monitoring stations weekly. The data was available in real-time for river users text alert, water quality report videos, and social media.
- NC Coastal Resiliency Workshops and NC Executive Order 80 Implementation:



- APNEP staff participated in a workgroup that planned a series of workshops for local governments to share knowledge and resources related to coastal resilience issues, as well as identify local challenges and needs. The workshops were held in May 2019, followed by a Summit in June 2019 where APNEP staff facilitated a panel highlighting the role of coastal habitats in building coastal resilience in addition to the vulnerabilities facing our region's estuarine systems. Moving forward, APNEP staff will be co-chairing this workgroup with the Division of Coastal Management to foster a coastal resilience community of practice.
- APNEP staff are also co-chairing the Coastal Habitats Subcommittee and participating on various other subcommittees, including Pocosin Wetlands and Riverine and Floodplain Buffers, of the Natural and Working Lands Stakeholder Group. Staff participation ensures that implementation of the CCMP and Coastal Habitat Protection Plan are included in the action plans that will be developed by the teams and then incorporated into the State of North Carolina Climate Risk and Resiliency Plan.
- APNEP was successful in obtaining additional North Carolina state funds during 2018 - 2019. A total of \$236,000 in new state funding was leveraged by year end.
 - In partnership with the North Carolina Division of Emergency Management (NCDEM), APNEP procured state funding to install three water level monitors in the Albemarle-Pamlico watershed. All of the monitors will be connected to the Flood Inundation Mapping and Alert Network (FIMAN) and will be managed by NCDEM. FIMAN provides real-time data on stream elevation, rainfall and weather parameters, and FIMAN maps can alert officials of flood risk with each incremental rise in flood waters. The network also provides information on water depth along with estimated damage cost. This will allow efficient evacuation efforts during storm events, as well as information for future planning needs in the watershed.
 - The North Carolina Department of Transportation conducted submerged aquatic vegetation (SAV) aerial photogrammetry flights for the watershed down to the Onslow county area in summer 2019 for APNEP. These flights are essential in mapping the presence and absence of SAV in the estuary.
 - In addition to the SAV photo imagery, funds were secured by APNEP and awarded to the North Carolina Division of Marine Fisheries to interpret the aerial SAV photos in 2019 and 2020. Interpretation includes ground truthing of all areas in which flights paths were flown, which allows for accurate photo interpretation in a real-time setting.
- APNEP participated in partner-sponsored conferences, workshops, and festivals throughout the year. APNEP also provided financial support for several partner conferences and workshops during this time period, including the WRI Conference, NC Oyster Summit, NC Coastal Federation/RAE Living Shorelines Workshop, EENC Workshop, and the 2019 Kids Riverfest.



2018-2019 PROJECTS & ACTIVITIES

2018-2019 Completed Projects



Identify: Research and Technical Assistance

Coastal Plain Ecological Flows Evaluation

At a 2016 meeting, the APNEP Ecological Flows Action Team identified an assessment of existing ecological flows data for North Carolina’s coastal plain as a regional need. APNEP provided funds to Team Lead Dr. Mike O’Driscoll (ECU) to conduct this assessment and the resulting study, “Existing Data for Evaluating Coastal Plain Ecological Flows in the Albemarle-Pamlico Estuary Region” has assisted the Team in identifying data gaps. The assessment has assisted the Team in determining that conducting pilot studies in selected watersheds is a necessary next step in order to determine if existing data for the region is adequate to determine ecological flows. Collection and centralization of existing data will help material, personnel, and monetary resources to be efficiently distributed toward the ecological flow characterization efforts in the APNEP region.

Partners: East Carolina University (Lead), Duke University
Outputs/Deliverables: Report: “[Existing Data for Evaluating Coastal Plain Ecological Flows in the Albemarle-Pamlico Estuary Region](#)”
Outcomes: Identification of knowledge gaps associated with ecological flows in the NC coastal plain
Cost: \$17,890
Estimated Leverage: \$ 2,000

CCMP Actions: A3.3, D3.2, E2.2
CCMP Outcomes: 2a, 2b, 3a, 2b
CWA Core Programs Addressed: (5) protecting wetlands, (6) protecting coastal waters through the National Estuary Program

College Campus Stormwater Impact and Needs Assessment

APNEP provided funds for Sound Rivers, Inc. to conduct a stormwater impact and needs assessment for six college campuses in the Tar-Pamlico and Neuse River basins, including Vance-Granville Community College (four campuses), NC Wesleyan College, and Nash Community College. The objective of this effort was to identify and prioritize stormwater projects that would yield the greatest water quality benefits, as well as dovetail with campus environmental education programs. As a portion of each assessment, stormwater BMPs were recommended and estimates of probable implementation costs of potential projects were provided. Findings from this assessment may be used by Sound Rivers and the colleges to secure funds for project implementation and integrate projects with environmental education curricula.



Partners: Sound Rivers (Lead), Vance Granville Community College, NC Wesleyan College, Nash Community College

Outputs/Deliverables: Comprehensive stormwater reports for each campus outlining areas of concern and campus needs, educational materials and suggested outdoor classroom lessons, and ranking matrix to suggest order of BMP implementation for future work

Outcomes: Increased knowledge of BMPs and opportunities to manage stormwater at each campus; opportunities to implement BMPs and improve stormwater impacts on campuses and surrounding areas

Cost: \$19,500

Estimated Leverage: \$10,561

CCMP Actions: B1.1, C1.5, D1.4, D2.2

CCMP Outcomes: 1b, 1c, 1d, 1e, 2a, 2b, 2c, 3b, 3c, 3d

CWA Core Programs Addressed: (2) identifying polluted waters and developing plans to restore them, (4) addressing diffuse, nonpoint sources of pollution



Ecosystem Protection and Restoration

Low Impact Development Stormwater Strategies

The River City Community Development Corporation collaborated with APNEP, the North Carolina Coastal Federation, and community partners to incorporate Low Impact Development (LID) stormwater management designs and permitting into its new 18-unit multi-family supportive housing development. The collaboration offered a unique opportunity to incorporate sound stormwater management into a housing project for veterans and special needs individuals within Elizabeth City and Northeastern North Carolina. The stormwater design for the new housing development included LID measures to prevent polluted runoff from reaching surface waters.

Partners: NC Coastal Federation (Lead), River City Community Development Corporation

Outputs/Deliverables: Improved stormwater management strategies

Outcomes: Knowledge transfer, improved restoration and management techniques, decreased stormwater runoff

Cost: \$15,000

Estimated Leverage: \$20,000

CCMP Actions: C1.5, D1.1, D1.2, D2.2, D3.1

CCMP Outcomes: 1a, 1b, 1d, 1e, 2a, 2b, 2c, 3a, 3c, 3d

CWA Core Programs Addressed: (4) addressing diffuse, nonpoint sources of pollution



Engage: Education and Public Outreach

Planning & Facilitating Collaborative Meetings Workshop

APNEP and many other organizations utilize a stakeholder-focused process that relies on conducting collaborative, consensus-based meetings in order to make decisions. In recognition that the process is difficult and requires a high level of skill in order to be effective, APNEP and NOAA teamed up to offer a training opportunity for APNEP partners to strengthen and refine their meeting facilitation skills. APNEP staff and partners learned to design meetings that enhance problem solving and minimize conflict. The NOAA workshop provided environmental professionals in the APNEP region with the skills to design and implement collaborative approaches to meetings.

Partners: NOAA (Lead), NC Division of Coastal Management
Outputs/Deliverables: Workshop, educational materials and resources
Outcomes: Facilitation of working relationships among APNEP committees and partners, 25 trained facilitators
Cost: \$ 1,400
Estimated Leverage: \$ 2,000

CCMP Actions: Objective D3
CCMP Outcomes: 1a, 1b, 1c, 1d, 1e, 2a, 2b, 2c, 3a, 3b, 3c, 3d
CWA Core Programs Addressed: (4) addressing diffuse, nonpoint sources of pollution, (5) protecting wetlands, (6) protecting coastal waters through the National Estuary Program



Monitor: Estuarine System Status and Trends

Swim Guide Citizen Science Program

APNEP funded Sound Rivers, Inc. to initiate Swim Guide, a regional, citizen science water quality monitoring program. Swim Guide filled a void in water quality monitoring by identifying sites on the Neuse and Tar-Pamlico rivers not currently monitored by the NC DMF-Recreational Water Quality Program. The funds were used to purchase monitoring equipment and sampling supplies, fund intern stipends, and train citizen science volunteers. Swim Guide engaged and educated the community, helped to identify sources of bacteria pollution, and notified the public of health concerns when using the Neuse and Tar-Pamlico rivers and streams. By organizing this community-oriented, volunteer-driven water monitoring program, Swim Guide helped to empower Eastern North Carolina residents to participate in stream monitoring, be active in restoration, and to be informed of potential environmental health concerns.

Partners: Sound Rivers (Lead)
Outputs/Deliverables: Monitoring equipment, sampling supplies, funding for intern stipends, training for citizen science volunteers.
Outcomes: Monitoring data, increased understanding of water quality issues in eastern North Carolina, increased community knowledge and engagement
Cost: \$ 9,500
Estimated Leverage: \$14,304

CCMP Actions: D1.1, D2.1, D2.3, D3.1, E1.3
CCMP Outcomes: 1a, 1b, 1c, 1d, 1e, 2a, 2b, 2c, 3a, 3b, 3c, 3d
CWA Core Programs Addressed: (4) addressing diffuse, nonpoint sources of pollution, (6) protecting coastal waters through the National Estuary Program



2018-2019 Ongoing Projects

The following provides an overview of APNEP’s ongoing projects since the last annual work plan was approved on April 30, 2018. Ongoing projects are those that began during or before the last fiscal year, and which APNEP expects to continue through the FY2019-2020 fiscal year. Projects proposed for additional funding in 2019-20 are noted.



Identify: Research and Technical Assistance

APNEP-NC Sea Grant Joint Graduate Fellowship in Estuarine Research

Objectives: Foster interest in research related to APNEP CCMP goals; obtain research that can be used to inform APNEP and regional partner efforts to protect and restore ecosystem processes.

Description: APNEP and the North Carolina Sea Grant (NCSG) College Program have supported a Joint Graduate Fellowship since 2015. The fellowship provides funding for a graduate student based in North Carolina or Virginia to conduct applied research within the North Carolina portion of the APNEP management boundary. Fellows must conduct research that addresses focus areas identified in the NCSG Strategic Plan and APNEP CCMP.

Year(s): 2015 - present

Partners: NC Sea Grant (Lead)

Outputs/Deliverables: Final report, maps, data.

Outcomes: Increased capacity to address CCMP implementation actions

FY2018-19 Cost: \$5,750

Estimated Leverage: \$5,000

CCMP Actions: A2.1, B2.6, C3.1, D1.3, D2.1

CCMP Outcomes: 2a, 2b, 2c, 3d

CWA Core Programs Addressed: (4) addressing diffuse, nonpoint sources of pollution, (6) protecting coastal waters through the National Estuary Program

Progress to Date:

- **2015:** Fellow Liz-Brown Pickren studied consumption of self-caught fish in Tyrrell County, North Carolina in order to determine whether fish consumption advisories for the region’s rivers are understood and/or followed. Her research has informed discussions and direction of the APNEP Engagement and Stewardship Action Team, as well as resulted in the participation of APNEP staff in a collaborative “Fish Forum” workgroup that is working to address fish consumption issues in North Carolina.
- **2016:** Fellow Stacey Zhang studied restoration strategies for seagrass beds that harness positive interactions between SAV and oyster reefs. This research is of critical importance to APNEP, as the program’s focus on submerged aquatic vegetation may entail discussion of potential restoration sites and methods.



- **2017:** Fellow Mollie Yacano researched how nitrogen is processed in sediments associated with the invasive aquatic plant *Phragmites australis*. Her research will be utilized by APNEP and its partners in efforts to assess the impacts of aquatic invasives on ecosystem function, notably through current efforts such as coordination of the Aquatic Nuisance Species Management Plan and Aquatic Invasives Communication and Outreach Plan development.
- **2018:** Fellow Erin Voigt began her research after September 2018. She is studying how native versus invasive marsh species distribution and wave exposure affect shoreline erosion and the availability of nursery habitats.
- **2019:** 2020 Fellow Haley Plaas was awarded the 2020 Joint Fellowship in fall 2019. Her research began in September and will explore the potential for aerosolization of cyanobacterial toxins in the Chowan River and Albemarle Sound.

FY2019-2020 Plans:

Estimated Cost: \$6,000

Milestones:

- Before December 31, 2019: 2019 Fellowship work completed
- Before December 31, 2020: 2020 Fellowship work completed
- Before May 1, 2020: Develop scope for next fellowship

This year APNEP and NC Sea Grant Fellowship focus areas reflected the current needs and priorities of both programs, and included submerged aquatic vegetation ecology, harmful algal bloom impacts, and social science approaches to community resilience.

Submerged Aquatic Vegetation Economic Analysis

Objectives: To estimate historic and current economic values directly related to submerged aquatic vegetation (SAV) within the coastal zone area of the Albemarle Pamlico Estuary. The estimate will include the values of goods and services provided by SAV and income relation to SAV habitat.

Description: APNEP will build upon a 2016 EPA-sponsored effort to value the ecosystem services provided by SAV. The refined valuation of SAV will be used by those who reside or have influence in the APNEP region, such as government agencies, local governments, economists, educators, legislators, researchers, key decision makers and the general public.

Year(s): 2018-Present

Partners: NC State University

Outputs/Deliverables: Economic analysis report

Outcomes: Increased awareness and appreciation for the value of North Carolina’s submerged aquatic vegetation

FY2018-19 Cost: \$50,000

Estimated Leverage: TBD

CCMP Actions: B2.2, C3.3

CCMP Outcomes: 2a, 2b

CWA Core Programs Addressed: (6) protecting coastal waters through the National Estuary Program



Progress to Date:

APNEP is currently in the contracting process with a qualified state university institution to lead the research project.

FY2019-2020 Plans:

Estimated Cost: \$70,000

Milestones:

- Project should be completed by August 31, 2020.

The contract will fund an economic study of SAV in the Albemarle Pamlico watershed. The research will estimate historic and current economic value of coastal SAV by evaluating three components:

1. Total economic value of SAV whose final services are “provisioning” or cultural in nature, including benefits to fisheries/wildlife, recreation, water quality, and various economic sub-components;
2. Equivalent market value of SAV whose services are “supporting” or “regulating” in nature, including primary productivity, water purification, flood protection, shoreline and soil stabilization, nutrient and carbon cycling; and
3. Income related to coastal SAV accounting for multiplier effect.



Ecosystem Protection and Restoration

NC Aquatic Nuisance Species Management Plan Coordination

Objectives: To update a strategic plan for coordinated management, research, and outreach on aquatic nuisance species in NC; to garner renewed commitment from lead state agencies for the plan’s implementation; to submit the plan to the NC Governor’s Office for consideration; to acquire approval from the federal Aquatic Nuisance Species Task Force.

Description: The NC Aquatic Nuisance Species Management Plan (NCANSMP) is a collaborative, multiagency plan to improve the state’s ability to address aquatic invasive/nuisance species issues. Although the original plan was adopted in 2015 by the state’s three lead regulatory agencies on invasive species, there has been no implementation to date. Furthermore, NC never submitted the plan for federal approval to become eligible for external funding under the Aquatic Nuisance Species Prevention and Control Act (1990). Given the states limited resources directed towards invasive species management, federal funding support is critical to successful implementation of the NCANSMP. In support of the CCMP, APNEP is leading a revision process of the NCANSMP by the plan’s Steering Committee with the end goals of renewing commitments for collaboration from state agencies and making NC eligible to receive federal funding for invasive species management.

Year(s): 2015-2016, 2018 - Present (years of APNEP involvement)

Partners: NC Dept. of Environmental Quality, NC Wildlife Resources Commission, NC Dept. of Agriculture and Consumer Services, NC Dept. of Natural and Cultural Resources, US



Fish and Wildlife Services, NC State University, The Nature Conservancy, NC Sea Grant

Outputs/Deliverables: State plan for coordinated management, research, and outreach on aquatic nuisance species.

Outcomes: Federal approval of this plan will make NC eligible to receive federal funding (~\$40K/year) to support the plan's implementation. Improved coordination and collaboration across state agencies will leverage limited resources available for invasive species management in NC. The NCANSMP will also compliment Virginia's equivalent plan, thereby better enabling coordinated management actions between the two states under the 2017 MOU.

FY2018-19 Cost: Staff Time

Estimated Leverage: TBD

CCMP Actions: A2.1, B2.6, C3.1, D1.3

CCMP Outcomes: 2c

CWA Core Programs Addressed: (5) protecting wetlands (6) protecting coastal waters through the National Estuary Program

Progress to Date:

APNEP staff provided feedback on the original NC ANS Management Plan that was adopted in 2015 and have been facilitating an update of the Plan through the NCANSMP Steering Committee in 2018-2019.

FY2019-2020 Plans:

Estimated Cost: Staff Time

Milestones:

- Spring 2020: Re-adoption of a revised NCANSMP by NCDEQ, NCWRC, and NCDA&CS, and first adoption by NCDNCR. Submission of updated NCANSMP to the federal Aquatic Nuisance Species Task Force for approval.

APNEP staff will continue to facilitate the coordination of revisions to the NC ANS Management Plan in 2019, with the goal of having the NC Governor's Office submit the revised Plan to the federal Aquatic Nuisance Species Task Force in 2020. From there, APNEP staff will continue to work with the Plan's Steering Committee towards implementing the NCANSMP in support of shared CCMP priorities.

NC Coastal Habitat Protection Plan Implementation Support

Objectives: To coordinate across NC state agencies in order to improve coastal habitats and to raise awareness about the importance of these habitats for NC fisheries.

Description: The [NC Coastal Habitat Protection Plan \(CHPP\)](#) adopted by the Coastal Resources, Environmental Management, and Marine Fisheries Commissions, has seen routine development since its implementation began in 2004. The Coastal Habitat Protection Plan has assisted in creating an opportunity for agencies and commissions within DEQ to work together on issues specific to fish habitat. The nature of the document forces the commissions and agencies focus



their actions on rules and regulations that enhance, improve, or restore significant habitats as they pertain to fisheries. While differences in scope, geography and mission exist, implementation of CCMP and the CHPP are complimentary and APNEP staff ensure that both plans are implemented in a coordinated and integrated fashion. A new CHPP implementation plan and updated scientific support documents were produced in 2015-16.

Year(s): 2004 - Present

Partners: NC Department of Environmental Quality, NC Coastal Resources Commission, NC Environmental Management Commission, NC Marine Fisheries Commission, Sedimentation Control Commission

Outputs/Deliverables: CHPP Annual Report

Outcomes: Coordinated activities and regulation across NC state agencies to improve estuarine habitats.

FY2018-19 Cost: Staff Time

Estimated Leverage: \$24,000

CCMP Actions: A1.1, A2.3, A2.4, B1.2, B1.3, B1.4, B1.5, B2.2, B3.2, B3.3, C1.3, C1.4, C1.5, C2.2, C3.2, C3.3, C4.2, C4.3, C5.1, C5.2, C5.3, D1.2, D1.4, E1.2

CCMP Outcomes: 1a, 1b, 1c, 1d, 2a, 2b, 2c, 3b, 3c, 3d

CWA Core Programs Addressed: (6) protecting coastal waters through the National Estuary Program

Progress to Date:

- A baseline has now been established for the extent and coverage of submerged aquatic vegetation in the Albemarle-Pamlico region. Photographic flights have now been flown in the APNEP region in 2007 and 2012 with another coast wide round of flights being flown in 2019. The Department of Environmental Quality has also been able to help cover some costs of these flights and the photo interpretation that follows. The information generated from the flights and subsequent photographs will be used to help determine the trends regarding SAV coverage in the state's estuarine waters.
- A significant attempt to help restore oyster populations across the state has generated support from the NC General Assembly. Over \$1 million dollars has been appropriated over the past several budget cycles to help with the construction of new oyster sanctuaries, as well as increased cultch plantings for to help with commercial harvests. The NC Division of Marine Fisheries and Marine Fisheries Commission have also responded with a new Oyster Fishery Management Plan, which implements new safeguards when oyster populations drop below certain thresholds during the commercial harvest season. APNEP's oyster study and action team played major roles in this process.
- For a number of years, DCM and DMF have been working with the Army Corps of Engineers for a General Permit for Living Shorelines. That GP was issued this year and should result in permits for living shorelines being easier to obtain, which will hopefully make them a more viable option verses bulkheads and hardened structures. This effort has been ongoing for more than 10 years. This activity is supported by APNEP long-running efforts to support living shorelines along the estuarine shoreline.



FY2019-2020 Plans:

Estimated Cost: Staff Time

Milestones:

- Effectiveness of implementation of the 2018-2020 CHPP Implementation Plan will be assessed in 2019. The 2020-2022 Implementation Plan will be created and the planning process will begin for the next CHPP revision, due in 2021.
- EO80 Natural and Working Lands Coastal Habitats Subcommittee Milestones:
 - Summer 2019: Facilitate meeting of the NWL Coastal Habitats Subcommittee and coordination with Duke on mapping and modeling.
 - Summer-Fall 2019: Develop Action plan for the NWL Coastal Habitats Subcommittee.
 - Winter 2019: Deliver Action plan to the NWL Stakeholder Committee for inclusion in the Climate Risk Assessment and Resiliency Plan.

APNEP's projects and initiatives related to SAV mapping and monitoring are strongly tied to CHPP implementation. See SAV Mapping and Monitoring project description for more information.

APNEP will continue to co-lead the Coastal Habitats Subcommittee (with DMF) of the NWL group and to evaluate resilience and carbon sequestration co-benefits that align with the goals of the CHPP and CCMP. It is anticipated that significant staff time will be needed to assist in leading the team and developing the subcommittee action plan and coordinating with the overarching Natural and Working Lands to ensure the action plan is included in the Climate Risk Assessment and Resiliency Plan required by Section 9 of NC Executive Order 80. Short term actions will be identified that may also require staff time, leverage, and resources to implement.

Using Natural and Nature-Based Features to Build Resilience to Storm-Driven Flooding Project

Objectives: To work with the Virginia Institute of Marine Sciences (VIMS) project team and partners to evaluate the applicability of tools for assisting coastal local governments and planners in determining suitable areas for natural and nature-based features (NNBFs) within North Carolina.

Description: APNEP is collaborating as a project partner on a [NOAA Coastal Resilience Grant](#) from NOAA awarded to [VIMS](#). The project is focused on increasing the use of NNBFs to increase resilience of coastal communities to flooding caused by storms and extreme weather events and is designed to include interaction with local government officials as the target audience for project generated data and guidance. The project includes development of tools that allow local planners in coastal counties in Virginia to determine suitable areas to implement natural infrastructure.

Year(s): 2018 - present

Partners: [Virginia Institute of Marine Science](#), Virginia Coastal Policy Center, Wetlands Watch

Outputs/Deliverables: Inventory and comparison of NC/VA data sources; workshops and meetings with partners in North Carolina



Outcomes: Increase in incentives and tools for local governments and communities to utilize natural and nature-based features including living shorelines. Increase in the number of communities in the APNEP region that incorporate resilience and consideration of impacts from sea level rise and climate change into local planning processes.

FY2018-19 Cost: Staff Time

Estimated Leverage: TBD

CCMP Actions: A2.2, B3.1, D3.3

CCMP Outcomes: 2a, 2b, 2c, 3a, 3b, 3d

CWA Core Programs Addressed: (4) addressing diffuse, nonpoint sources of pollution, (6) protecting coastal waters through the National Estuary Program

Progress to Date:

APNEP staff are currently planning meetings and other outreach opportunities to solicit feedback from North Carolina agency personnel and other partners. This information is being used to develop an evaluation of opportunities and limitations to extend the project outputs beyond Virginia in 2019 and 2020.

Spring/Summer 2019: VIMS staff presented about the project to the Living Shorelines Steering Committee and members of the Coastal Regional Resilience Workgroup. Coordination was initiated with partners that house geospatial data (AGOL team, Division of Coastal Management, Natural Heritage Program) to compare data sources.

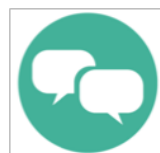
FY2019-2020 Plans:

Estimated Cost: Staff Time

Milestones:

- Summer-Winter 2019: Continued targeted outreach and follow up discussions with potential project partners in North Carolina.

The project team will work with agency representatives to identify opportunities and criteria for using NNBFs to increase resilience to flooding and simultaneously generate credits for local governments in other resource management and hazard mitigation programs such as the National Flood Insurance Community Rating System, TMDL program for nutrient and sediment load reductions; and the stormwater management program. APNEP will work with the project team and other partners to evaluate applicability of the basic products in North Carolina coastal localities to plan for possible extension of the guidance developed in this project to areas beyond coastal Virginia.



Engage: Education and Public Outreach

Albemarle-Pamlico Estuary Highway Signs



Objectives: Educate the public in North Carolina about the location of the Albemarle-Pamlico watershed in relation to where they work, play, go to school, and vacation.

Description: As part of APNEP’s commitment to increase public awareness of the Albemarle-Pamlico watershed and its biological and natural significance to the region, APNEP is seeking the services of the NC Department of Transportation for the manufacturing and installation of six Albemarle-Pamlico watershed signs to be placed throughout the North Carolina portion of the region.

Year(s): 2018-Present
Partners: North Carolina Department of Transportation
Outputs/Deliverables: Six signs installed at the intersections of major N.C. highways and the Albemarle-Pamlico watershed boundary.
Outcomes: Increased public’s awareness of the Albemarle-Pamlico watershed.
FY2018-19 Cost: Up to \$36,000
Estimated Leverage: NCDOT maintenance to address normal wear and tear of the six signs in their respective locations.

CCMP Actions: Objectives D1 and D2.
CCMP Outcomes: All (indirect)
CWA Core Programs Addressed: (6) protecting coastal waters through the National Estuary Program

Progress to Date:

This contract has been fully executed and signs should be installed by December 2019. APNEP signage will be installed at six locations throughout the watershed: Orange County, Wake County, Johnston County, Sampson County and Onslow County.

APNEP Action Team Facilitation

Objectives: To facilitate interagency and inter-organization communication related to priority issues in the Albemarle-Pamlico region, to improve cooperation and develop collaborative initiatives that accomplish shared goals.

Description: APNEP’s initiatives are guided by input from a diverse group of regional partners and stakeholders. Action Teams have been created to address the management strategies elucidated in APNEP’s CCMP. Each Action Team works toward implementation of several closely aligned management action in various environmental disciplines. Members include representatives from state, local, and federal government, nonprofits, and universities.

Year(s): Ongoing
Partners: [Varies; see Action Team webpages for partner organizations](#)
Outputs/Deliverables: Decisions about CCMP implementation priorities; improved communication between AP region environmental organizations
Outcomes: Implementation of the CCMP
FY2018-19 Cost: Staff Time



Estimated Leverage: \$25,500

CCMP Actions: All

CCMP Outcomes: All

CWA Core Programs Addressed: (4) addressing diffuse, nonpoint sources of pollution, (5) protecting wetlands, (6) protecting coastal waters through the National Estuary Program

Progress to Date and FY2019-2020 Plans:

Estimated Cost: Staff Time

Contaminant Management Action Team: The team met in October 2018 to discuss the direction of the Team. The last action supported by the team was solely dedicated to nutrient reductions. The 2018 reboot opted to include stronger emphasis on septic, and personal care products to the list of team priorities.

Decision Support Tools Action Team: The team met in October 2018 to discuss conceptual models as a way to analyze data using APNEP selected indicators. The model will be accessible to everyone including scientists, management, policy makers and the general public. All model input will be distributed via the monitoring and assessment teams

Ecological Flows Action Team: The Phase I draft report “Existing Data for Evaluating Coastal Plain Ecological Flows in the Albemarle Pamlico Estuary Region” was submitted to APNEP August 2018, delivered to the team for review, and presented at the October 2018 team meeting by Dr. Mike O’Driscoll of East Carolina University. The team discussed initial plans for conducting Phase II, a pilot study. Team co-leads Dr. O’Driscoll and Bob Christian of ECU submitted draft recommendations moving forward including commitment of resources from APNEP and NCDEQ Division of Water Resources.

In 2019, the team has been working on a detailed proposal for Phase II, which will consist of selecting at least two watersheds (one inner coastal plain; one outer coastal plain) for detailed pilot studies that focus on flow-ecology relationships, longer-term flow record analysis, and detailed water budgets to help develop a better understanding of the linkages between water use, meteorological conditions, and low flows and the ecological response to flow alteration (including flow, stage, and salinity aspects). The Team met in October 2019 to continue this process and will meet again in 2019 to further determine Phase II details.

Engagement and Stewardship Action Team: The Team met in October 2018 to discuss efforts to map implementation of the Team’s CCMP actions, recommendations for continued funding for Shad in the Classroom and the Teacher Institute, and to provide feedback on criteria to evaluate ongoing requests for project funding. Since then, APNEP staff have presented the Team’s recommendations to the Leadership Council and finalized/published the guidelines and criteria [on the APNEP website](#).

Funding for Shad in the Classroom and the Teacher Institute was approved through 2021 by the Leadership Council in April 2019. The next step for the Team is to develop and



communicate the process/criteria that will be used to evaluate Shad in the Classroom, the Teacher Institute, and any other long-term funded initiatives in the future. In addition, APNEP will determine if any remaining funds are available for Engagement and Stewardship Actions and based on that decide how to proceed with Team activities between 2019 and the end of Shad/Teacher Institute funding in 2021.

Freshwater Habitat and Fish Passage Action Team: CCMP actions associated with this Team are largely either opportunity-based (e.g., dam removal) or aligned with other APNEP teams and activities. Although this Team has not met for two years, opportunities to advance CCMP initiatives for anadromous fish have been pursued and supported by APNEP over the last year. APNEP staff have been participating on the Virginia Alosa Task Force (VATF) since December 2017. A Coordination Committee of the VATF is facilitated by APNEP to promote coordinated monitoring and management between NC and VA in shared waterways in support of the NC/VA MOU. This committee met in November 2018 and January 2019 and collaborated for the 2019 spawning season.

This Team will be rebooted to reassess partner interest and to review existing or anticipated opportunities for CCMP implementation relative to associated CCMP actions. Prior to reconvening, a survey will be developed and issued to Team members to identify how current partner conservation and management priorities align with existing CCMP actions. The results of this survey will help focus Team efforts in the near term to achieve meaningful progress on CCMP initiatives for anadromous fish. APNEP staff plan to also attend the next meeting of the larger VATF to help in fall/winter 2019.

Invasive Species Action Team: Implementation of CCMP actions associated with this Team are particularly challenging due to the scope of the problem and the overall lack of resources available for invasive species management. As such, APNEP initiatives on invasive species must be coordinated with ongoing initiatives by APNEP partners to strategically leverage resources and make meaningful progress. Although this Team has not met for two years, APNEP has made considerable progress towards CCMP implementation regarding invasive species. See information about the NC Aquatic Nuisance Species Management Plan and APNEP-NC Sea Grant Graduate Fellowship for details.

Depending on the length of the revision process currently underway by a Steering Committee for the NCANSMP, we anticipate this state plan being re-adopted by NCDEQ, NCWRC, and NCDA&CS in 2020 and submitted by the Governor's Office for approval from the federal Aquatic Nuisance Species Task Force at either their May 2020 or November 2020 meetings. APNEP staff will continue to facilitate the NCANSMP Steering Committee, with meetings occurring approximately bimonthly over the next year until the plan's revisions are complete. APNEP will coordinate with DEQ Creative Services for formatting and production of the final plan. APNEP, through the DEQ Secretary's Office, will also coordinate the plan's re-adoption process and submission to the Governor's Office for consideration.

Submerged Aquatic Vegetation Team: The SAV Team's February 2019 workshop included SAV mapping discussions on (1) finalizing the 2013-2014 interpretations for high-salinity SAV, and (2) protocols to amend the 2006-2008 SAV map to correct some errors revealed



during the 2013-2014 interpretation. Also, during this session, select team members have been compiling SAV policy position documents from key partner organizations. Their compilation will facilitate a review of regulatory consistency with the objective to promote SAV protection and restoration. The public release of the 2013-2014 SAV map occurred in October 2019. The distribution and refinement of these maps will provide status and trends information to facilitate APNEP partners to protect and restore high-salinity SAV beds. APNEP undertook a third-generation mission of image acquisition for high-salinity SAV during spring and fall 2019. Although image acquisition was largely successful, further flights for certain portions of the estuary will need to occur in spring 2020 before interpretation and production of a third-generation map can occur in 2020 and 2021.

Water Quality (LID) Action Team: The inaugural meeting of this team was held October 2018. Attendees felt that a LID cost-benefit analysis, which potentially could result in common guidelines for individual developers and towns working with local resources.

Living Shorelines Action Team (jointly facilitated with NC Coastal Federation): The Team met for the first time in July 2018 to communicate and collaborate on various actions by different partners concerning education and outreach, research, and incentives for the development of living shorelines in North Carolina. Since then, subcommittees have been formed and have met to discuss the various actions listed in a draft action document. The committee is working to finalize a living shoreline working strategy document that will guide the group in supporting sustainable management of estuarine shorelines through the promotion and expanded use of living shorelines. Members of the Action Team participated with the NC Coastal Federation and Restore America's Estuaries to organize and bring together experts in the field of living shorelines at the 2019 Living Shorelines Tech Transfer Workshop held in Beaufort October 8-9.

Oyster Habitat Restoration Action Team (externally facilitated by NC Coastal Federation): Over the past six to eight months, the Northern Oyster Action Team has recognized the need to set science-based oyster targets/goals for the update of the Oyster Blueprint. At the last meeting in April, the group took the first step towards developing science-based restoration goals for oysters in NC. The conversation focused on an important decision point – whether to continue to develop goals under the current Oyster Blueprint structure, which focuses on sanctuaries, cultch and commercial harvest, to develop a set of new goals based on desired services, things like larval output and the total value of the fishery.

Regional Coastal Resiliency Workshops and Summit

Objectives: Learn from local governments about their greatest challenges and needs to build resiliency and inform development of the State Climate Risk Assessment and Resiliency Plan under Executive Order 80. Share the latest information about climate science, impacts, and what other communities are doing in the region to adapt to changing conditions before and after disasters occur. Develop peer-to-peer networking opportunities to facilitate interdisciplinary understanding and collaboration on resilience issues at local and regional scales.

Description: APNEP is participating in a working group led by the NC Division of Coastal Management, North Carolina Coastal Federation, and partners. The team is conducting two



Regional Resilience Workshops for local elected officials, local planners and local emergency managers in Elizabeth City and Wilmington.

Year(s):	2019-Present
Partners:	Division of Coastal Management, North Carolina Coastal Federation, NC Sea Grant, NC Division of Emergency Management, various regional Councils of Government
Outputs/Deliverables:	Summary of technical session and panel at WRI conference via a Soundings blog post; Assist partners with workshop and summit summaries for inclusion in the Climate Risk and Resiliency Plan; information to inform APNEP focus and resources and utilization of EPA funding
Outcomes:	Share resources and perspectives about how the state can and should support reducing risks to natural hazards and climate change impacts and build long-term resilience for communities in coastal areas of North Carolina.
FY2018-19 Cost:	Staff Time
Estimated Leverage:	TBD
CCMP Actions:	D3.3
CCMP Outcomes:	1a, 1b, 1c, 1d, 1e, 2a, 2b, 2c, 3a, 3b, 3c, 3d
CWA Core Programs Addressed:	(4) addressing diffuse, nonpoint sources of pollution, (5) protecting wetlands, (6) protecting coastal waters through the National Estuary Program

Progress to Date:

APNEP organized technical sessions and panel discussion at the 2019 WRI Conference to help focus our involvement with this effort moving forward. Staff provided logistical support for the Northeast Regional workshop and assisted in organizing and facilitating a panel discussion at the June Summit. Staff have developed more detailed proposals for use of EPA supplemental funds.

In June 2019, a two-day event was held in Havelock to synthesize what has been learned from the regional workshops. Information from the regional workshops and summit was summarized and shared with workshop participants and included in the development of the Climate Risk Assessment and Resiliency Plan required by Section 9 of Executive Order 80. APNEP plans to utilize information and feedback from communities that participate in the workshops and summit to inform utilization of the supplemental funding for EPA (See *Assisting Underserved Communities with Incorporating Resiliency into Local and Regional Planning Processes* project.)

FY2019-2020 Plans:

Estimated Cost: Staff Time

Milestones:

- March 2020: NC DEQ Climate Risk and Resiliency Plan due
- October 2020: Completion of Tribal Communities Resilience project identified by EPA supplemental funding: APNEP has developed a proposal to utilize 2019-2020



supplemental funding from the Environmental Protection Agency (EPA) to support Tribal communities in the APNEP region with considering climate risk and resiliency into tribal planning and community engagement processes. Staff have been working with Tribal community representatives and leaders and agency and university resiliency practitioners from North Carolina and Virginia to refine the proposal, and will be convening a steering committee to evaluate climate resilience and adaptation strategies utilized by Tribal Nations around the country, and resilience efforts being conducted by local, state and federal agencies to determine an approach relevant to Tribal communities in the APNEP region. The proposal seeks to build capacity for Tribal Nations/communities to have active engagement in federal, state, regional, and local planning efforts that impact Indigenous people, recognizing considerations and perspectives that are unique to Tribal Nations/communities.

Event Participation and Sponsorships

Objectives: To support regional partners in reaching shared goals, to leverage resources and transfer knowledge/skills within the Albemarle-Pamlico region

Description: APNEP supports regional outreach, networking, and knowledge/skill transfer events via sponsorship. Sponsorship funding generally falls between \$500-\$2500 and helps to leverage resources to reach shared goals and promote partnership opportunities. APNEP may participate in sponsored or non-sponsored events via tabling, environmental education activities, or logistical support.

Year(s):	Ongoing
Partners:	Varies
Outputs/Deliverables:	Event sponsorship
Outcomes:	CCMP implementation, increased visibility and improved partner relationships
FY2018-19 Cost:	\$8,500
Estimated Leverage:	\$30,000
CCMP Actions:	All
CCMP Outcomes:	All
CWA Core Programs Addressed:	All

Progress to Date:

- 2018 Hyde, Seek, and Discover (Environmental education, ~120 K-5 students reached)
- 2018 Rising - A Conversation about Coastal Change (Tabling, Lead a panel discussion, ~75 people reached)
- 2018 SciREN Triangle (Tabling, ~50 teachers reached)
- Tidewater Screening and Panel Discussion (Logistical support, ~200 people reached)
- 2018 Environmental Educators of NC Conference (Sponsorship, Keynote address, ~50-75 people reached)
- 2019 Water Resources Research Institute Conference (Tabling, Sponsorship, Organized a technical and participatory session~100 people reached)



- 2019 SciREN Coast (Tabling, ~45 teachers reached)
- 2019 Coastal Envirothon (Environmental education, ~100 6-8th grade students reached)
- 2019 NC Oyster Summit (Tabling, Sponsorship, ~25 people reached)
- Kids River Fest with Sound Rivers Inc. (\$1000 Sponsorship)
- 2019 Hyde, Seek, and Discover (Environmental education, ~120 K-5 students reached)
- 2019 SciREN Triangle (Tabling, ~65 teachers reached)
- 2019 Hyde County Environmental Education Field Day (Environmental education, ~45 4th grade students reached)

FY2019-2020 Plans:

Estimated Cost: \$8000

- 2019 Environmental Educators of NC Conference (\$1000 Sponsorship)
- 2019 NC Sea Grant Coastal Conference (\$500 Sponsorship)
- 2020 SciREN Coast (Tabling)
- 2020 Water Resources Research Institute Conference (\$1000 Sponsorship, Tabling)
- 2020 Coastal Envirothon (Environmental education)
- 2020 NC Oyster Summit (Tabling, Sponsorship)

Public Outreach: Digital and Print Media Development

Objectives: Increase awareness of and access to APNEP and partner resources, increase knowledge and understanding of Albemarle-Pamlico region issues and promote environmental stewardship behaviors.

Description: APNEP produces a wide variety of communications materials to improve the Partnership’s ability to reach different audiences, including its partner organizations, local government, the general public, and scientists and researchers. APNEP accomplishes this through print and digital materials, including its website, social media platforms, blog, e-newsletter, and printed fact sheets and brochures.

Year(s): Ongoing

Partners: Varies

Outputs/Deliverables: Regularly updated print and digital communications materials

Outcomes: Increased understanding of the issues affecting the Albemarle-Pamlico region and awareness of APNEP’s role in the region

FY2018-19 Cost: Staff Time

Estimated Leverage: \$300

CCMP Actions: All

CCMP Outcomes: All

CWA Core Programs Addressed: (4) addressing diffuse, nonpoint sources of pollution, (5) protecting wetlands, (6) protecting coastal waters through the National Estuary Program

Progress to Date:

In FY2018-2019, APNEP staff developed a new long-term Engagement Strategy for the Partnership. The Engagement Strategy tackles (1) Partner Engagement, (2) Public Outreach, and



(3) Communications, presenting a detailed vision for how APNEP would like to conduct its communications and outreach efforts going forward.

In addition, in March 2019 APNEP launched a new website, with an updated look and feel and updated content. This new website is mobile-friendly and designed to meet accessibility standards. APNEP also developed an interactive ArcGIS Online-based map of 2012-2018 funded projects, with information about partnerships, funding amounts, and project details. This map is embedded prominently on the new APNEP website.

APNEP staff worked to redevelop the Partnerships' Annual Work Plan to both better align it with EPA Guidance and to create a product that can serve as a public-facing document for those interested in APNEP's progress and plans. The first iteration of this redevelopment occurred in 2019, with plans to further improve the Work Plan based on EPA and partner feedback in subsequent years.

FY2019-2020 Plans:

Estimated Cost: \$1000

Milestones:

- May 2019: Annual Work Plan redevelopment complete
- Fall 2019-Winter 2020: New printed materials complete

APNEP staff have begun working on the development of new printed materials for APNEP, including fact sheets for different audiences, rack cards, bifold for general public, and potentially on materials related to specific priority issues (SAV, coastal resiliency, aquatic invasives, etc.). Staff will be working with NCDEQ's Creative Services department to design these new materials, which will be used at partner meetings, sponsorship/networking events, outreach events, and at other events as needed.

APNEP will be continuing to improve and maintain its new website, including its GIS map of past projects and its Soundings blog. Social media platforms, e-newsletter, and other digital products will be updated on a consistent and ongoing basis. As needed, APNEP staff will develop digital and print materials to accompany and illustrate any State of the Sounds reports that are published in 2019 and 2020.

Shad in the Classroom

Objectives: Engage students in hands-on learning about American Shad and Albemarle-Pamlico region river basins, foster environmental stewardship and understanding of watershed connections, contribute to the restoration of American Shad within the Neuse River Basin, inspire a new generation of biologists and ecologists.

Description: The Shad in the Classroom project provides teachers with the training, resources, and support to raise American Shad from eggs to fry in their classrooms, and then release those fry into the Neuse basin. In doing this, students are able to learn about water quality issues, watershed connections, and aquatic ecosystems through hands-on activities and outdoor education. Teachers are also able to utilize extension activities facilitated by the Shad in the Classroom program, including fish dissections, gyotaku (fish printing), and other lesson plans. In addition,



raising and releasing shad contributes to the US Fish and Wildlife Service's and NC Wildlife Resource Commission's goals for restoring American Shad populations in these river basins. The collaborative project provides students with an understanding of the scientific process, an inspiration for careers in science, and a desire to protect our waterways.

Year(s):	2011-Present
Partners:	NC Museum of Natural Sciences (Lead), US Fish and Wildlife Service, NC Wildlife Resources Commission, NC State University, East Carolina University
Outputs/Deliverables:	American Shad fry released into the Neuse River in conjunction with USFWS and NCWRC restoration efforts, ~30 educators/year trained on rearing and releasing American Shad, 1000+ students participating/year
Outcomes:	Increased community involvement in water quality and habitat protection
FY2018-19 Cost:	\$ 20,000
Estimated Leverage:	\$ 11,000
CCMP Actions:	D2.1, D2.2, D2.3
CCMP Outcomes:	1a, 1b, 1c, 1d, 1e, 2a, 2b, 2c, 3b
CWA Core Programs Addressed:	(4) addressing diffuse, nonpoint sources of pollution, (5) protecting wetlands, (6) protecting coastal waters through the National Estuary Program

Progress to Date:

Shad in the Classroom reaches over 1000 students each year through 20-30 classrooms that participate in the program. This initiative has consistently grown since its inception, with demand that outstrips the program's capacity to accommodate additional classroom participation. The limiting factor for the program's growth is staff capacity - currently, the program is coordinated by one part-time staff member and it has reached the limits of that person's ability to manage the program. APNEP's funding supports the salary of this staff member, and in addition APNEP staff provide assistance with egg deliveries to schools and shad release day events.

American Shad were chosen as the fish species for the program because they have cultural and historic importance in eastern North Carolina, and there are active efforts by the NC Wildlife Resources Commission to restore their populations in the Roanoke and Neuse river basins. While Shad in the Classroom doesn't contribute significantly to population restoration efforts, it raises awareness about the issue.

Program outputs (2009-2018) include:

- 216 classrooms reached
- 13,764 students reached (2013-2018)
- 100% positive evaluation of workshops and overall program
- Growth of program from 13 classrooms in 2010 (pre-APNEP funding) to 30 classrooms in 2018
- 30 NC counties participating in the program (21 in APNEP region)



FY2019-2020 Plans:

Estimated Cost: \$20,000

Milestones (occur each year):

- January-March: Applications were reviewed, and teachers selected, supplies purchased, teacher training session scheduled and facilitated, shad weeks scheduled with USFWS, NCWRC, classrooms, extension educational activities coordinated.
- April-June: Shad delivered to classrooms, raised, released. Extension education activities coordinated. Hatchery field trip for teachers. Evaluations returned from classrooms and summary of program completed.
- July-September: Communication with interested teachers for 2020 program. Data entry and analysis of student survey.
- October-December: Applications distributed, supplies inventoried, tanks retrieved and/or refurbished, planning for 2020 season begins.

The Shad in the Classroom program plans to continue in 2020 as it has in 2019.

Summer Teacher Institute

Objectives: To increase teacher knowledge of watershed science, provide resources to teach watershed science, and increase teacher confidence in utilizing immersive, hands-on, inquiry-based, and outdoor-focused curricula in their classrooms.

Description: Since 2004, APNEP has worked with partner organizations to offer a multi-day professional development opportunity for teachers in the Albemarle-Pamlico region that focuses on the development of skills and knowledge in environmental education methods that support teachers in integrating the outdoors into their curricula. The immersive experience varies each year depending on identified topic and grade level needs but includes curriculum training in earth and environmental sciences with hands-on activities, site visits, and specific content to support inquiry, experiential, and research-based instruction on estuarine and watershed resources. Teachers are able to participate in authentic outdoor learning experiences, including exploration of maritime forest, estuary, and salt marsh ecosystems.

Year(s): 2004 - Present

Partners: UNC Institute for the Environment (Lead), NC Museum of Natural Sciences, NC Coastal Federation, US Environmental Protection Agency, NC Sea Grant, NC Aquariums

Outputs/Deliverables: Approximately 25 teachers trained in hands-on, outdoor environmental education, water quality, and watershed curricula

Outcomes: Increased use of environmental education curricula in North Carolina schools

FY2018-19 Cost: \$ 20,000

Estimated Leverage: \$ 11,000

CCMP Actions: D2.1, D2.2, D2.3

CCMP Outcomes: 1a, 1b, 1c, 1d, 1e, 2a, 2b, 2c, 3b



CWA Core Programs Addressed: (4) addressing diffuse, nonpoint sources of pollution, (5) protecting wetlands, (6) protecting coastal waters through the National Estuary Program

Progress to Date:

Each summer since 2004, APNEP has supported a Summer Teacher Institute for educators that focuses on estuarine and water quality education. The specific grade level(s) and goals of the program vary each year and are based on identified needs and gaps in current professional development opportunities for educators in the Albemarle-Pamlico region. The UNC Institute for the Environment is the longtime facilitator of this institute, and in 2017 and 2018 incorporated the summer institute into a year-long professional development program called ExPLORE NC that targeted 4th and 5th grade teachers. Both the Teacher Institute and larger ExPLORE NC program showed educators how to utilize place- and inquiry-based learning strategies to help students learn about North Carolina's rivers, coasts, and watersheds. The main themes of the program are (1) learning from the headwaters to the ocean, (2) involvement of scientists and experts, and (3) integration of new and existing instructional materials/EE resources.

From 2012-2018, 145 4th-12th grade teachers were reached through the program (approximately 20 teachers/year) and:

- Through these educators, over 50,000 students have been indirectly reached since 2012
- These educators have come from 19 counties in the APNEP region and 47 counties in North Carolina overall

The ExPLORE NC program (2017-2018) had up to 50 contact hours per teacher per year.

Outcomes from pre/post surveys showed:

- Increased knowledge of local ecosystems and watershed science ($p < 0.05$)
- Increased confidence in using the outdoors to teach required curriculum ($p < 0.05$)
- Increased science teaching and outdoor science teaching self-efficacy beliefs ($p < 0.05$)
- Increased awareness and use of local EE resources

Other outcomes:

- Teacher knowledge of/enrollment in the NC Environmental Education Certification Program
- Creation of outdoor classrooms
- Increased knowledge of and enrollment in other EE professional development opportunities
- Seeking grant funding to improve outdoor/EE resources

The 2019 Summer Teacher Institute, *At Water's Edge*, took place in July 2019 at the Trinity Center in Salter Path, North Carolina. The Trinity Center is the location of many previous Institutes and is located within walking distance of maritime forest, salt marsh, and beach ecosystems. Discussions between UNC Institute for the Environment and APNEP staff resulted in the target audience for the Teacher Institute being shifted to 8th-12th grade science teachers, both because the past few years have targeted 4th-5th grade teachers. In addition, the cessation of additional (non-APNEP) funding for the year-long ExPLORE NC program means that targeting teachers who already have a science-specific knowledge base will be more effective for building skills during the Teacher Institute.



During this four-day teacher institute, 8th -12th grade science teachers explored and compared several unique coastal ecosystems through inquiry-based, hands-on activities, evaluating human impacts on these systems alongside scientists and expert environmental educators. Teachers gained updated content knowledge and instructional resources designed to foster student learning of watershed science and stimulate awareness of actions that promote watershed stewardship. Content and activities were aligned with the NC Essential Standards for 8th Grade Science, Earth/Environmental Science and AP Environmental Science. [At Water's Edge Webpage](#)

FY2019-2020 Plans:

Estimated Cost: \$20,000

Milestones:

- July 2018: Summer Teacher Institute takes place
- April 30, 2019: Applications due for 2019 Summer Teacher Institute
- July 2019: Summer Teacher Institute takes place

VA-NC Memorandum of Understanding Implementation

Objectives: To facilitate and strengthen partnerships between North Carolina and Virginia state agencies; to identify shared goals for AP region watersheds and contribute to projects that work towards those goals.

Description: In 2017, APNEP facilitated the development and signing of a Memorandum of Understanding (MOU) between the NC Department of Environmental Quality, NC Department of Natural and Cultural Resources, and Virginia Secretary of Natural Resources that would foster interstate collaboration within the Albemarle-Pamlico region to manage for healthy ecosystems and communities. The MOU replaces an earlier version that was signed in 2001.

Year(s): 2017 - present

Partners: NC Department of Environmental Quality, NC Department of Natural and Cultural Resources, Virginia Secretary of Natural Resources

Outputs/Deliverables: New partnerships and activities in VA and NC focused on protecting and restoring the region

Outcomes: Increased capacity to address CCMP implementation

FY2018-19 Cost: Staff Time

Estimated Leverage: TBD

CCMP Actions: All

CCMP Outcomes: All

CWA Core Programs Addressed: (2) identifying polluted waters and developing plans to restore them, (4) addressing diffuse, nonpoint sources of pollution, (5) protecting wetlands, (6) protecting coastal waters through the National Estuary Program

Progress to Date:

The MOU has assisted NCDEQ, NCDNCR, and VADNR in coordinating with APNEP to improve the water quality and ecological health of the states' shared river basins flowing into Albemarle



Sound. The MOU specifically calls for tackling regional issues such as nonpoint source pollution, restoring fish passage and spawning habitat, and controlling invasive species. Agencies have also explored opportunities to assist state, regional, and local governments in incorporating climate change and sea level rise considerations into their planning processes.

As part of this commitment, APNEP and partners have been actively working to revitalize our efforts in Virginia, with current emphasis in the following areas:

- **Stewards of the Southern Watersheds:** In 2018, APNEP helped to organize the [North Landing River Albemarle Sound Estuarine Symposium](#) in Virginia Beach, which aimed to foster partnerships between Virginia and North Carolina stakeholder groups on topics important to both states. APNEP has continued to engage with the city, presenting at their summer sea level rise symposium series on “North Carolina’s Connections to the Southern Watersheds of Virginia”, participating in information sharing sessions for local government and planners in northeastern North Carolina hosted by the city and Virginia Sea Grant, and inviting these partners to speak and participate in a panel at APNEP organized and sponsored sessions at the 2019 WRRRI conference titled “Sharing Lessons Learned with North Carolina and “Planning for Resilience in Coastal North Carolina and Beyond.” APNEP is also currently assisting partners with development of educational materials and participating in information sessions to educate residents and regional stakeholders about the portion of Virginia's watersheds that flow into Albemarle Sound.
- **Virginia ALOSA Task Force Committee facilitation:** APNEP helped to organize and chair meetings of the Virginia Alosa Task Force (VATF) Coordination Committee to encourage coordination of VATF members from Virginia and North Carolina on monitoring and management of anadromous fish (herring and shad) in interjurisdictional waters. The group is working together to share information regarding monitoring in the Albemarle drainage and explore opportunities for coordination and assistance.
- **Using Natural and Nature-Based Features to Build Resilience to Storm-Driven Flooding:** APNEP is a partner on a NOAA Coastal Resilience Grant led by the Virginia Institute of Marine Sciences that aims to expand the use of natural and nature-based features as a means of building coastal resilience to storm driven flooding. More information can be found within the detailed description of this project in the continuing projects section.
- **Healthy Waters Initiative:** APNEP is working with the Virginia Department of Cultural Resources, Natural Heritage Program and other partners to explore opportunities to implement the [Chowan Healthy Watersheds Plan](#) and protect conservation land in the Virginia's Southern Watersheds. APNEP staff have also continued to attempt to engage with partners to support and reinstate the Albemarle Chowan Watershed Roundtable (inactive since 2017) with limited success; a champion in Virginia will be needed to reboot this effort, coordinate, and administer VA based roundtable funding for the Southern Watersheds.
- **Southern Watersheds Workshop:** APNEP staff worked with partners from Lynnhaven River Now and other Virginia-based environmental organizations to organize a “Southern Watersheds Workshop” for Virginia teachers located in the river basins that flow into Albemarle Sound. The workshop will take place in July 2019 and materials are available [on APNEP’s website](#).



FY2019-2020 Plans:

Estimated Cost: Staff Time

Milestones:

- July 2019: Southern Watersheds Workshop takes place

APNEP staff are also continuing to participate in and help to chair the Virginia ALOSA Task Force Coordination Committee and seeking support to implement the Chowan Healthy Waters Initiative. APNEP will also be working with partners and stakeholders to evaluate the feasibility in North Carolina of the local government tools developed for the VIMS “Natural and Nature-Based Features” grant in 2019-2020.

APNEP has drafted a concept proposal for a Governor’s Agreement and will continue to engage with partners to identify areas of focus and opportunities for project implementation moving forward.



Monitor: Estuarine System Status and Trends

Integrated Monitoring Strategy & Ecosystem Indicator Development

Objectives: To facilitate the development and implementation of an integrated monitoring network through the guidance of regional monitoring and assessment teams, to assess the value of information for measuring ecosystem and CCMP implementation outcomes.

Description: APNEP continues to facilitate the establishment of an integrated monitoring strategy to detect, measure, and track changes in the ecosystem. Much preparatory work has already been conducted by the APNEP Monitoring and Assessment teams, and these teams’ contributions will be essential to complete the strategy. Upon completion, the strategy will provide resource managers and other partners with cost and information quality (uncertainty) alternatives that will facilitate the selection of a set of monitoring protocols to be included in the APNEP integrated monitoring plan.

Year(s): 2017 - Present

Partners: [See list of members on each Monitoring and Assessment Team](#)

Outputs/Deliverables: List of indicators and metrics for the Albemarle-Pamlico region, Integrated Monitoring Strategy

Outcomes: Improved understanding of the status and trends of Albemarle-Pamlico estuarine system, detection of environmental changes in support of CCMP implementation

FY2018-19 Cost: Staff Time

Estimated Leverage: TBD

CCMP Actions: E1.1, E1.2, E1.3, E2.1, E2.2

CCMP Outcomes: 1a, 1b, 1c, 1d, 1e, 2a, 2b, 2c, 3a, 3b, 3c, 3d



CWA Core Programs Addressed: (6) protecting coastal waters through the National Estuary Program

Progress to Date:

In 2017, APNEP convened seven Monitoring and Assessment Teams (Air Resources, Aquatic Fauna, Human Dimensions, Submerged Aquatic Vegetation, Terrestrial Resources, Water Resources, Wetland Resources) to develop priorities among scientists, managers, policy makers, and citizens on how ecological monitoring should be targeted to best support APNEP indicator tracking of CCMP ecosystem outcomes. By the end of 2018 each Team had identified a prioritized list of indicators and metrics. In early 2019, APNEP staff synthesized the priorities of each Team to create an overall list of “high priority/Tier 1” indicators and metrics to monitor in the region. High priority metrics were those (1) identified as a Team priority, (2) with data currently available, and (3) with an identified path to data analysis and indicator report publication.

FY2019-2020 Plans:

Estimated Cost: TBD

Milestones:

- An initial draft strategy featuring a subset of APNEP ecosystem outcome indicators (EOIs) that together link to all 12 ecosystem outcomes will be produced later in the year.
- April 2020: Final draft strategy featuring a more complete set of APNEP EOIs, stressor, and management indicators. Ready for Management Conference review.

Recreational Water Quality Monitoring

Objectives: To monitor and test bacterial concentrations in coastal recreational waters and inform the public about any dangers to public health.

Description: APNEP continues to provide bridge funding to the NC Division of Marine Fisheries’ Recreational Water Quality Monitoring Program for the continuation of water quality monitoring near recreational areas. The program tests bacterial concentrations in coastal recreational waters to protect public health. The program is responsible for notifying the public when bacteriological standards for safe bodily contact have been exceeded. The program also has an educational component that accompanies the testing. Their educational campaign informs the public how bacteria enter coastal waters and what actions can help prevent it.

Year(s): 2014 - Present

Partners: NC Division of Marine Fisheries

Outputs/Deliverables: Enterococci bacteria data for approximately 30 recreational water quality testing sites

Outcomes: CCMP Implementation, integrated monitoring strategy

FY2018-19 Cost: \$ 9,000 (extended and renewed for another year) total \$18,594

Estimated Leverage: \$ 283,000

CCMP Actions: D2.3, E1.1, E2.1, E2.2

CCMP Outcomes: 1a, 1b, 1c, 1d, 1e, 2a, 2b, 2c, 3a, 3b, 3c, 3d



CWA Core Programs Addressed: (4) addressing diffuse, nonpoint sources of pollution, (6) protecting coastal waters through the National Estuary Program

Progress to Date:

In 2014 the APNEP Policy Board (now Leadership Council) directed the Program to provide bridge funding for the NC DMF Recreational Water Quality Monitoring Program after funding for the program from the EPA were decreased. Since then, funding from APNEP has assisted DMF in its recreational water quality monitoring efforts for 30 sites in the Albemarle-Pamlico region - 20 of which are located at public beaches or near popular summer camps. These continuation of monitoring at these sites both protects public health and ensures that a long-term data collection effort (since 1997) is continued. Monitoring data from these sites provides a continuous, long-term dataset to study trends in water quality within these estuarine areas.

FY2019-2020 Plans:

Estimated Cost: \$9,600

Milestones:

- Approximately 90 samples will be collected through September 30, 2019 with an approved contract extension.
- The new contract will begin October 1, 2019 with a total of 27 APNEP swimming sites sampled 19 times throughout the year. Three sites will be sampled 31 times throughout the year
- Sampling will be completed on a weekly basis during the swimming season, all water quality data will be available on the website as soon as sample analysis is completed.

NC DMF will continue routine water quality monitoring with in the Albemarle Pamlico watershed. APNEP will continue to fund NC DMF’s Recreational Water Quality Monitoring Program in FY2019-2020. There will be no changes to funding amount or number/type of stations monitored.

Submerged Aquatic Vegetation Mapping and Monitoring

Objectives: To monitor and map the extent and density of submerged aquatic vegetation (SAV) in the Albemarle-Pamlico region.

Description: In coastal waters of the APNEP region, submerged aquatic vegetation (SAV) is widely recognized as serving many important ecological functions. Other than APNEP’s efforts, there are no long-term SAV monitoring programs yet established in the region that can provide reliable quantitative data on the status and trends of this resource. Thus, APNEP continues to lead and support the monitoring of submerged aquatic vegetation (SAV) in the Albemarle-Pamlico region via various platforms, including remote sensing and boat-based protocols.

Year(s): 2005 - Present

Partners: East Carolina University, NOAA, NC Division of Marine Fisheries, NC National Estuarine Research Reserve, NC Department of Transportation, NC Division of Water Resources, UNC-Wilmington, NRCS

Outputs/Deliverables: Maps of SAV extent and density; report on status and trends of this resource



Outcomes: New information for decision-makers
FY2018-19 Cost: \$49,717
Estimated Leverage: \$25,000

CCMP Actions: A1.1, E1.1, E2.1
CCMP Outcomes: 1a, 1b, 1c, 1d, 1e, 2a, 2b, 2c, 3a, 3b, 3c, 3d
CWA Core Programs Addressed: TBD

Progress to Date:

Since 2001, an Albemarle-Pamlico SAV partnership has collaborated with the long-term goal of determining the location of the region's underwater grasses and trends in their overall extent and density. Monitoring SAV is important because among other benefits it serves as an indicator of overall water quality. The partnership has taken steps towards assessing the extent of underwater grasses in the region. APNEP's SAV Team in 2011 published a baseline SAV map using data from aerial flights during 2006 through 2008, and in 2019 finalized and published a second map based on data from 2013 through 2014.

To address challenges in tracking "hidden" SAV in turbid lower-salinity waters and to detect significant trends more quickly (including changes in species composition), APNEP began coordinating a SAV Sentinel Network in 2014. The sentinel network combines boat-based sonar and video technology with in-water observations to track SAV at stations dispersed throughout the sounds. The boat-based protocols were tested on Albemarle Sound in 2014 and the first installment of sentinel stations occurred there in 2015. Subsequent stations have now been established near the mouths of Pamlico and Neuse Rivers.

FY2019-2020 Plans:

Estimated Cost: \$50,000 (carryover)

Milestones:

- The SAV Team will use data from the 2006-2008 and 2013-2014 SAV maps to begin development of a report on the status and trends of the resource. These two maps, used together, will help the group to analyze how the extent and density of underwater grasses has changed over the past half-decade as well as determine if there are any areas where SAV is disappearing. APNEP and its partners will use this information to develop protection and restoration strategies for SAV and fish species in the region.
- Development of a coordinated SAV Monitoring Strategy
- Continued Sentinel Network monitoring in established stations, expansion of stations into lower-salinity (Currituck Sound and Back Bay) and higher-salinity waters.
- SAV flights and establishment of sentinel stations in select higher-salinity waters during late September and October 2019, interpretation of aerial images to produce third-generation map.



ADMINISTRATION AND FINANCIAL

APNEP ADMINISTRATION

APNEP staff is responsible for the coordination, planning and successful completion of APNEP functions, including Management Conference and Action Team meetings, APNEP forums, and other APNEP-sponsored/partner events. In addition, staff often becomes involved in activities of federal and state resource management agencies that relate to CCMP implementation, the APNEP mission, and the Albemarle-Pamlico estuarine system. Additional interactions occur with local and regional governments as appropriate. Staff also attend meetings, conferences, and workshops in order to stay apprised of technological advancements that may prove beneficial in the APNEP region and to the partnership. Although the Leadership Council and Advisory Committees are instrumental in identifying local environmental issues and prioritizing management actions within each basin, most management actions are implemented by various federal, state, and local agencies on a local, basin-wide, regional or statewide basis and require staff involvement and interactions.

Host Entity

The North Carolina Department of Environmental Quality currently serves as the host entity for the partnership. APNEP staff were relocated to NC DEQ's Office of the Secretary in March 2018. The Department is responsible for assisting with administrative and fiscal management of the APNEP-EPA cooperative agreement, which provides federal funds for APNEP. The Department's efficiency of operation and support of the Management Conference plays a key role in the success of APNEP, including assisting in the administration of the cooperative agreement and other funding sources.

Administrative Costs

Overall administration costs during 2019-20 are estimated at approximately \$428,815 and include six staff FTE salaries, and interns, along with benefits, longevity pay, equipment, supplies, office and office and storage space rent, IT services and phone, and training and development.

441,814 direct and \$47,415 indirect cost @13.7%

Indirect Costs

Under the 2018-19 *Negotiated Indirect Cost Agreement* between NC DEQ and the US EPA, the NC Division of Water Resources indirect rate is 13.7% of all salaries supported by this federal grant. Indirect costs were \$47,415 based on the indirect rate for grant-supported salaries.

Personnel*

Presently the APNEP staff consists of the APNEP office in Raleigh, with the Director, Program Scientist, Program Manager, Policy and Engagement Manager, Quantitative Ecologist, and Communications and Outreach Specialist. The APNEP office in Washington, NC houses the Coastal Habitats Coordinator. The APNEP office in Beaufort, NC houses the Watershed Manager. The Virginia Department of Environmental Quality also provides personnel to support CCMP implementation, however this position is not covered under program administration as it occurs at no additional cost to the program.



Director

The Director administers and coordinates program activities and CCMP implementation, involving interaction with numerous federal and state resource management agencies, universities, interest groups, and the general public. This position manages the post-CCMP grants and associated contracts, provides staff support to the APNEP Policy Board and Advisory Committees, and represents APNEP at local, state, regional and national meetings. Dr. Bill Crowell has been the Director since June 2002.

Program Manager

The Program Manager assists in the administration of the 320 Grant and coordinates and manages APNEP contracting and associated activities within NCDEQ. The position also assists in the development and maintenance of broad support for the APNEP mission and CCMP implementation; develops tracking mechanisms for performance measures and CCMP implementation efforts; and provides staff support to the Policy Board and Advisory Committees. Heather Jennings has been the Program Manager since June 2018.

Program Scientist

The Program Scientist assists the Director with CCMP administration. This position helps design and implement a comprehensive monitoring strategy and reporting process, guides the Scientific and Technical Advisory Committee (STAC), and reviews project proposals and reports for merit. This position provides staff support to the Policy Board and Advisory Committees. Dr. Dean Carpenter has served in this role since November 2003.

Policy and Engagement Manager

The Policy and Engagement Manager assists the Director and Management Conference with engagement, educational and outreach activities. The position oversees communication strategies, pursues new partnership and funding opportunities, and works with program staff to engage in new CCMP implementation actions. It also provides staff support for the Management Conference and serves as a liaison on various external working groups. Stacey Feken has served in this role since March 2016.

Communications and Outreach Specialist

The Communications and Outreach Specialist coordinates APNEP's digital and print communications efforts, as well as managing the Partnership's education and outreach initiatives. The position also supports field/boat-based work with APNEP and its partners. Kelsey Ellis served as Program Associate in this role from May 2017 to September 2018, and as Communications and Outreach Specialist from September 2018 until the present.

Quantitative Ecologist

The Quantitative Ecologist coordinates with staff and contributing scientists and managers to assess the environmental health of the Albemarle-Pamlico estuarine system. Responsibilities include working with partner agencies and researchers to analyze and report upon indicators of watershed and estuarine health, including identification of monitoring gaps, facilitating and supporting APNEP Action Teams and Monitoring & Assessment Teams, and managing the program's GIS functions. Dr. Tim Ellis has served in this role since March 2017.



Coastal Habitats Coordinator (Non-federal Match)

This position serves as an APNEP liaison to local governments and state agencies. The Coastal Habitats Coordinator (NC) provides coordination and support to local governments and state agencies to enhance CCMP implementation. The position also works also directs coordinated implementation of the NC Coastal Habitat Protection Plan (CHPP) in with the Coastal Resource Commission, the Marine Fisheries Commission, and the Environmental Management Commission. Jimmy Johnson has served in this role since January 2006. *This position is funded by NCDEQ and provides a portion of the non-federal match for the CWA §320 grant funds.*

Watershed Manager (Non-federal Match)

The primary purpose of this position is to assist APNEP in CCMP implementation. The position supports support to APNEP advisory committees and workgroups and monitoring and assessment efforts. The position works cooperatively with the NC National Estuarine Research Reserve in Beaufort, NC. Additionally, the position also works towards implementation of the CHPP with the APNEP Coastal Habitats Coordinator. Trish Murphey has served in this role since January 2018. *This position is funded by NCDEQ and provides a portion of the non-federal match for the CWA §320 grant funds.*

**All positions are administered in compliance with NC Office of State Personnel rules and policies.*

TABLE of 320 FUNDED GRANTS and CONTRACTS

APNEP established and managed many grants and contracts during time period between October 1, 2018 and September 30, 2019. Descriptions of these items are discussed in the Projects and Activities section of this report. The following table represents only the projects that directly involved grant funds from CE-0D20614.

The following table provides an overview of all active and completed contracts to local entities since the last grant applicant/annual report approved by the Leadership Council in April 2019. It only reflects activities funded under this cooperative agreement. The narrative also contains descriptions of projects, activities, contracts, and grants funded by other sources.

Additional contracts are anticipated prior to the end of the current federal fiscal year/reporting period. Any additional contracts or grants in the current federal fiscal year/reporting period will be reported in the Annual Work Plan next year and in the Year-End Report to EPA Region IV.



GRANTS AND CONTRACTS TO LOCAL ENTITIES

Active or completed: October 1, 2018 to September 2019

See narrative for comprehensive list of partnerships and activities

Project Title	Funded Amount	Project Leader	Purpose	Deliverables	Completion Date	Status
ECU Subcontract for NFWF – Support for Sentinel Monitoring	\$49,717	ECU	Continue sentinel monitoring using award provided from NFWF	SAV monitoring to assess estuary health	1/31/20	Active
2019 Graduate Fellowship in Estuarine Research	\$10,750	NC Sea Grant	Applied research within the APNEP management boundary	Applied research specific to APNEP area	12/31/19	Active
NCDMF NC Recreational Water Quality Program	\$27,594	NC DMF	Support the continuation of bacteriological contamination monitoring by the North Carolina Shellfish Sanitation Recreational Water Quality Program within the NC Division of Marine Fisheries.	Continuation of monitoring for NC DMF	4/30/19	Active
Shad in the Classroom	\$10,900	Friends of NCNSM	Seeking funding in order to continue to engage students in hands-on learning about American Shad and North Carolina's river basins	Education about shad and the ecosystem requirements for shad survival and population restoration	8/31/19	Active
Summer Teacher Institute	\$29,644	UNC-Chapel Hill	Seeks funding to support the Summer Teacher Institute	Educational training to STEM teachers in APNEP region	1/31/20	Active
NC DOT Aerial Photography	\$80,000	NC DOT	Seeks funding to support SAV mapping in the APNEP region	Aerial photographs will be taken in order to survey SAV	2/28/24	Active
NC DOT Highway Signs	\$35,000	NC DOT	Seeks funding to install road signs in the region	Road signs will be erected to inform public of entry into Albemarle-Pamlico watershed	5/31/20	Active



FIMAN Monitoring Network	\$80,000	NC Emergency Management	Gauge installation in the region to monitor flooding	Emergency Management will install 3 gauges in the watershed to monitor flooding and alert the public to any flooding threats	6/30/20	Active
Aerial Photo Interpretation	\$56,000	NC Marine Fisheries	Analyze DOT photos for SAV mapping purposes	Analyze and record SAV data using DOT aerial photographs to produce a map of SAV in region	9/30/20	Active
Economic Analysis of SAV in Albemarle Watershed	\$68,193	NCSU	Economic study of the monetary value of SAV in the watershed	Report on the economic importance of SAV in the Albemarle -Pamlico Sounds	9/30/20	Active



NON-FEDERAL COST SHARE (Match)

Summary of Match Requirements

NCDEQ provided \$600,000 for the required 1:1 non-federal match for time period of October 1, 2018 to September 30, 2019. This match was provided through:

- 1) In-kind Services: The North Carolina Department of Environmental Quality (NCDEQ) intends to provide \$184,823 as part of the required 1:1 non-federal match the period of October 1, 2018 to September 30, 2019. This match was provided by staff support from the Coastal Habitats Coordinator and Watershed Manager positions. The match positions are responsible for program administration, support, community involvement and guiding implementation of the APNEP CCMP and the NC Coastal Habitat Protection Plan (CHPP), as well as other A-P watershed issues.

<u>POSITION</u>	<u>FTE</u>	<u>SALARY</u>	<u>EFFORT</u>	<u>Match</u>
Coastal Habitats Coordinator	1	70,050	1.0	70,050
Watershed Manager	1	66,050	1.0	66,050
		Benefits*	2.0	47,925
		Total In-Kind Service Match:		\$ 184,823

* *Benefits are based on Social Security (7.65 %) & Retirement (18.44 %) of position's annual salary, plus Medical Insurance Plan rate of \$6,104 per year.*

- 2) In-kind Project Expenditures as Non-federal Match: The NCDEQ provided \$415,177 as part of the 1:1 non-federal match for the period of October 1, 2018 to September 30, 2019. The expenditure of non-federal funds will be provided through water quality improvement projects in one or more of the APNEP river basins. State funds allocated to cover costs associated with water quality improvement projects through funding of the NC Division of Water Infrastructure for one or more projects within the APNEP program boundary.

Division of Water Infrastructure

The North Carolina Division of Water Infrastructure provides financial assistance for projects that improve water quality. Programs within the Division fund many types of projects, including sewer collection and treatment systems, drinking water distribution systems, water treatment plants, storm water management systems, and stream restoration. The Division supports the State Water Infrastructure Authority (SWI), which was created in 2013, under North Carolina General Statute 159G-70. The SWI Authority is an independent body with primary responsibility for awarding both federal and state funding for water and wastewater infrastructure projects.

Summary of Non-federal State Match

In-kind Positions (salaries and benefits)	\$ 184,823
Water Quality Improvement Project(s) Expenditures:	\$ 415,177
TOTAL:	\$ 600,000

Additional information on match funds can be found in the Year End Federal Financial Report submitted by NC DEQ in December 2018.



TRAVEL

National Estuary Programs may use CWA §320 funds and matching funds to cover the cost of travel by staff and/or stakeholders from other NEPs or watershed organizations who collaborate with the NEP on issues of common interest. Stakeholders may include members of the general public and of environmental and public interest organizations, business or industry representatives, academicians, scientists, and technical experts.

- CWA §320 funds and matching funds may be used to cover costs associated with attending conferences, meetings, workshops, or events that advance CCMP implementation. CWA Section 320 funds also may be used to cover the cost of projects described in the annual work plan and the cost of renting facilities.
- Note that when using CWA Section 320 funds for travel, NEPs should use the least expensive means of travel whenever possible.
- CWA §320 and matching funds may not be used to cover the travel costs of Federal employees.

APNEP, the Management Conference, and EPA consider personal, face-to-face contact essential for information sharing and technology transfer. As part of the federal grant requirements to attend EPA-NEP meetings, each NEP is required to allocate a minimum of \$10,000 to travel funds for program activities, enhancement, education, and outreach support. APNEP intends to use budgeted travel funds to support:

- 1) Management Conference, Action Team, Monitoring and Assessment Teams, and Ad-Hoc committee meetings,
- 2) Participation in watershed stakeholder meetings, workshops and conferences relevant to CCMP implementation
- 3) Participation in national or regional NEP and EPA meetings
- 4) Participation in international, nation, regional, and local workshops or conferences
- 5) Travel to other NEPs or communities to provide peer-to-peer technical assistance
- 6) Travel to other NEPs or watersheds for assistance
- 7) Travel by NEP staff or stakeholders from other NEPs or watershed programs to provide NEP with assistance

Travelers may include Management Conference members, Action Team members and Monitoring and Assessment Team members, citizens, and members of environmental or public interest organizations, business or industry representatives, academicians, scientists or technical experts as determined appropriate by the APNEP Director.

As a requirement of this grant agreement, a member of the APNEP core staff are required to participate in all meetings called on behalf of the NEPs by the EPA.

Food

While most travel funds are associated with staff, management conference members, and action team participants, travel funds and funds associated with specific workplan projects, APNEP funds awarded as grants or contracts may be used for light refreshments and/or meals served at meetings, conferences, training workshops and outreach activities (events), consistent with 41 CFR 301-74.7 and NC DEQ travel policies, and as approved by the APNEP Director.



2018-19 Travel

APNEP staff attended a number of meetings and conferences using the allotted travel funds and specific project funds or administration costs. Some travel costs may be associated with specific projects, as such and travel costs are budgeted/reported for those projects not listed specifically as travel. Rates are listed in the table below. Below is a summary of these activities that have occurred or are currently planned for the year:

Personnel	Date	Purpose	Location	Cost *
APNEP Staff/ Management Conference	10/1/18 to 9/ 30/19	Routine Program Activities/ meetings/ projects/ workshops/ conferences/ fieldwork/ MC meetings	APNEP area	7,900
Crowell, W.	3/2019	Spring EPA/NEP Meeting	Washington, DC	2,100
Ellis, K.	9/2019	Fall NEP Meeting	Delaware	2,000
			Total*	\$ 12,000

**Estimated*

