

Albemarle - Pamlico

National Estuary Partnership



Progress Report and 2021-22 Work Plan Proposal

*Approved by the
APNEP Leadership Council
on 18 May 2021*

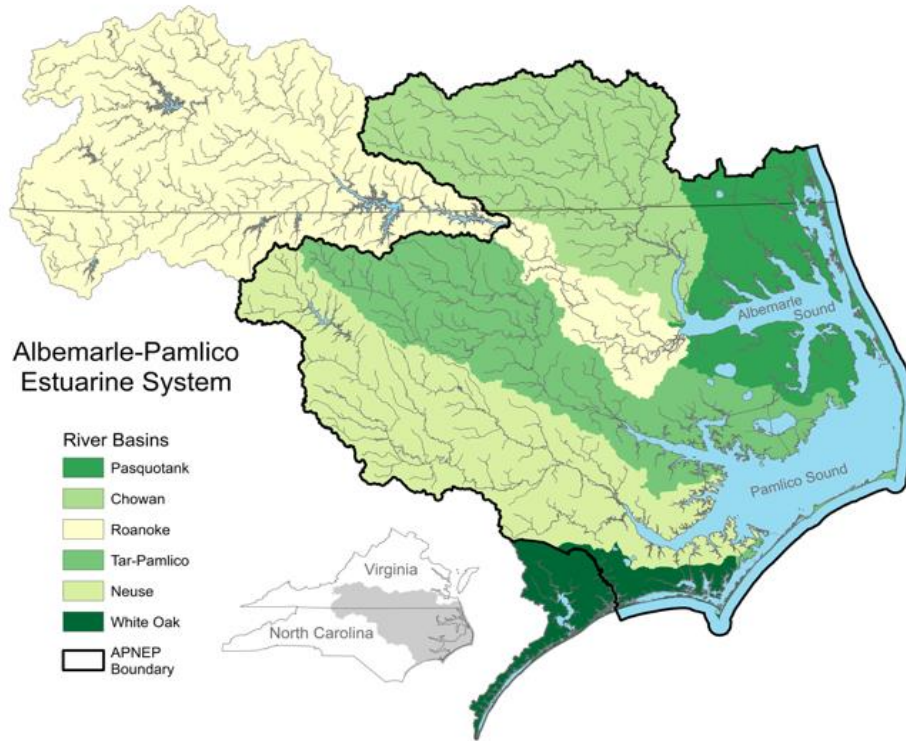
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INTRODUCTION

The Albemarle and Pamlico Sounds comprise the nation’s largest semi-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. It was one of the first programs established under amendments to the Clean Water Act in 1987. APNEP’s mission is to identify, protect, and restore the significant natural resources of the Albemarle-Pamlico region. The Partnership is a cooperative effort currently hosted by the N.C. Department of Environmental Quality (NC-DEQ) under a cooperative agreement with the EPA and works closely with the Commonwealth of Virginia. The Partnership also works closely with both EPA Regions III and IV.

APNEP’s 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](#) was created in a stakeholder-driven process with an ecosystem-based management approach. APNEP staff are advised by a Management Conference as authorized under [N.C. Governor's Executive Order #26 \(2017\)](#).

EXECUTIVE SUMMARY

Purpose

This document addresses the following items:

2020-21 Progress Report

The report presents information about the Albemarle-Pamlico National Estuary Partnership's completed and ongoing projects from May 2020 to October 2021 under cooperative agreement *CE-0D95519*.

2021-22 Work Plan and Budget Proposal

This report also presents the 2021-2022 Annual Work Plan, associated budget, and proposed projects for the fiscal year beginning on October 1, 2021. This Work Plan and the associated grant application represent a funding increase request of \$700,000 for year three (10/1/21 to 9/30/22) under cooperative agreement *CE-00D95519* between the US Environmental Protection Agency (EPA) and the North Carolina Department of Environmental Quality (NCDEQ).

Cooperative Agreements

This report addresses actions funder EPA/NC-DEQ Cooperative Agreement *CE-0D95519* to support implementation of the management strategies recommended in APNEP's [2012-2022 Comprehensive Conservation and Management Plan \(CCMP\)](#) under the direction of the Leadership Council, as well as to support APNEP's mission of identifying, protecting, and restoring the Albemarle-Pamlico region's significant resources. The period of performance under this Cooperative Agreement is from October 1, 2019 through September 30, 2024. Work under Cooperative Agreement *CE-0D20614* was concluded by September 30, 2020.

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2020-2021 Key Accomplishments

Key accomplishments from May 2020 to April 2021 are listed below. Additional details about these and other projects can be found in the [Activities and Projects 2020-21 section](#) of this document.

Scientific and Technical Initiatives

Development of Integrated Monitoring Plan

With the input of APNEP's Science and Technical Advisory Committee (STAC), staff developed a proof-of-concept Integrated Monitoring Plan whose initial scope focused on coastal SAV and estuarine water quality factors that impact coastal SAV. The plan was accepted by the Leadership Council on March 11, 2021.

SAV Metric Report

APNEP published a report showing a net loss in the extent of high salinity submerged aquatic vegetation (SAV) habitat in North Carolina's sounds between 2006 and 2013. While the data also confirm that the state possesses the largest acreage of seagrass along the east coast of the United States, around 100,000 acres, the overall extent of seagrass meadows in the Albemarle-Pamlico estuary decreased by 5,686 acres or 5.6% between 2006 and 2013 despite the availability of suitable habitat for expansion of the resource. Seagrass is declining worldwide; North Carolina is experiencing annual rates of seagrass loss at or below the global average. [Learn more.](#)

SAV Map Data Collection

In 2020, APNEP coordinated with the N.C. Department of Transportation and the N.C. Division of Marine Fisheries to gather data via aerial imagery and boat-based ground truthing respectively for a third SAV map. [Learn more.](#)

Water Quality

Research Study to Develop Chlorophyll-*a* Standards for SAV Protection

To set SAV protection and restoration goals for the Albemarle-Pamlico Estuarine System and make the connection to needed nutrient and sediment load reductions, quantitative linkages between chlorophyll-*a* concentrations and SAV light requirements are needed. APNEP has contracted with the UNC Institute for Marine Sciences to develop recommendations for scientifically defensible chlorophyll-*a* standards that are protective of SAV in high- and low-salinity zones. A draft final report is now under review by select APNEP staff and STAC members.

N.C. Nutrient Criteria Development Plan Support

APNEP staff are active in the N.C. Nutrient Criteria Development Plan process for the Albemarle Sound and Chowan River. Staff assisted the N.C. Division of Water Resources with gaining a complete understanding of the system and made recommendations for the Scientific Advisory Council members who are experts in high- and low-salinity SAV. Submerged Aquatic Vegetation has been selected as a health indicator for the Albemarle Sound and Chowan River. APNEP staff plan to continue to be active and participate in the development of nutrient criteria in the Albemarle Sound and Chowan River until recommendations are accepted and approved by US EPA.

Communications and Outreach

Submerged Aquatic Vegetation Communications

- **SAV Economic Valuation:** APNEP has contracted with the N.C. State University Center for Environmental and Resource Economic Policy (CEnREP) to fund an analysis of the economic value of SAV in the Albemarle-Pamlico region. This contract ended on February 15, 2021 and a draft final report has been reviewed by the project's steering committee, along with select APNEP staff and STAC members. Once the report is revised by the project team, the study's findings will be incorporated into future outreach and communication campaigns about the resource.
- **SAV Press and Outreach:** In February 2021, a high-salinity SAV extent metric report was [released](#) along with an associated press release and [StoryMap](#) to help convey these findings to a general audience. This press release also led to external press for APNEP's efforts in [Coastal Review Online](#), [WUNC](#), and [WITN](#).

Water Quality Testing and Communications Projects

Central 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 2019-2020 the Partnership funded a few projects in support of this goal. Through support for Sound River's Swim Guide program and N.C. Division of Marine Fisheries' Recreational Water Quality Monitoring Program, APNEP is expanding the collection of water quality data for our region that prioritizes public health. Both programs monitor water quality with the primary goal of alerting local communities to potentially hazardous conditions, and the Swim Guide program with Sound Rivers has the added educational benefit of operating through citizen scientists. [Learn more.](#)

Summer Teacher Institute (Virtual)

In 2020 APNEP continued its long-term support for the Summer Teacher Institute, a multi-day environmental education professional development opportunity for the region's educators. Due to the COVID-19 pandemic, the 2020 Institute was conducted using an internet-based virtual format for educators. The program has reached approximately 25 teachers each year since its inception in 2004. [Learn more.](#)

Shad in the Classroom (Virtual)

Long-term APNEP support for the N.C. Museum of Natural Science's Shad in the Classroom program has resulted in this initiative reaching approximately 30 educators each year since 2011, and through those educators over 1000 students each year. From 2010 (pre-APNEP funding) to 2018, the program has been able to grow from 13 classrooms to 30 classrooms each year across the region. In 2020, the program was conducted via the internet among students and educators. However, live shad fry were still released in area rivers as part of the event. [Learn more.](#)

Coastal Resiliency Initiatives

Tribal Coastal Resilience Connections

Using supplemental EPA 320 funds designated to work with underserved and under-represented communities on climate resilience, APNEP partnered with the North Carolina Commission of Indian Affairs (NCCIA), NC State University (NCSU), and Virginia Coastal Policy Center to work with tribal communities in the Albemarle-Pamlico region. The goal of this initiative is to develop a strategy for incorporating resilience into tribal planning and community engagement processes. The Tribal Coastal Resilience Team has been successful in creating partnerships, generating research on tribal engagement in climate and resilience planning efforts throughout the U.S., launching a social media campaign, conducting outreach at conferences and events, and building the groundwork for a sustainable program. The team will utilize these efforts to build towards creating a Tribal Coastal Resilience toolbox, interactive skill building workshops, and develop interactive maps to assist with future resilience planning. The information will also provide a platform that can be utilized to educate agency staff on considerations, perspectives, and traditional ecological knowledge unique to native communities.

N.C. Executive Order 80 Implementation

APNEP staff continue to participate in activities stemming from implementation of the N.C. Risk and Resiliency Plan published in June 2020, including the Natural and Working Lands Stakeholder Team and Coastal Habitats and Pocosin Wetlands Subcommittees. Staff worked closely with DMF staff develop actions that complement the goals and objectives of both the CCMP and Coastal Habitat Protection Plan. Staff are exploring options to assist with implementation of the actions developed by these teams, and which are included in the Climate Risk Assessment and Resiliency Plan.

Water Level Monitoring Stations (non-320 funds)

APNEP supported placement of an additional N.C. Flood Inundation Mapping and Alert Network (FIMAN) remote monitoring station in Newport, Carteret County through the N.C. Division of Emergency Management. Data from gauges located within the Albemarle-Pamlico watershed increases real-time knowledge of flood conditions in the Albemarle-Pamlico region, as well as contributing to knowledge that can be used to address future water management actions in the watershed. [Learn more.](#)

US Climate Alliance Project: Prioritizing Coastal Habitats and Carbon Resilience

APNEP was invited to collaborate on a United States Climate Alliance (USCA) project to expand work led by Duke University for the NC-DEQ Natural and Working Lands sub-teams established to support N.C. Governor's Executive Order #80. The USCA grant was awarded in winter 2019 and is a multi-state effort that builds on the EO80 NWL Initiative. The project involved a spatial analysis to map and prioritize coastal habitats that store carbon, enhance natural and human community resilience to coastal hazards, and support a variety of species. It is designed to support Atlantic coast states that are engaged in resilience planning and working to incorporate blue carbon into their climate mitigation plans. APNEP's role has included assisting the project team in making connections to scientists, restoration practitioners, resource managers, and communities working

2020-2021 Key Accomplishments

in coastal resilience and climate mitigation in North Carolina and Virginia to ensure products reflect their feedback and priorities. APNEP led development of a proposal, in coordination with VIMS, ODU, TNC, Chowan University, and Audubon, for an interstate pilot project with partners in Virginia & North Carolina. This project resulted in a GIS-based modeling tool that can be utilized by the Currituck Sound Coalition to assist in future planning reflect local community restoration priorities and goals.

Partnership-Building and Regional Coordination

N.C. Aquatic Nuisance Species Management Plan Committee Coordination

APNEP staff continued working with the N.C. Aquatic Nuisance Species Management Plan Committee over the year to revise the Plan for federal approval, and afterwards identify next steps for Plan implementation. This state plan for coordinated management, research, and outreach of aquatic nuisance species, once finalized and federally approved, will make North Carolina eligible for federal funding to support the plan's implementation. Improved coordination and collaboration across state agencies will leverage limited resources available for invasive species management in North Carolina. [Learn more.](#)

North Carolina - Virginia Memorandum of Understanding (2020)

Facilitated by the Albemarle-Pamlico National Estuary Partnership (APNEP), six environmental and natural resources agencies from North Carolina and Virginia signed a Memorandum of Understanding (MOU) that re-affirms their commitment to foster interstate collaboration within the shared waterways of the Albemarle-Pamlico region. The MOU, released in September 2020, builds upon the MOU signed in 2017. It will assist agencies in coordinating with APNEP to tackle regional issues such as nonpoint source pollution, restoring fish passage and spawning habitat, and controlling invasive species. Agencies included: North Carolina Department of Environmental Quality, North Carolina Department of Natural and Cultural Resources, North Carolina Department of Agriculture and Consumer Services, North Carolina Wildlife Resources Commission, Secretary of Natural Resources of the Commonwealth of Virginia, and the Secretary of Agriculture and Forestry of the Commonwealth of Virginia. Agencies will also continue to explore opportunities to assist state, regional, and local governments in incorporating climate change and sea level rise considerations into their planning processes. Staff from APNEP and the Virginia Department of Conservation and Recreation, Natural Heritage Division were designated to lead coordination and facilitation of MOU implementation with assistance from the Virginia Deputy Secretary of Natural Resources. The MOU required a report on coordination, data-sharing, and assessment of interstate initiatives by March 2021, which has been circulated to the agencies for review. A final recommendation regarding interstate joint-management strategies will be delivered to the signatories by December 2021.

Currituck Sound Coalition

This initiative is being led by Audubon and is a coalition of many of APNEP's partner organizations. The idea behind the formation of the coalition is to increase collaboration and coordination on nature-based strategies that provide multiple benefits – flood risk reduction, storm protection, improved water quality, habitat, recreational opportunities, cultural heritage, etc. – for communities

2020-2021 Key Accomplishments

and wildlife in Currituck Sound. Together the coalition can effectively inform planning, advance policy, and lead on-the-ground projects that demonstrate the capacity of nature-based solutions to address the most pressing coastal challenges in northeastern North Carolina. APNEP staff participate on the Wetlands Working Group and worked with coalition partners to develop a pilot demonstration project for use in project prioritization discussed under the USCA project. [Learn more](#)

NC Marine Debris Action Plan Development

APNEP staff continue to serve on the N.C. Marine Debris Advisory and Implementation Team that advises on and participates in implementing the [NC Marine Debris Action Plan](#) which was completed in January of 2020. This plan provides a strategic framework for prevention and removal of marine debris along the North Carolina coast and inspires coordination, focus, and direction for the organizations and communities that address marine debris. A summary of 2020 [accomplishments](#) and a [full report](#) are available.

Scuppernong Regional Water Study

In partnership with Washington and Tyrell Counties, APNEP submitted a grant application to the NC Water Resources Development Fund on behalf of Washington County in Fall 2019 and received notification of a grant award in Fall 2020. APNEP will continue working with these local governments who have requested assistance with technical and grant administrative capacity to address flooding and resilience planning, as well as to conduct a hydrologic study of the headwaters of the Scuppernong River, Lake Phelps, and the surrounding land. The outcomes from the study will be utilized to build a more comprehensive approach to regional water management to create a water budget for the northern Albemarle-Pamlico peninsula, which has been experiencing cycles of flooding and drought in an area that is highly vulnerable to sea level rise.

2021-2022 CCMP Focus Areas and Activities

In 2021-2022, APNEP will continue to focus on CCMP focus areas and activities as directed by the Leadership Council during the January 2020 strategic planning meeting. These actions will primarily be focused on SAV, Water Quality, Coastal Habitats, and Resiliency consistent with the 2012-22 CCMP and the APNEP mission.

PROPOSED BUDGET 2021-2022

For the timeframe of October 1, 2021 to September 30, 2022, APNEP anticipates receiving an EPA Section 320 grant award of up to \$700,000 to support activities geared towards implementing the Partnership’s CCMP and its mission. Funding received for 2020-21 was \$625,000*.

The proposed uses for this funding are highlighted below. Detailed information about each funding category is described within this work plan.

Activity	2021-22 Grant Budget
Engagement & Education Projects (RFP)	\$40,000
Calibration of a Bio-optical Water Clarity Model	\$24,000
Undesignated Implementation Projects	\$17,000
SAV Mapping & Monitoring	\$10,000
Tribal Communities	\$10,000
Joint Fellowship	\$5,000
Events & Sponsorships	\$2,500
Administration**	\$542,680
Travel	\$10,000
Subtotal	\$ 661,180
Indirect Cost (10.2%)***	\$38,820
Total Grant Funds	\$ 700,000

*A copy of the 2020-21 budget is available in Appendix C.

**Includes supplies, equipment, & fringe benefits that are based on Social Security (7.65 %), Retirement (21.68 %) of position’s annual salary and Medical Insurance Plan rate of \$6,326 per year per person (as of 23 March 2021 NC DEQ).

***Indirect Costs are based on an EPA negotiated rate of federal salaries under “Water Resources” currently based on 2021-22 agreement May 2021.

ACTIVITIES & PROJECTS 2020-2022

The following provides an overview of the status of APNEP’s projects and activities since the last annual work plan was approved on May 20, 2020. Ongoing projects are those that began during or before the last fiscal year, and which APNEP expects to continue through the 2021-2022 fiscal year. Projects with additional funding proposed for 2021-22 are noted.

Undesignated CCMP Implementation Projects 2021-22

(An ongoing undesignated category with new projects approved by Management Conference)

Objectives: Targeted CCMP Implementation Projects.

Description: APNEP staff and Leadership Council will work with the Advisory Committees, associated Teams and partners to identify projects that need financial support or administrative support from APNEP for CCMP implementation. A group composed of the Leadership Council and Science and Technical Advisory Committee will evaluate requests and administer the funding for priority projects and activities. In addition to the currently unallocated funds noted here, a total of \$64,600 has been allocated to ongoing projects for the upcoming fiscal year (see “Ongoing Projects” section for details). These projects may include: APNEP-North Carolina Sea Grant Fellowship, APNEP printed materials, and support for projects that align with APNEP priorities and CCMP implementation.

Partners: To be determined by project or activity
Outputs/Deliverables: Partnership building, CCMP implementation
Outcomes: CCMP implementation
FY2021-22 Cost: \$ 17,000
Estimated Leverage: \$ 17,000
CCMP Actions: TBD
CCMP Outcomes: TBD
CWA Core Programs Addressed: TBD
EPA Element(s): TBD



Identify: Research and Technical Assistance

Joint Graduate Fellowship in Estuarine Research

Objectives: To foster interest in research related to 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 (first awarded project began in 2016). The fellowship provides funding for a graduate student based in North Carolina 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: N.C. Sea Grant (Lead)
Outputs/Deliverables: Final report, presentations, maps, data
Outcomes: Increased capacity to address CCMP implementation actions
FY2021-22 Cost: \$5,000
Estimated Leverage: \$5,000 per cycle
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
EPA Element(s): Direct Assistance

Progress to Date:

- **2016-2020:** Fellows Liz Brown-Pickren, Stacy Zhang, Mollie Yacano, Erin Voigt, and Haley Plaas were funded through this Fellowship program. [Learn more.](#)
- **2021:** In January 2021, fellow Stacy Trackenberg began studying how restored seagrass beds in coastal North Carolina are functioning as habitat for faunal communities across varying depths.

FY2021-2022 Plans:

Estimated Cost: \$5,000

Milestones:

- July 2021: 2022 Fellowship applications due
- After September 2021: 2022 Fellowship begins
- Before December 31, 2021: 2021 Fellowship work completed
- Before December 31, 2022: 2022 Fellowship work completed

Coastal Plain Ecological Flows Evaluation: Pilot Project (Phase II)

Objectives: Complete data compilation, field studies, and analysis needed to address data gaps in the coastal plain to identify surface flows needed to protect the ecological integrity of biota in coastal streams.

Description: APNEP has led an Ecological Flows Action Team since 2015 at the request of partners that participated in the N.C. Ecological Flows Science Advisory Board (EFSAB) to address data gaps and needs identified by members of the board’s Coastal Ecological Flows Working Group. EFSAB was established in response to 2010 legislation directing the former N.C. Department of Environment and Natural Resources to develop hydrologic models for each river basin in North Carolina and determine the flows needed to maintain ecological integrity in surface waters. [Learn more.](#)

Year(s): 2015 – present

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Partners:	East Carolina University, APNEP Ecological Flows Team members (multiple partners), N.C. Land of Water (N.C.LOW)
Outputs/Deliverables:	Phase II Pilot Study & Summary Report.
Outcomes:	Refinement of data needed to develop recommendations for the N.C. Division of Water Resources for ecological flows in the N.C. coastal plain. Development of an evaluation process, decision tree, or matrix that can be replicated in other waterbodies.
FY2021-22 Cost:	\$ 50,000
Estimated Leverage:	\$ 43,478
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
EPA Element(s):	Habitats, Water Quality

Progress to Date:

APNEP provided funds to team co-lead Dr. Mike O'Driscoll and colleagues at ECU to conduct the Phase I study, [Existing Data for Evaluating Coastal Plain Ecological Flows in the Albemarle-Pamlico Estuary Region](#), completed in 2018. The team met regularly throughout 2019-2020, focusing on addressing the recommendations in the Phase I report and developing a proposal for a Phase II Study to conduct pilot studies in selected watersheds and develop an evaluation process to inform development of ecological flows in the coastal plain. APNEP contracted with ECU to conduct work on the Phase II pilot study which will begin in spring 2021.

FY2021-2022 Plans:

- Study contracted in April 2021

Milestones:

- Identification of pilot study location, workshops, analysis, report.

Development of scientifically defensible chlorophyll-*a* standards for protection of SAV in the Albemarle-Pamlico Estuarine System

Objectives:

- 1) Calibrate an empirical model relating Secchi disk depth to attenuation of photosynthetically active radiation (PAR);
- 2) Validate the Biber et al. (2008) bio-optical model for predicting attenuation of PAR in both low and high salinity estuarine waters at locations throughout the Albemarle-Pamlico Estuarine System;
- 3) Use the validated bio-optical model or empirical relationships developed from Objective2 to set thresholds for the maximum growing season average chlorophyll *a* that is protective of SAV habitats in low- and high-salinity zones; and

ACTIVITIES & PROJECTS 2020-22

- 4) Combine diffuse attenuation coefficient and bathymetry data sets from sites throughout the Albemarle-Pamlico Estuarine System to determine the potentially suitable habitat with respect to light under current chlorophyll-*a* levels and across a range of potential, future chlorophyll-*a* scenarios.

Description: In order to set SAV protection and restoration goals for the Albemarle-Pamlico Estuarine System and make the connection to needed nutrient and sediment load reductions, quantitative linkages between chlorophyll-*a* concentrations and SAV light requirements are needed. This project will develop recommendations for scientifically defensible chlorophyll-*a* standards that are protective of SAV for high- and low-salinity zones of the Albemarle-Pamlico Sound Estuarine System through four objectives listed above.

Year(s) 2020-2021

Partners: UNC Institute of Marine Sciences, APNEP SAV Team

Outputs/Deliverables: A final report that provides 1) a description of chlorophyll-*a* thresholds protective of high- and low-salinity SAV habitats including quantification of uncertainty in those thresholds; 2) documentation of the data sets and data analyses to validate the bio-optical model or similarly functioning empirical models for determining thresholds; and 3) identification of data gaps that could improve threshold estimates. An oral presentation of project findings will be given to the APNEP management conference, the N.C. Nutrient Criteria Development Plan Scientific Advisory Committee, and other groups decided by APNEP. A publication will be submitted to a journal oriented toward environmental management.

Outcomes: Scientifically defensible chlorophyll-*a* standards that are protective of SAV for high- and low-salinity zones of the Albemarle-Pamlico Estuarine System. Interpolated maps of the depth to which sufficient light penetrates to support SAV (i.e., photic depth maps) will be created and overlaid with bathymetry to define the potential SAV habitat area under different chlorophyll-*a* scenarios.

FY2021-22 Cost: \$ 24,751

Estimated Leverage: \$ TBD

CCMP Actions: A1.1, B2.2., C1.1., C1.2, C3.3, E1.1

CCMP Outcomes: 2b, 3b

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

EPA Element(s): Habitats, Water Quality

Progress to Date:

- Project contracted and work began in April 2020.
- Draft final report received on March 26, 2021; APNEP review under way.

ACTIVITIES & PROJECTS 2020-22

- Presentation of progress and findings to the N.C. NCDP Scientific Advisory Council on October 30, 2020 and March 31, 2021.

FY2021-2022 Plans:

- Draft report currently under review.

Milestones:

- Summer 2021: Revised final report expected.
- 2021: Press release and briefing to STAC and NCDP group.

Calibration of a bio-optical model for low-salinity SAV in Albemarle-Pamlico Estuarine System

Objectives:

1. In collaboration with NC-DWR and the University of North Carolina Institute of Marine Sciences (UNC IMS), collect necessary paired chlorophyll-*a*, colored dissolved organic matter (CDOM), and photosynthetically active radiation (PAR) data from select N.C. Ambient Monitoring System (AMS) stations.
2. Calibrate a bio-optical model for low-salinity SAV in the Albemarle-Pamlico Estuarine System using the data from Objective 1.
3. Develop scientifically defensible chlorophyll-*a* standards for protection of low-salinity SAV.

Description: To set SAV protection and restoration goals for the Albemarle-Pamlico Estuarine System (APES) and make the connection to needed nutrient and sediment load reductions, quantitative linkages between chlorophyll-*a* concentrations and SAV light requirements are needed. APNEP previously contracted with the UNC IMS to conduct this analysis for both high- and low-salinity SAV. While the bio-optical model performed well for the high-salinity waters of the APES where it was originally developed, further calibration is needed to utilize the model for low-salinity SAV. Extensive compilation and review of available water quality data revealed limited measurements of the critical parameters CDOM and PAR in low-salinity waters of the APES that are necessary for further calibration of the bio-optical model. This project will collect these data, calibrate the model, and develop recommendations for scientifically defensible chlorophyll-*a* standards that are protective of SAV for low-salinity zones of the APES. These findings, in association with the findings for high-salinity SAV, will help guide the development of water quality management strategies for the protection of SAV, particularly through the N.C. Coastal Habitat Protection Plan and the N.C. Nutrient Criteria Development Plan.

Partners: NC-DWR, UNC IMS, APNEP SAV Team

Outputs/Deliverables: A final report that provides 1) a description of chlorophyll-*a* thresholds protective of low-salinity SAV habitats including quantification of uncertainty in those thresholds; 2) documentation of the data sets and data analyses to validate the bio-optical model or similarly functioning empirical models for determining thresholds; and 3) identification of data gaps that could improve threshold estimates. An oral presentation of project

ACTIVITIES & PROJECTS 2020-22

findings to the APNEP management conference, the N.C. Nutrient Criteria Development Plan Scientific Advisory Committee, and other groups decided by APNEP.

Outcomes: Scientifically defensible chlorophyll-*a* standards that are protective of SAV for low-salinity zones of the Albemarle-Pamlico Estuarine System.

FY2021-22 Cost: \$ 24,000

Estimated Leverage: \$ TBD

CCMP Actions: A1.1, B2.2., C1.1., C1.2, C3.3, E1.1

CCMP Outcomes: 2b, 3b

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

EPA Element(s): Habitats, Water Quality

Progress to Date:

- **2021:** Since February, APNEP has met several times with NC-DWR and Nathan Hall of UNC IMS regarding collaboration on this project. A tentative plan for completing the work was established. In April, APNEP began formalizing the roles and responsibilities of APNEP, NC-DWR, and UNC IMS relative to specific tasks needed to complete the project.

FY2021-2022 Plans:

Estimated Cost: \$24,000

Milestones:

- May 2021: NC-DWR begins collecting monthly water samples
- July 2021: UNC IMS contract begins; start lab analyses of water samples
- April 2022: NC-DWR completes collecting monthly water samples
- June 2022: UNC IMS contract ends; lab analyses, model calibration, and final report are completed



Ecosystem Protection and Restoration

N.C. Aquatic Nuisance Species Management Plan Coordination

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

Description: The N.C. Aquatic Nuisance Species Management Plan (NC - ANSMP) 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, N.C. never submitted the

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plan for federal approval to become eligible for external funding under the Aquatic Nuisance Species Prevention and Control Act (1990). Given the state's limited resources directed towards invasive species management, federal funding is critical to successful implementation of the NC-ANSMP. In support of the CCMP, APNEP staff and NC-DWR are co-leading a revision process of the NC - ANSMP by the plan's Steering Committee with the end goals of renewing commitments for collaboration from state agencies and making N.C. eligible to receive federal funding for invasive species management.

Year(s):	2015-2016, 2018 - Present (years of APNEP involvement)
Partners:	N.C. Dept. of Environmental Quality, N.C. Wildlife Resources Commission, N.C. Dept. of Agriculture and Consumer Services, N.C. Dept. of Natural and Cultural Resources, US Fish and Wildlife Services, N.C. State University, The Nature Conservancy, N.C. Sea Grant
Outputs/Deliverables:	State plan for coordinated management, research, and outreach on aquatic nuisance species.
Outcomes:	Federal approval of this plan will make N.C. 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 N.C.. The NC - ANSMP will also compliment Virginia's equivalent plan, thereby better enabling coordinated management actions between the two states under the 2017 MOU.
FY2021-22 Cost:	Staff Time
Estimated Leverage:	\$6,103
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
EPA Element(s):	Direct Assistance, Habitats, Living Resources

Progress to Date:

APNEP staff provided feedback on the original NC - ANSMP that was adopted in 2015 and have been co-facilitating, along with NC Division of Water Resources, an update of the Plan through the NC -ANSMP Steering Committee in 2018-2021.

FY2021-2022 Plans:

Estimated Cost: Staff Time

Milestones:

- Fall 2021: Re-adoption of a revised NC-ANSMP by NC-DEQ, NC-WRC, and NC-DA&CS, and first adoption by NC-DNCR.
- Spring 2022: Submission of updated NC-ANSMP to the federal Aquatic Nuisance Species Task Force for approval.

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APNEP staff will continue to co-facilitate the coordination of revisions to the NC – ANSMP in 2021, with the goal of having the N.C. Governor’s Office submit the revised Plan to the federal Aquatic Nuisance Species Task Force by early 2022. From there, APNEP staff will continue to work with the Plan’s Steering Committee towards implementing the NC-ANSMP in support of shared CCMP priorities.

N.C. Coastal Habitat Protection Plan Implementation Support

Objectives: To coordinate across N.C. state agencies to improve protection, conservation and restoration of coastal habitats, and to raise awareness about the importance of these habitats for N.C. fisheries.

Description: The N.C. 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 CHPP has assisted in creating an opportunity for agencies and commissions within NC-DEQ to work together on issues specific to fish habitat. While differences in scope, geography and mission exist, implementation of the CCMP and the CHPP are complimentary and APNEP staff ensure that both plans are implemented in a coordinated and integrated fashion. By statute, the CHPP must be reviewed and updated if needed every five years. The CHPP was last revised in 2016 and adopted by all three management commissions. An amendment to the 2016 CHPP began in 2020 and is scheduled for adoption by the three commissions in November of 2021.

Year(s): 2004 - Present

Partners: N.C. Department of Environmental Quality, N.C. Coastal Resources Commission, N.C. Environmental Management Commission, N.C. Marine Fisheries Commission, Sedimentation Control Commission

Outputs/Deliverables: CHPP Annual Report

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

FY2020-21 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

EPA Element(s): Direct Assistance, Habitats, Living Resources

Progress to Date:

- A baseline has now been established for the extent of high-salinity SAV within the Albemarle-Pamlico region. Aerial images to maximize SAV detection have now been acquired during 2007-2008, 2012-2014, and 2019-2020. Aerial images will again be taken in 2021. It is

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hoped that a significant amount of field work to ground-truth the results will take place as soon that staff and partners can get back into the field to work post-COVID-19 restrictions. The information generated from the images will be used to help determine trends regarding high-salinity SAV extent in the state's estuarine waters. *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.*

- A significant attempt to help restore oyster populations in N.C. has generated support from the N.C. General Assembly. Over one million dollars has been appropriated over several budget cycles to help with the construction of new oyster sanctuaries, as well as increased cultch plantings to help with commercial harvests. The N.C. Division of Marine Fisheries and Marine Fisheries Commission have also responded with the 2017 Oyster Fishery Management Plan, which implements new safeguards when oyster populations drop below certain thresholds during the commercial harvest season.
- For a number of years, NC-Division of Coastal Management and NC-Division of Marine Fisheries have been working with the U.S. Army Corps of Engineers to develop a General Permit for Living Shorelines. That General Permit was issued in 2019, and the result has been an uptick in permits for living shorelines. As anticipated, this has made living shorelines a more viable option verses bulkheads and hardened structures. This activity was supported by long-term APNEP efforts to facilitate the construction of living shorelines.
- To inform the CHPP Wetland Issue paper titled "Wetland Protection and Restoration through Nature-Based Solutions", the DEQ CHPP Planning Team hosted a series of three virtual technical workshops on coastal wetlands in August of 2020. The three workshops were: 1) Coastal Wetland Mapping and Monitoring, 2) Coastal Wetland Threats and Conservation, and 3) Coastal Wetland Restoration and Living Shorelines. APNEP CHPP staff were part of the planning team and also assisted in facilitating the workshops. There were over seventy participants from state and federal agencies, non-government organizations and academia.

FY2021-2022 Plans:

Estimated Cost: Staff Time

Milestones:

- Continue the development of 2021 CHPP Amendment and Issue Papers
- Ongoing: CHPP Amendment Process. Effectiveness of implementation of the 2018-2020 CHPP Implementation Plan is being assessed and the results will help in the 2021 amendment of the document. The next Implementation Plan will be written from the newly amended CHPP document in late 2021 or early 2022.

Submerged Aquatic Vegetation Economic Valuation Study

Objectives: Estimate current economic values and projected economic losses relative to current SAV extent and potential SAV-loss scenarios over the next decade within the Albemarle-Pamlico Estuary. The study will include the values of select ecosystem services provided by SAV where data are readily available and modeling relationships between SAV abundance and economic value are well established.

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Description: This contract funded an economic analysis of SAV in the Albemarle-Pamlico Estuary. Building upon a 2016 EPA-sponsored effort to value the ecosystem service of carbon storage and sequestration provided by SAV, this updated and expanded valuation of SAV will investigate the economic relationships of five ecosystem services provided by SAV: water quality improvements, recreational and commercial fisheries habitat, carbon sequestration, waterfowl habitat, and shoreline stabilization. The study's findings are intended to 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 public.

Year(s): 2019-2021
Partners: N.C. State University
Outputs/Deliverables: Economic analysis report
Outcomes: Increased awareness and appreciation for the value of North Carolina's coastal SAV
FY2020-21 Cost: \$68,193
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
EPA Element(s): Living Resources, Habitats

Progress to Date:

The N.C. State University Center for Environmental and Resource Economic Policy (CEnREP) was chosen to conduct the study. APNEP formed a steering committee of SAV and resource economics expertise to guide CEnREP researchers through the project as necessary. The steering committee met with the project team several times throughout 2020 and early 2021 to receive progress updates and provide valuable feedback. The contract ended on February 15, 2021 and a draft final report was submitted to APNEP shortly thereafter. Select members of the APNEP staff, project steering committee, and APNEP STAC reviewed the draft report during March and April 2021. The project team is currently working through the compiled feedback and requested edits that were provided.

FY2021-22 Plans:

Milestones:

- Quarterly: CEnREP researchers provide updates to APNEP and the steering committee
- February 15, 2021: Economic Analysis complete.
- February 26, 2021: Draft final report submitted to APNEP.
- April 9, 2021: APNEP feedback and requested edits provided to project team.
- April 31, 2021: Revised final report due to APNEP.

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

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Objectives: 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 NNBFs within North Carolina.

Description: APNEP is a partner with VIMS, Wetlands Watch, and the Virginia Coastal Policy Center on this NOAA-funded Coastal Resilience project. The project team has developed a spatial analysis tool that will be shared with Virginia local governments to identify opportunities and criteria for using NNBFs that increase resilience to flooding and generate credits for local governments in resource management and hazard mitigation programs. APNEP is working with the project team and other partners to evaluate applicability of the tool in N.C. coastal localities to plan for possible extension of the guidance developed in this project to areas beyond coastal Virginia.

Year(s): 2018 - present

Partners: Virginia Institute of Marine Science, Virginia Coastal Policy Center, Wetlands Watch

Outputs/Deliverables: Inventory and comparison of N.C. and Virginia data sources; workshops and meetings with partners in N.C.

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.

FY2021-22 Cost: \$31,050, Staff Time

Estimated Leverage: \$31,050

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

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

CWA Core Programs (4) addressing diffuse, nonpoint sources of pollution, (6)

Addressed: protecting coastal waters through the National Estuary Program

EPA Element(s): Direct Assistance, Healthy Communities

Progress to Date:

VIMS was granted a one-year extension on the project due to COVID and lack of ability to conduct in-person workshops and focus groups. APNEP staff have been conducting virtual meetings and other outreach opportunities to solicit feedback from N.C. agency personnel and other partners throughout 2019-21. Staff will be participating in planned outreach with Virginia local governments during the spring-summer 2021. This information will be used to develop an evaluation of opportunities and limitations to extend the project outputs beyond Virginia in summer 2021.

FY2021-22 Plans:

Milestones:

- Spring 2021: Distribute draft SOW to utilize project funding that would have been used for in person workshops for use with other outreach materials for local governments.
- Spring/Summer 2021: Complete follow up discussions and targeted outreach with partners.

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- July 2021: Develop a report for the project team that includes 1) an assessment of similar tools, projects, and programs that already exist in N.C.; 2) an assessment of information gaps and needs; 3) an assessment of the transferability of the tool to North Carolina; and 4) an analysis of how the tool could be modified for North Carolina that could be used as the basis for future NOAA proposals.
- October 2021: Submit abstracts for sessions at technical conferences.



Engage: Education and Public Outreach

APNEP Action and Monitoring/Assessment Teams Facilitation

Objectives: Facilitate interagency and inter-organization communication related to priority issues in the Albemarle-Pamlico region, improve cooperation and develop collaborative initiatives that accomplish shared goals and development of APNEP's monitoring plan.

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 actions 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 Albemarle-Pamlico region environmental organizations

Outcomes: CCMP implementation

FY2020-21 Cost: Staff Time

Estimated Leverage: \$12,000

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

EPA Element(s): Healthy Communities

FY2021-2022 Plans:

Estimated Cost: Staff Time

Building Climate Resilience Capacity in Albemarle-Pamlico Region Tribal Communities Project

Objectives: Support tribal communities in the Albemarle-Pamlico region with considering climate risk and resiliency into tribal planning and community engagement processes.

Description: APNEP utilized supplemental Section 320 funding from the EPA and worked with representatives from tribal communities in the Albemarle-Pamlico region and the coastal plain of Virginia and North Carolina to develop a strategy for incorporating resilience into tribal planning and community engagement processes. The proposal seeks to build capacity for tribal communities to actively engage in federal, state, regional, and local planning efforts that impact Indigenous people, recognizing considerations and perspectives that are unique to tribal communities.

Status: In progress

Partners: N.C. Commission of Indian Affairs, NC State University, Virginia Coastal Policy Center

Outputs/Deliverables: Comparative analysis of engagement approaches, focus group discussions, workshops, project summaries, asset mapping, risk & vulnerability assessments, social media engagement, recommendations for inclusion in state and local climate risk and resiliency plans.

Outcomes: Increase in the number of communities in the APNEP region that incorporate resilience into local planning processes.

FY2020-21 Cost: \$27,500 (\$25,000 EPA Region IV Supplemental 320 Funding, \$2,500 APNEP 320 funding)

Estimated Leverage: At least \$27, 500

CCMP Actions: D3.3

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

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

EPA Element(s): Healthy Communities, Direct Assistance

Progress to Date: A summary is included below, the team has a report with additional details located [here](#). Through extensive coordination with tribal representatives, community leaders, and organizations including the N.C. Office of Recovery and Resiliency, APNEP developed a project proposal which was approved by the Leadership Council in fall 2019 and the N.C. Commission of Indian Affairs in March 2020. APNEP contracted with the NCCIA and NCSU in spring 2020. Both partners were granted an extension in March 2021 through September 2021 due to COVID and lack of ability to conduct planned in-person engagement including workshops, Pow-wows, and community events.

Though COVID has changed the engagement approaches originally outlined in the proposal, the Tribal Coastal Resilience Team has been successful in creating partnerships, generating research on tribal engagement in climate and resilience planning efforts throughout the U.S., launching a social media campaign, conducting outreach at conferences and events, and building the groundwork for

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a sustainable program. The team plans to use success stories from coastal tribal communities in and adjacent to the APNEP region as well as those throughout Turtle Island to build awareness around what is working well and could be replicated. The team is working on a climate-risk analysis with the Meherrin Indian Nation and the Climate Service and will share the results with tribal members who wish to implement similar work in their own communities.

The team will utilize these efforts to build towards creating a Tribal Coastal Resilience toolbox, create interactive skill building workshops, and develop interactive maps to assist with future resilience planning. The information will also provide a platform that can be utilized to educate agency staff on considerations, perspectives, and traditional ecological knowledge unique to native communities.

APNEP participates as a team member and assists with the Facebook page, Tribal Coastal Resilience Connections, that was launched fall 2020. APNEP organized and will facilitate a panel discussion highlighting the team's work at the May 2021 Carolinas Climate Resilience Conference. Staff will also ensure that recommendations from the project are incorporated into reports and workplans that result from the VA/NC MOU.

FY2021-2022 Plans: \$10,000

Milestones:

- Spring/Summer 2021
 - Input data from Meherrin and Haliwa Saponi into the Climate Service database and release results
 - Plan paddles and water stories
 - Continue research, water story engagement, and outreach at various events
 - Work with Science Museum of VA to design an Indigenous Water Trail digital exhibit of the Chowan River Watershed using the WAMPUM Indigenous Adaptation Framework for Sea Level Rise
- Fall 2021
 - Submit final report in September and present to an emerging advisory council/roundtable/steering committee (TBD) at an indigenous climate summit
 - Review of coastal adaptation plans from tribal communities
 - Develop Summary of water story findings
 - Water Stories designed using WAMPUM framework
 - From the Chowan to the Chesapeake - WM Coastal Policy Center Conference
 - Coastal Futures Conservatory Conference and Release of Podcast
 - Science Museum of Virginia Water Story Video & Digital Exhibit
 - Pocahontas Re-framed Film Festival

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.

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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.
FY2020-21 Cost: \$6,000
Estimated Leverage: \$12,000
CCMP Actions: All
CCMP Outcomes: All
CWA Core Programs Addressed: All
EPA Element(s): Healthy Communities, Direct Assistance

Progress to Date:

- 2020 SciREN Coast, Pine Knoll Shores Aquarium (Virtual, 45 teachers reached)
- 2020 Coastal Envirothon (Virtual platform, 80 students and teachers reached)
- 2020 National Estuary Week (posting of events)
- 2020 NCEE, North Carolina Environmental Education (virtual, 50 teachers reached, sponsorship)

FY2021-2022 Plans:

Estimated Cost: \$2,500

Milestones:

- 2021 Coastal Envirothon (Environmental Education)
- 2021 Carolina's Climate Resilience Conference (Sponsorship, Panel facilitation)
- 2021 SciREN Triangle (Tabling)
- 2021 SciRen Coast (Virtual)
- 2021 National Estuaries Week Event
- 2021 Water Resources Research Institute Conference (Sponsorship, Tabling)
- 2021 N.C. Oyster Summit (Tabling, Sponsorship)

Prioritizing Coastal Habitats and Carbon Resilience Project

Objectives: Support Atlantic coast states that are engaged in resilience planning and working to incorporate blue carbon into their climate mitigation plans.

Description: APNEP participated on a United States Climate Alliance (USCA) project to expand work led by Duke University for the NC-DEQ Natural and Working Lands sub-teams that were

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established to support N.C. Governor's Executive Order #80. The project is a multi-state effort that includes APNEP partners in Virginia and other Atlantic coast states. The project involves spatial analysis to map and prioritize coastal habitats that store carbon, enhance resilience to coastal hazards, and support a variety of species.

Status:	In progress; complete by spring/summer 2021
Partners:	Duke University (Lead), NC-DEQ, N.C. Natural and Working Lands Workgroup, VIMS, ODU, TNC, Sea Grant, NOAA, multiple agencies, and university partners
Outputs/Deliverables:	Geospatial analysis, Vista decision support pilot, workshops, storymaps
Outcomes:	Identification of priority areas for wetland protection and restoration that have carbon sequestration and resilience co-benefits.
FY2020-21 Cost:	Staff time
Estimated Leverage:	TBD
CCMP Actions:	A2.2, A2.3, B2.3, B3.1, C2.3, D3.3
CCMP Outcomes:	2a, 2b, 2c, 3a, 3b, 3d
CWA Core Programs Addressed:	(5) protecting wetlands, (6) protecting coastal waters through the National Estuary Program
EPA Element(s):	Healthy Communities, Direct Assistance

Progress to Date:

- APNEP's role was to assist the project team in making connections to scientists, restoration practitioners, resource managers, and communities working in coastal resilience and climate mitigation in N.C. and Virginia to ensure products reflect their feedback and priorities. Staff assisted in writing support letters for grants, facilitating connections with potential project partners, and disseminating information at workgroups including the N.C. Coastal Resilience Community of Practice.
- APNEP led development of a proposal, in coordination with VIMS, ODU, TNC, Chowan University, and Audubon, for an interstate pilot project (the grant had funding for a local project) with partners in VA & NC, which resulted in a GIS-based modeling tool that can be utilized by the Currituck Sound Coalition to assist in future planning reflect local community restoration priorities and goals.
- NCDEQ DMF staff are utilizing information from the project in updates to the CHPP.

FY2021-2022 Plans:

Estimated Cost: Staff Time

Milestones:

- April 2021: APNEP will distribute the final Vista pilot project to Currituck Sound Coalition and Virginia partners and continue coordination regarding a final home for the tool.
- Spring/Summer 2021: APNEP staff will continue to work through the Coastal Resilience Community of Practice Group and partners at VIMS to determine the

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feasibility of integrating the information into other data platforms hosted by partners (Green Growth Toolbox, VIMS NOAA NNBF study outputs, NCDEQ Watershed Restoration Team, etc.)

- Ongoing: Staff continue coordination with PIs Lydia Olander and Katie Warnell at Duke in seeking grant funding to further refine the project outputs for habitat restoration in specific areas (Pocosin wetlands, floodplains, etc.)

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 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

FY2020-21 Cost: Staff Time

Estimated Leverage: \$TBD

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

EPA Element(s): Direct Assistance

Progress to Date:

In FY2018-2020 APNEP staff developed a new long-term Engagement Strategy for the Partnership, which presents a detailed vision for how APNEP plans to conduct its communications and outreach efforts going forward. In March 2019 APNEP launched a new website with an updated look, feel and content. The website was updated again in early 2021 to adjust to software changes. This new website is mobile-friendly and designed to meet accessibility standards.

FY2020-2021 Plans:

- 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.

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, and 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 fry into the Neuse basin waters. In doing this, students can 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. Raising and releasing shad contributes to the U.S. Fish and Wildlife Service's and N.C. 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: N.C. Museum of Natural Sciences (Lead), US Fish and Wildlife Service, N.C. Wildlife Resources Commission, N.C. State University, East Carolina University

Outputs/Deliverables: American shad fry released into the Neuse River in conjunction with USFWS and N.C.WRC 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.

FY2020-21 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

EPA Element(s): Trainings, Direct Assistance

Progress to Date:

Most years Shad in the Classroom reaches over 1,000 students 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 N.C. Museum of Natural Sciences 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 aid with egg deliveries to schools and shad release day events.

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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 N.C. Wildlife Resources Commission to restore their populations in the Roanoke and Neuse river basins. While Shad in the Classroom does not contribute significantly to population restoration efforts, it raises awareness about the issue.

Milestones:

- April-June 2020: Due to school and field trip closures as a result of the Covid-19 pandemic, in-person activities for Shad in the Classroom were cancelled for 2020. In lieu of in-person activities, the Shad in the Classroom Coordinator completed data entry and evaluation of results from previous years' student pre- and post- surveys. The coordinator also purchased needed materials for 2021 Shad in the Classroom and reevaluated program materials.
- July-September 2020: Communication with interested teachers for 2021 program. Data entry and analysis of student survey.
- October-December 2020: Applications distributed, supplies inventoried, tanks retrieved and/or refurbished, planning for 2021 season begins.
- January-March 2021: Applications reviewed, teachers selected, supplies purchased, teacher training session scheduled and facilitated, shad weeks scheduled with USFWS, N.C. WRC, classrooms, and extension educational activities coordinated.
- April-June 2021: Shad delivered to classrooms, raised, and released. Extension education activities coordinated. Hatchery field trip for teachers. Evaluations returned from classrooms and summary of program completed.
- September 2021: Final Report

FY2021-2022 Plans:

Project to be discontinued and funds posted to RFP.

Summer Teacher Institute

Objectives: 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. This 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 can participate in authentic outdoor learning experiences, including exploration of maritime forest, estuary, and salt marsh ecosystems.

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Year(s):	2004 - Present
Partners:	UNC Institute for the Environment (Lead), N.C. Museum of Natural Sciences, North Carolina Coastal Federation, EPA, N.C. Sea Grant, N.C. 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.
FY2020-21 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
EPA Element(s):	Trainings, Direct Assistance

Progress to Date:

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 North Carolina. that targeted 4th and 5th grade teachers. Both the Teacher Institute and larger ExPLORE North Carolina 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/environmental education resources.

FY2020-2021

Milestones:

- July 2020: Summer Teacher Institute (Virtual Conference due to Covid-19 restrictions)
- March 13, 2021: Applications due for 2021 Summer Teacher Institute
- July 2021: Summer Teacher Institute takes place

FY2021-2022 Plans:

Project to be discontinued and funds posted to RFP.

Virginia-North Carolina Memorandum of Understanding Implementation

Objectives: Facilitate and strengthen partnerships between North Carolina and Virginia state agencies and other partners; identify shared goals for Albemarle-Pamlico region watersheds and contribute to projects that work towards those goals.

Description: Facilitated by the Albemarle-Pamlico National Estuary Partnership (APNEP), six environmental and natural resources agencies from North Carolina and Virginia signed a

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Memorandum of Understanding (MOU) in 2020 that re-affirmed their commitment to foster interstate collaboration within the shared waterways of the Albemarle-Pamlico region. The agreement builds upon the MOU signed in 2017 and will assist agencies in coordinating with APNEP to tackle regional issues such as nonpoint source pollution, restoring fish passage and spawning habitat, and controlling invasive species. Agencies included: North Carolina Department of Environmental Quality, North Carolina Department of Natural and Cultural Resources, North Carolina Department of Agriculture and Consumer Services, North Carolina Wildlife Resources Commission, Secretary of Natural Resources of the Commonwealth of Virginia, and the Secretary of Agriculture and Forestry of the Commonwealth of Virginia. Agencies will also continue to explore opportunities to assist state, regional, and local governments in incorporating climate change and sea level rise considerations into their planning processes

Year(s): 2017 – present
Partners: NC-DEQ, NC-DNCR, NC-WRC, NC-DACS, Virginia Secretary of Natural Resources, Virginia Secretary of Agriculture and Forestry.
Outputs/Deliverables: Reports, annual work plan, recommendations, new partnerships and activities in Virginia and N.C. focused on protecting and restoring the region.
Outcomes: Increased capacity to implement CCMP.
FY2021-22 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
EPA Element(s): Healthy Communities, Direct Assistance

Progress to Date:

Designees from both states have been meeting regularly since the 2020 MOU was signed last fall. Staff from APNEP and the Virginia Department of Conservation and Recreation, Natural Heritage Division were designated to lead coordination and facilitation of MOU implementation, with assistance from the Virginia Deputy Secretary of Natural Resources. The MOU requires a report on coordination, data-sharing, and assessment of interstate initiatives by March 2021, which has been circulated to the agencies for review.

Progress has also been made on a Governor-level agreement to elevate the status and recognition of the importance of the Albemarle-Pamlico ecosystem both regionally and nationally. A draft agreement has been circulated amongst the designees and is currently under review by the Governor's offices in both states. The Governor's agreement will elevate the commitment between Virginia and North Carolina to collaborate in the shared waterways of the Albemarle-Pamlico estuarine system.

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

- Participation in the USCA Coastal Habitat Project, Currituck Sound Coalition, and VIMS NNBF Coastal Resilience project discussed elsewhere.
- **City of Virginia Beach Coordination:** Staff continued coordination with Virginia Beach city staff and partners, building on relationships developed during planning for the 2018 North Landing River/Albemarle Sound Ecosystem Symposium. Staff wrote support letters for restoration projects being led by the city in Back Bay in partnership with VAWRC and USFWS.
- **Back Bay Restoration Foundation & Lynhaven River NOW:** Staff continue communication with Virginia partners to discuss opportunities for coordination and collaboration. Lynhaven River NOW worked to introduce a resolution through the Virginia legislature in 2020 and 2021 directing the Virginia Department of Environmental Quality to conduct a study of the Albemarle-Pamlico Watershed in Virginia. The proposed study includes collecting and analyzing land use and demographic data, water quality, water management, impacts from storms, and data on key species of flora and fauna. APNEP has proposed utilizing the MOU to assist with this effort.
- **Coordination with Congresswoman Luria:** Virginia Representative Luria reached out to APNEP summer 2020 for information regarding initiatives and activities to mitigate flooding in the Virginia Beach and coastal watersheds. Staff were invited to participate in a roundtable March 2021 to discuss federal support and resources for the shared waterways.

FY2021-2022 Plans:

Estimated Cost: Staff Time

Milestones:

- MOU: APNEP will continue to facilitate implementation of the 2020 MOU, including:
 - Coordination with designees on the draft March 2021 report and delivery to the agency signatories in April 2021.
 - Continued coordination with NCDEQ and VA, Governor's office on the Governor agreement to be signed summer 2021.
 - A final recommendation regarding interstate joint-management strategies will be delivered to the signatories by December 2021.
- APNEP will continue working with partners and stakeholders through 2021 to evaluate the feasibility in North Carolina of applying the local government tools developed for the VIMS "Natural and Nature-Based Features" project and will complete a report for the project team by July 2021.



Monitor: Estuarine System Status and Trends

Integrated Monitoring Plan & Ecosystem Indicator Development

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

Description: APNEP continues to facilitate the establishment of an integrated monitoring plan 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 Plan. Upon completion, the Plan will provide resource managers and other partners with cost and information quality alternatives that will facilitate the selection of a set of monitoring protocols to be included in the final APNEP Monitoring Plan.

Year(s): 2017 - Present

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

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

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

FY2020-21 Cost: Staff Time

Estimated Leverage: \$2,441

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

EPA Element(s): Healthy Communities, Direct Assistance

Progress to Date:

In 2017, APNEP convened seven Monitoring and Assessment Teams 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 start of 2019, each Team had identified a prioritized list of indicators and metrics. 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. With the input of APNEP’s Science and Technical Advisory Committee (STAC), staff developed a proof-of-concept Integrated Monitoring Plan whose initial scope focused on coastal SAV and estuarine water quality that impacts coastal SAV. The plan was accepted by the Leadership Council on March 11, 2021.

FY2021-2022 Plans:

Estimated Cost: TBD

Milestones:

- August 2021: Initial draft of integrated monitoring framework
- October 2021: Initial drafts of ecosystem monitoring plans for water, wetlands, terrestrial, air resources, as well as human dimensions.
- February 2022: Final draft monitoring framework and plans, featuring a more complete set of APNEP ecosystem outcome indicators (EOIs), stressor, and/or management indicators. Ready for Management Conference review.
- May 2022: Approved integrated monitoring framework and plans.

Recreational Water Quality Monitoring

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

Description: APNEP continues to provide bridge funding to the NC-DMF 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, which informs the public about how bacteria enter coastal waters and what actions can help prevent it.

Year(s): 2014 - Present

Partners: NC-DMF

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

Outcomes: CCMP Implementation, integrated monitoring strategy.

FY2021-22 Cost: \$ 9,600 (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

EPA Element(s): Water Quality, Healthy Communities

Progress to Date:

In 2014 the APNEP Policy Board (now Leadership Council) directed the Partnership to provide bridge funding for the NC-DMF Recreational Water Quality Monitoring Program after funding for the program from the U.S. EPA was decreased. Since then, funding from APNEP has assisted NC-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. The continuation

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of monitoring at these sites protects public health and ensures that a long-term data collection effort is continued. Monitoring data from these sites provides a continuous, long-term dataset to study trends in water quality within these estuarine areas.

- A new contract began on October 1, 2019 with a total of 27 swimming sites sampled 19 times throughout the year with APNEP funding. Three sites were sampled 31 times throughout the year.
- Sampling will be weekly during the swimming season and all water quality data will be available on the NC-DMF website as soon as sample analysis is completed.

FY2021-2022 Plans:

NC-DMF will continue routine water quality monitoring within the Albemarle-Pamlico watershed. APNEP will continue to fund NC-DMF's Recreational Water Quality Monitoring Program in FY2020-2021. The funding amount or number/type of stations monitored is unchanged.

Coastal Submerged Aquatic Vegetation Mapping and Monitoring

Objectives: Monitor and map the extent, spatial cover class, and percent cover of coastal SAV in the Albemarle-Pamlico region.

Description: In coastal waters of the APNEP region, SAV is widely recognized as serving many important ecological functions. Other than APNEP's efforts, there are no long-term SAV monitoring programs 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 coastal SAV monitoring via various platforms, including remote sensing and boat-based protocols.

Year(s): 2005 - Present

Partners: East Carolina University, NOAA, NC-DMF, NC-NERR, N.C. Department of Transportation, NC-DWR, UNC-Wilmington, U.S. NRCS

Outputs/Deliverables: Maps of coastal SAV areal extent by cover class; metric reports whose target readership are technically inclined environmental managers

Outcomes: New information for decision-makers

FY2021-22 Cost: \$ Staff time

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: (6) protecting coastal waters through the National Estuary Program

EPA Element(s): Living Resources, Direct Assistance

Progress to Date:

Since 2004, APNEP has participated in and often led the facilitation of a statewide SAV partnership that has collaborated to achieve the long-term goal of determining the location of the region's underwater grasses and trends in their overall extent and spatial cover classes. Monitoring coastal

ACTIVITIES & PROJECTS 2020-22

SAV is important because among other benefits it can serve as an indicator of estuarine habitat condition. The Partnership has taken steps towards assessing the extent of underwater grasses. APNEP's SAV Team published a baseline SAV map in 2011 using data from aerial surveys from 2006 through 2007, as well as a second map based on high-salinity SAV survey data in 2013 and published in 2019. APNEP plans to produce by September 2021 a high-salinity SAV map based on 2019-2020 aerial surveys.

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 been established throughout the Pamlico River and Neuse River Estuaries. A final report on low-salinity sentinel site monitoring in Albemarle Sound and Neuse River Estuary (associated with National Fish & Wildlife Federation funding) was submitted in March 2020. COVID-19 precluded boat-based SAV monitoring in low-salinity waters during the 2020 field season.

A significant milestone was achieved in the first quarter of 2021 with the completion of an APNEP SAV monitoring plan, which supports beginning in Spring 2021 (1) the acquisition of four boat-based metrics to complement the traditional metric "extent by spatial cover class": maximum depth distribution, species presence, relative abundance, macroalgae presence and absence; (2) conducting annual surveys on a portion of the region (sub-region) rather than surveying the entire region every five-to-seven years; (3) bi-seasonal (spring and fall) surveys for high-salinity SAV; (4) single-season (summer) surveys for low-salinity SAV.

FY2021-2022 Plans:

Estimated Cost: \$10,000

Additional funds provided by NC DEQ: \$90,000

The overall project includes the following: A bi-seasonal Tier 1 high-salinity survey, \$20K for, a bi-seasonal Tier 2 high-salinity survey, a low-salinity survey and interpretation of images for mapping and assessment. APNEP will be reaching out to partners for additional funds.

Milestones:

- Update the 2020 (revised early 2021) APNEP high-salinity SAV metric report, incorporating the 2019-2020 SAV high-salinity extent by cover class map. APNEP and its partners will use this information to develop protection and restoration strategies for SAV and fish species in the region and support the CHPP update.
- Enhancement of the SAV monitoring plan based on knowledge gained during the 2021 and 2022 field seasons.
- Building on the SAV monitoring plan and anticipated 2021 pilot survey, establish an expanded survey effort in low-salinity waters.
- Building on the SAV monitoring plan and 2021 survey/mapping of Bogue and Back Sounds, bi-seasonal survey of a second high-salinity sub-region in 2022.

Swim Guide Citizen Science Program

Objectives: By organizing this community-oriented, volunteer-driven water monitoring program, Swim Guide helps to empower Eastern North Carolina residents to participate in stream monitoring, be active in restoration, and to be informed of potential environmental health concerns.

Description: APNEP funds Sound Rivers, Inc. to organize Swim Guide, a regional, citizen science water quality monitoring program. Swim Guide fills 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 (see above). Swim Guide engages and educates the community, helps to identify sources of bacteria pollution, and notifies the public of health concerns when using the Neuse and Tar-Pamlico rivers and streams.

Year(s): 2018-Present

Partners: Sound Rivers

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

FY2020-21 Cost: \$ 4,500

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

EPA Element(s): Healthy Communities, Water Quality

Progress to Date:

In 2018, Swim Guide volunteers who monitored the Tar-Pamlico found that on average, sites did not exceed the U.S. EPA bacterial standard 74% of the time. The overall bacteria levels in the Lower Neuse were slightly lower, with samples not exceeding the standard 89% of the time. Of the sampling sites with routinely high bacteria levels, all were located on the Trent River. Through the Swim Guide program, Sound Rivers was able to engage with thousands of members of the public each week through posting results and volunteer efforts.

FY2021-2022 Plans:

Milestones:

- Summer 2020: Swim Guide educational information documents completed and distributed.
- Mobile App developed for real time data download in the watershed:
<https://www.theswimguide.org/get-the-app/>
- Final report pending.

SUPPLEMENTAL PROJECTS (NON-320 FUNDS)

Water Level Monitoring Stations

Objectives: Additional water-level monitoring stations within the Albemarle-Pamlico watershed.
Description: Each station is equipped with meteorological monitoring equipment and maintained by N.C. Emergency Management’s Flood Inundation Mapping and Alert Network (FIMAN). The data derived from the project will be used to address future water management actions across the watershed and will inform local governments, citizens, and low-lying communities who are subject strong storm surges in how to plan for future events. Since sea-level rise will influence these impacts, as well as saltwater intrusion into freshwater streams, the gauges will allow for maximum safety of citizens and protection of natural resources.

Status: Complete

Partners: NC-DEQ, N.C. Department of Emergency Management, N.C. Department of Transportation, U.S. FWS

Outputs/Deliverables: Flood gauge installation with monitoring equipment to include water level sensor, multi-weather parameter sensor, cellular transmission, battery/solar charging system and geodetic control monuments. Data collected will be analyzed and a flood inundation library will be developed.

Outcomes: An interactive FIMAN will be produced with real-time storm surge information that will be used to inform local communities of flood inundation risk.

FY2020-21 Cost: \$80,000 (Provided by N.C. DEQ)

Estimated Leverage: \$120,000

CCMP Actions: B2.3, C2.3

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

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

EPA Element(s): Healthy Communities, Direct Assistance

Accomplishments and Deliverables:

APNEP contracted with N.C. Department of Emergency Management to install an additional water-level monitoring station in the Albemarle-Pamlico region’s coastal plain. The gauge is located in Carteret County. APNEP is currently working with DEM on an opportunity to install additional gauges, in (1) Havelock, NC and (2) Davis Point, NC

2019 SAV Aerial Images and Analysis

Objective: Map North Carolina’s coastal SAV using aerial imagery.

Description: In 2019, NC-DEQ provided APNEP with funds to support acquisition of new aerial images and conduct analysis of the data collected and to reassess previous data interpretations.

SUPPLEMENTAL PROJECTS

APNEP under cooperative agreement with N.C. Department of Transportation acquired aerial imagery of submerged aquatic vegetation. The NC-DMF will provide the photo interpretation and ground truthing necessary to analyze the photographic data.

Status: In progress (to be completed 31 May 2021)
Partners: N.C. Department of Transportation, NC-DMF, NC- DEQ
Outputs/Deliverables: 2019-20 Map of high-salinity SAV extent and density
Outcomes: Data verified map of SAV through the APNEP region. The map will be used for protection of vital SAV habitat and the restoration of SAV habitat.
FY2020-21 Cost: \$130,000 (Provided by NC-DEQ)
Estimated Leverage: \$50,000
CCMP Actions: B2.2, C3.3
CCMP Outcomes: 2a, 2b
CWA Core Programs Addressed: (6) protecting coastal waters through the National Estuary Program
EPA Element(s): Living Resources, Habitats

Progress to Date:

Unfortunately, the 2019 images were impacted by poor water clarity in several areas and thus images were acquired in spring 2020 using APNEP's existing SAV mapping efforts and funds. NC-DMF was able to analyze some data and has been working to address issues with earlier images and habitat mapping efforts. An additional \$80,000 in APNEP (320 Grant Funds) were added to the contract to capture Spring and Fall 2020-2021 imagery.

2020 SAV Aerial Images and Analysis

Objective: Map North Carolina's coastal SAV using aerial imagery.

Description: In 2020, NC-DEQ provided APNEP with funds to support acquisition of new aerial images and conduct analysis of the data collected and to reassess previous data interpretations. APNEP under cooperative agreement with N.C. Department of Transportation acquired aerial imagery submerged aquatic vegetation. The NC-DMF will provide the photo interpretation and ground truthing necessary to analyze the photographic data.

Status: In progress (to be completed 31 May 2021)
Partners: N.C. Department of Transportation, NC-DMF, NC- DEQ
Outputs/Deliverables: 2019-20 Map of high-salinity SAV extent and density
Outcomes: Data verified map of SAV through the APNEP region. The map will be used for protection of vital SAV habitat and also the restoration of SAV habitat.
FY2020-21 Cost: \$56,000 (Provided by NC-DEQ)
Estimated Leverage: \$50,000
CCMP Actions: B2.2, C3.3
CCMP Outcomes: 2a, 2b

SUPPLEMENTAL PROJECTS

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

EPA Element(s): Living Resources, Habitats

Progress to Date:

Images were acquired in spring and fall 2020 under APNEP's existing SAV mapping efforts and funds. NC-DMF was able to analyze some data and has been working to address issues with earlier images and habitat mapping efforts.

Scuppernong Regional Water Management Study

Objectives: Develop a collaborative approach for conducting a hydrologic study of the headwaters of the Scuppernong River, Lake Phelps, and the surrounding land in Washington and Tyrell Counties. The outcomes from the study will be utilized to build a more comprehensive approach to regional water management to create a water budget for the northern Albemarle-Pamlico peninsula.

Description: The N.C. Division of State Parks requested assistance from APNEP (formally in April 2018 via the Leadership Council) to serve as a neutral, science-based partner and convene a steering committee to develop an approach for a regional hydrologic study. The study's purpose is to determine a regional water budget that can serve as a decision support tool to guide future potential water management implementation actions in collaboration with stakeholders including conservation land managers, local governments, other state and federal agencies, and private landowners. The need for the study was prompted by cycles of flooding and drought, as well as concerns from local communities regarding N.C. Division of State Parks and U.S. FWS water management and hydrologic restoration activities on lands they manage in the region. The study will also consider impacts from climate variability and sea level rise in an area that is extremely vulnerable to flooding. This study will provide for more water monitoring in the watershed, update existing water management plans, and inform future water management strategies, including improving regional drainage efficiency and building regional resilience.

Status: Proposed; funding has been awarded to Washington County. APNEP has been working with project partners to refine estimates for match funding and potential partners that have the capacity to conduct the water budget and modeling work. APNEP will work with the county managers to create a Memorandum of Agreement that specifies roles and responsibilities amongst APNEP, county staff, and other partners if the grant is awarded.

Partners: NC-DEQ, N.C. Department of Agriculture and Consumer Services, Washington County, N.C. Division of State Parks, U.S. FWS, N.C. Cooperative Extension

Outputs/Deliverables: Engineering and feasibility study to evaluate flood risk and future planning needs, stakeholder engagement process, scenario-based models and visualization, interactive stakeholder engagement tools such as

SUPPLEMENTAL PROJECTS

augmented reality sandboxes, web-based maps, and data portals.

Outcomes: Water budget for Washington County, basis for development of collaborative regional water management strategies

FY2021-22 Cost: \$200,000 (Requested from the WRDG)

Estimated Leverage: \$424,547

CCMP Actions: A3.1, B2.3, C2.3

CCMP Outcomes: 2a, 2b, 3d

CWA Core Programs Addressed: (5) protecting wetlands

EPA Element(s): Healthy Communities, Direct Assistance, Water Quality, Habitats, Living Resources

ADMINISTRATION & PROGRAM IMPLEMENTATION

PROGRAM ADMINISTRATION

APNEP staff is responsible for the coordination, planning, and successful completion of partnership functions, including Management Conference and Action Team meetings, APNEP forums, and other APNEP-sponsored/partner events. In addition, staff monitor and often become 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 to stay apprised of technological advancements that may prove beneficial in the APNEP region and 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 APNEP Office and the partnership. The Office was moved 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-U.S. 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 under the federal grant during FY2021-22 are estimated at approximately \$542,680 and include six staff FTE salaries, interns, benefits, longevity pay, equipment, supplies, office and office and storage space rent, IT services and phone, and training and development. Temporary employees added for contract or specific project support will be paid under the budgeted amount for the project.

Indirect Costs

Under the FY2021-22 *Negotiated Indirect Cost Agreement* between NC-DEQ and the U.S. EPA, indirect rate is 10.2% of all salaries supported by this federal grant (May 2021). Estimated indirect costs will be \$38,820 based on the indirect rate for grant-supported salaries.

Personnel

Presently, a majority of APNEP staff are housed at the APNEP office in Raleigh within the N.C. DEQ Headquarters. This site houses the Director, Program Scientist, Program Manager, Policy and Engagement Manager, Quantitative Ecologist, and Communications and Outreach Specialist. The APNEP field office in Washington, N.C. houses the Coastal Habitats Coordinator. The Watershed Manager is collocated with the National Estuarine Research Reserve at the NOAA Laboratory in Beaufort, N.C. The Virginia Department of Environmental Quality also provides personnel to support CCMP implementation, however this position (currently vacant) is not covered under

program administration as it occurs at no additional cost to the program. *All positions are administered in compliance with N.C. Office of State Personnel rules and policies.*

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 public. This position manages the post-CCMP grants and associated contracts, provides staff support to the APNEP Leadership Council 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 U.S. EPA §320 Grant and coordinates and manages APNEP contracting and associated activities within NC-DEQ. 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 Leadership Council 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 Science and Technical Advisory Committee (STAC), and reviews project proposals and reports for merit. This position provides staff support to the Leadership Council 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. 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. She returned to graduate school in the fall of 2020 but continues in a part-time capacity at present. It is anticipated that the position will be returned to full-time during FY2021-22.

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 provides coordination and support to local governments and state agencies to enhance CCMP implementation. The position also directs coordinated implementation of the CHPP with three N.C. Commissions: Coastal Resources, Marine Fisheries, and Environmental Management. Jimmy Johnson has served in this role since January 2006. *This position is funded by NC-DEQ and provides a portion of the non-federal match for the U.S. EPA §320 grant funds.*

Watershed Manager (Non-federal Match)

The primary purpose of this position is to assist APNEP in CCMP implementation. The position provides support to APNEP advisory committees and workgroups. The position works cooperatively with the N.C. National Estuarine Research Reserve in Beaufort, N.C. 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 NC-DEQ and provides a portion of the non-federal match for the U.S. EPA §320 grant funds.*

TRAVEL

National Estuary Programs may use U.S. EPA §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 public and of environmental and public interest organizations, business or industry representatives, academicians, scientists, and technical experts.

- U.S. EPA §320 funds and matching funds may be used to cover costs associated with attending conferences, meetings, workshops, or events that advance CCMP implementation. 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 U.S. EPA §320 funds for travel, NEPs should use the least expensive means of travel whenever possible.
- U.S. EPA §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 minimum of \$10,000 as 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 APNEP’s core staff is required to participate in all meetings called on behalf of the NEPs by U.S. 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.

2020-21 Travel

APNEP staff attended a few meetings and conferences using the allotted travel funds and specific project funds or administration costs. COVID-19 restrictions impacted in-person staff and partner interactions greatly in 2020-21. As a result, the Partnership incurred less costs than normal associated with travel during the year. Some travel costs may be associated with specific projects 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	10/1/19 to 9/ 30/21	Routine Program Activities/ meetings/ projects/ workshops/ conferences/ fieldwork/ MC meetings	APNEP area	3,000
			Total*	\$ 3,000

**Estimated to September 30, 2021*

2021-22 Projected Travel

All travel is allocated into three categories: In-State, Out-of-State, and U.S. EPA Required. All travel, including non-staff travel, must be consistent with published NC-DEQ travel policies (2018) and

regulations. Due to the dynamic nature of the Partnership, all travel cannot be scheduled a year ahead: therefore, only an estimate can be provided based on established NC-DEQ rates (below). Some travel is associated with specific projects, and travel costs are included in budgeted amounts. Rates are listed in the table below.

Funds will also be used for light refreshments and/or meals served at meetings, conferences, training workshops, and outreach activities (events) projects and contracts, consistent with 41 CFR 301-74.7, and as approved by the APNEP Director and through the NC-DEQ travel approval processes.

NC-DEQ TRAVEL RATES*

Item	In-State	Out of State	Overnight Trip	Day Trip
Breakfast	\$ 8.60	\$ 8.60	Depart Office before 6:00 AM	Depart before 6:00 AM; Extend workday by 2 hours
Lunch	\$ 11.30	\$ 11.30	Depart Office by 12:00 Noon; Overnight return after 2:00 PM	NA
Dinner	\$ 19.50	\$ 22.20		Depart before 5:00 PM; Return after 8:00 PM; Workday extended by 3 hours
Hotel	\$ 75.10	\$ 88.70		NA

1 January 2021 rates, Albemarle-Pamlico coastal area often exceeds posted hotel rates

In State:

In-state travel is primarily for APNEP staff to conduct routine business associated with daily operations, field work, staff training or topical meetings germane to the Partnership. It may also cover non-staff for APNEP business (i.e., board and committee members, guest speakers, and experts). Funds are also used to cover meetings as allowed under the NC-DEQ travel guidance. Rates are listed above.

EPA-NEP Associated Out-of-State:

The NEPs generally hold two national meetings each year (these may be in same fiscal year or not). Each program is strongly encouraged to participate in the meetings. The spring meeting is held in the Washington, DC area and the fall meeting is hosted by one of the 28 NEPs. The level of staff participation will vary depending on the agenda for a particular meeting. Generally, one or two staff members attend. Travel may also cover non-staff (e.g., Leadership Council or Advisory Committee members).

Other Out-of-State:

Out-of-state travel is primarily for APNEP staff to conduct business associated with the NEP general meetings (see above), and to attend training or topical meetings germane to the Partnership. It may

also cover non-staff (e.g., council and committee members, guest speakers, experts) for NEP-related activities.

2021-22 Projected Travel (320 Funds)

Personnel	Date	Purpose	Location	Estimated Cost
APNEP Staff, Management Conference, and Volunteers	10/2021 – 9/2022	Normal program activities	Albemarle-Pamlico region	\$6,000
APNEP Staff	10/2021 – 12/2021	EPA/NEP National Fall Meeting	TBA	\$2,000
APNEP Staff	1/2022 – 7/2022	EPA/NEP National Spring Meeting	Washington, DC	\$2,000
				\$10,000

NON-FEDERAL COST-SHARE (MATCH)

Summary of Match Requirements

As Partnership host (grant applicant), NC-DEQ intends to provide \$662,500 for the required 1:1 non-federal matching funds from October 1, 2020 to September 30, 2021. This match will be provided through:

Summary of Non-federal State Match

In-kind Positions (salaries and benefits)	\$ 202,386
Water Quality Improvement Project(s) Expenditures:	<u>\$ 497,614</u>
TOTAL:	\$ 700,000

- 1) **In-kind Services:** NC-DEQ intends to provide **\$ 202,386** as part of the required 1:1 non-federal match for federal fiscal year October 1, 2021 to September 30, 2022. This match will be provided for staff support (salaries and benefits) by the Coastal Habitats Coordinator and Watershed Manager positions (see “Personnel” above). The match positions are responsible for program administration, support, community involvement and guiding implementation of the CCMP and CHPP, as well as other Albemarle-Pamlico watershed issues.
- 2) **In-kind Project Expenditures Non-federal Match:** The NC-DEQ intends to provide \$497,614 as part of the 1:1 non-federal match for federal fiscal year October 1, 2021 to September 30, 2022. The expenditure of these non-federal funds will be provided through water quality improvement projects in one or more of the river basin areas within APNEP’s programmatic jurisdiction. The projects will be administered by the N.C. Division of Water Infrastructure.

Division of Water Infrastructure

The N.C. Division of Water Infrastructure provides financial assistance for projects that improve water quality. Programs within this agency 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.

LEVERAGE FUNDS

APNEP actively seeks alternative funding sources for Partnership activities and projects to support CCMP goals. In addition, APNEP pursues additional avenues for collaborating with partners to assist in targeting program funds towards CCMP and basin-wide goals. Where possible, APNEP works to cost-share projects to increase the effectiveness or the magnitude of projects, even though in several cases APNEP has not been the primary catalyst for a project or activity.

APNEP has been successful in its ability to promote the needs, as well as the successes, associated with natural resource management, protection, and enhancement efforts in the Albemarle-Pamlico region. Several state conservation-funding sources were developed in response to research funded by the Albemarle-Pamlico Estuarine Study. Examples of these programs include the N.C. Clean Water Management Trust Fund, the N.C. Clean Water State Revolving Fund Program, and the N.C. Conservation Reserve and Enhancement Program.

2020-21

During the 2020 federal fiscal year (October 1, 2020 - September 30, 2020), APNEP continued to seek partners and additional opportunities for partners in targeting actions and funds towards CCMP implementation. APNEP submitted its 57s leverage results in September 2020 to the EPA *NEPORT* database for the 2019 federal fiscal year (October 1, 2019 to September 30, 2020): total leverage was \$57 for every dollar provided by the U.S. EPA §320 grant, with \$38,000,283 of that tied to direct APNEP efforts with partners (primary and significant). In 2019 the leverage was 41:1.

2021-22

In 2021-22, APNEP will continue to seek additional avenues for collaborating with various partners to assist in targeting funds to support CCMP implementation actions and the Partnership mission. Where possible, APNEP will actively seek additional sources of funding for APNEP activities and projects to support CCMP goals. We will maintain our goal of 8:1 leverage for the coming year.

PARTNERSHIP ENTITIES

Host

The main APNEP office is located within the NC-DEQ Office of Secretary in Raleigh, N.C., with additional personnel in Washington and Beaufort, N.C. The Virginia Department of Environmental Quality also provides support through a position to working with APNEP.

Management Conference

Leadership Council

The Leadership Council is the main advisory body for APNEP and the Management Conference. It was established by a N.C. 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 maintain 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

The Science and Technical Advisory Committee (STAC) was established in 2004 to provide independent advice to the Leadership Council and the Implementation Committee on scientific and technical issues, including ecosystem assessment and monitoring, in support of CCMP implementation.

Implementation Advisory Committee

As recommended by the Leadership Council during their January 2020 Strategic Planning Meeting, the function of the Implementation Advisory Committee will be carried out by the Executive Committees from both the Leadership Council and the STAC. The Executive Committees thus will evaluate those CCMP implementation projects whose funding exceeds the \$5,000 threshold for funding project decisions by staff only. The future of an independent Implementation Advisory Committee lies in a new Executive Order regarding the structure of the Management Conference.

Action Teams

APNEP has established several Action Teams focused on implementing CCMP objectives and actions. 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. For 2021-22, the active Action Teams receiving staff facilitation priority will be those who most closely align with the focus areas as directed by the Leadership Council.

Monitoring and Assessment Teams

Two of the four phases of APNEP's adaptive management cycle, "Monitoring" and "Assessment", help ensure that stakeholders have regular, reliable decision support as to whether CCMP outcomes and actions are being achieved. To leverage program capacity and promote partner collaboration when implementing these two crucial phases, APNEP established in 2008-2009 six resource monitoring and assessment teams (MATs) whose missions each addressed a major sub-system of the Albemarle-Pamlico regional ecosystem. For 2021-22 the MATs receiving staff facilitation priority will be those who most closely align with the further development of the monitor plan and the focus areas (SAV, Water Quality, Coastal Habitats, & Resilience) as directed by the Leadership Council.

Other Partnerships

In general, APNEP is considered a boundary organization, or an organization that facilitates collaboration and information flow between diverse research disciplines and between the research and public policy community. As such, APNEP engages its partnering organizations and the public to improve awareness and understanding of environmental issues facing the Albemarle-Pamlico region. The various methods of APNEP engagement are discussed in greater detail in the [APNEP Engagement Strategy](#).

Much of this coordination occurs through relationships built via our partner network, independent of whether partners are participating on an APNEP team. APNEP is tracking issues of interest to the Partnership and providing support where feasible, such as Chowan algal blooms, offshore oil drilling, impacts to communities due to flooding and sea level rise, and fisheries issues. Engagement associated with these issues has led to letters of support for partners applying for grants, formal comments through the Leadership Council, technical advice and support to agency management, funding and logistical assistance, and hosting workshops to convene technical experts.

APNEP staff also regularly participate in external workgroups and committees to expand our reach, facilitate regional collaboration, and reciprocate volunteer involvement. Where possible, APNEP seeks to prioritize projects that align with the complimentary missions of these external workgroups. Staff also actively seek opportunities to integrate external workgroup projects with APNEP Action Team projects.

APNEP Contracts and Grants Summary Table

Completed Projects

Activity Category	CCMP Actions Addressed	Program Title	320 Funds	Match Funds	Total
Engagement	D1 & D2	Albemarle-Pamlico Estuary Highway Signs	\$35,000	N/A	\$35,000
Engage	D3.3	Duke USCA Project: Prioritizing Coastal Habitats/Carbon Resilience	\$0	N/A	TBD
Outreach	A2.1, B2.6, D1.3	Aquatic Invasive Species Communication & Outreach Strategy Development	\$2,000	N/A	\$2,000
Monitor	D1.1, D2.1, D2.3, D3.1, E1.3	Swim Guide	\$9,500	\$14,304	\$23,804

Ongoing Projects

Activity Category	CCMP Actions Addressed	Program Title	CWA 320 Funds	Match Funds	Total
Identify	A1.1, B2.2, C1.1, C1.2, C3.3, E1.1	Development of scientifically defensible chlorophyll- <i>a</i> standards for protection of SAV in the Albemarle-Pamlico Estuarine System	\$24,751	N/A	\$24,751
Identify	A3.3, D3.2, E2.2	Coastal Plain Ecological Flows Evaluation: Phase II	\$50,000	TBA	\$50,000
Identify	A2.1, B2.6, C3.1, D1.3, D2.1	APNEP-N.C. Sea Grant Joint Graduate Fellowship in Estuarine Research	\$5,000	\$5,000	\$10,000
Protect & Restore	A2.1, B2.6, C3.1, D1.3	N.C. Aquatic Nuisance Species Management Plan Coordination	\$0	\$6,103	\$6,103
Protect and Restore	A1.1, A2.3, A2.4, B1.3, B1.4, B1.5, B2.2, B3.2,	N.C. Coastal Habitat Protection Plan Implementation Support	\$0	\$24,000	24,000

	B3.3, C1.3, C1.4, C1.5, C2.2, C3.2, C4.2, C5.1, C5.2, C5.3, D1.2, D1.4, E1.2				
Protect & Restore	A2.2, B3.1, D3.3	Using Natural and Nature-Based Features to Build Resilience to Storm Driven Flooding Project	\$0	\$27,000	\$27,000
Protect & Restore	B2.2, C3.3	SAV Economic Analysis	\$68,193	\$0	\$68,193
Engage	All	APNEP Action Team Facilitation	\$0	\$12,000	\$12,000
Engage	All	Event Participation & Sponsorship	\$8,500	\$30,000	\$38,500
Engage	All	Public Outreach & Print Media	\$0	\$300	\$300
Engage	D2.1, D2.2, D2.3	Shad in the Classroom	\$20,000	\$11,000	\$31,000
Engage	D2.1, D2.2, D2.3	Summer Teacher Institute	\$20,000	\$11,000	\$31,000
Engage	D3.3	Building capacity for Climate Resilience in Albemarle-Pamlico Region Tribal Communities	\$27,500	\$27,500	\$55,000
Monitor	E1.1, E1.2, E1.3, E2.1, E2.2	Integrated Monitoring Plan & Ecosystem Indicator Development	\$0	\$2,441	\$2,441
Monitor	D2.3, E1.1, E2.1, E2.2	Recreational Water Quality Monitoring	\$18,594	\$283,000	\$301,594
Monitor	A1.1, E1.1, E2.1	SAV Mapping & Monitoring	\$0	\$74,717	\$74,717
Protect & Restore	All	Undesignated CCMP Implementation Projects	\$7,442	\$7,442	\$14,884

APNEP Leverage Projects

Activity Category	CCMP Actions Addressed	Program Title	CWA 320 Funds	Match Funds	Total
Monitor	E1.1, E1.2, E2.1, E2.2	Sentinel Network Monitoring of SAV in Roanoke and Neuse River Watershed	\$0	\$75,000	\$75,000
Monitor	B2.2, C3.3, E1.1	APNEP Estuarine Workboat	\$0	\$43,118	\$43,118
Monitor	B2.2, C3.3	2019 SAV Aerial Images and Analysis	\$0	\$180,000	\$180,000
Monitor	A3.1, B2.3, C2.3	Scuppernong Study	\$0	\$624,547	\$624,547
Monitor	B2.3, C2.3	Water-Level Monitoring Gauges	\$0	\$120,000	\$120,000

APPENDIX A: 2012 CCMP GOALS AND OUTCOMES

Goal 1: A region where human communities are sustained by a functioning ecosystem

Ecosystem Outcomes:

1. Waters are safe for personal contact.
2. Designated surface and ground water supplies are safe for human consumption.
3. Surface hydrologic regimes sustain regulated human uses.
4. Fish and game are safe for human consumption.
5. Opportunities for recreation and access to public lands and waters are protected and enhanced.

Goal 2: A region where aquatic, wetland, and upland habitats support viable populations of native species

Ecosystem Outcomes:

1. The biodiversity, function, and populations of species in aquatic, wetland, and upland communities are protected, restored, or enhanced.
2. The extent and quality of upland, freshwater, estuarine, and near-shore marine habitats fully support biodiversity and ecosystem function.
3. Non-native invasive species do not significantly impair native species' viability or function, nor impair habitat quality, quantity, and the processes that form and maintain habitats.

Goal 3: A region where water quantity and quality maintain ecological integrity

Ecosystem Outcomes:

1. Appropriate hydrologic regimes support ecological integrity.
2. Nutrients and pathogens do not harm species that depend on the waters.
3. Toxics in waters and sediments do not harm species that depend on the waters.
4. Sediments do not harm species that depend on the waters.

APPENDIX B: 2012-2022 CCMP ACTIONS

IDENTIFY

- A1.1 Facilitate the mapping of significant ecological, bathymetric, geologic, demographic, and cultural features.
- A1.2 Facilitate the refinement and use of online conservation planning tools.
- A2.1 Facilitate the development of protocols and conduct rapid assessments to determine presence and potential threat of invasive species.
- A2.2 Create and improve projections of land use and climate change related impacts on the regional ecosystem.
- A2.3 Support research on adapting to impacts associated with climate change and sea level rise.
- A2.4 Facilitate risk assessments of targeted personal care and pharmaceutical products in the aquatic system.
- A3.1 Assess the effectiveness of policies and regulations to minimize wetland loss.
- A3.2 Assess the effectiveness of policies and regulations regarding riparian buffers.
- A3.3 Develop and refine ecological flow requirements for each major river.

PROTECT

- B1.1 Minimize the introduction of toxics from targeted sources.
- B1.2 Minimize the introduction of pathogens from targeted sources.
- B1.3 Facilitate the protection of natural riparian buffers to reduce runoff.
- B1.4 Facilitate the development of state and local policies that support the use of low impact development.
- B1.5 Facilitate the use of best management practices on agricultural and silvicultural lands.
- B2.1 Facilitate the development and implementation of an integrated freshwater habitat protection strategy.
- B2.2 Develop and implement a submerged aquatic vegetation (SAV) protection strategy.
- B2.3 Facilitate the development of incentives for protection and management of targeted natural communities and habitats.
- B2.4 Facilitate the development of policies to minimize dredge and fill activities in naturalized areas and sensitive habitats.
- B2.5 Facilitate protection of designated anadromous fish spawning areas and inland primary nursery areas from marina impacts.
- B2.6 Minimize and rapidly respond to the introduction of invasive species through the development and implementation of integrated prevention and control strategies.
- B3.1 Assist local governments in the development of incentives for protecting natural shorelines.
- B3.2 Develop and distribute educational materials encouraging landowners to protect natural shorelines.
- B3.3 Facilitate the development of requirements for living shoreline stabilization projects that optimally protect estuarine aquatic and shoreline habitats while minimizing regulatory requirements.

RESTORE

- C1.1 Establish contaminant management strategies for waters not meeting water quality standards.
- C1.2 Facilitate the implementation of existing contaminant management strategies.
- C1.3 Facilitate the restoration of riparian and estuarine shorelines.
- C1.4 Reduce unregulated discharge from wastewater treatment systems.
- C1.5 Facilitate voluntary retrofitting of existing development and infrastructure to reduce runoff.
- C2.1 Facilitate the development and implementation of coordinated landscape-scale hydrological restoration strategies.
- C2.2 Facilitate the development of incentives to replace hardened estuarine shorelines with living shorelines.
- C2.3 Facilitate the hydrologic restoration of floodplains and streams.
- C3.1 Develop and refine integrated invasive species eradication and control strategies.
- C3.2 Develop and implement a coordinated wetland restoration strategy.
- C3.3 Develop and implement a submerged aquatic vegetation restoration strategy.
- C4.1 Install fish ladders and eel-ways on existing dams and other permanent barriers.
- C4.2 Facilitate the removal of dams, culverts, and other in-stream barriers.
- C4.3 Restore degraded anadromous fish spawning habitats.
- C4.4 Facilitate research to improve fish passage.
- C5.1 Construct new oyster habitats.
- C5.2 Reduce the adverse impacts of harvests to existing oyster habitat.
- C5.3 Facilitate research to improve oyster restoration technologies and methods.

ENGAGE

- D1.1 Communicate the importance of stewardship and offer opportunities for volunteerism to further APNEP's mission.
- D1.2 Facilitate efforts to improve collaborations to protect and restore ecosystem processes.
- D1.3 Coordinate outreach and engagement efforts regarding the impacts of invasive species.
- D1.4 Coordinate outreach efforts regarding the proper application of fertilizers to reduce nutrient runoff.
- D1.5 Increase opportunities for public access to waterways, public lands, and trails.
- D2.1 Provide and promote opportunities for outdoor experiences that connect individuals with the Albemarle-Pamlico ecosystem.
- D2.2 Provide environmental education training opportunities for educators in the region.
- D2.3 Increase public understanding of the relationship between ecosystem health and human health advisories relating to water, fish, and game.
- D3.1 Develop and implement a strategy to improve decision-makers' understanding of the costs and benefits of environmental protection, restoration, planning, and monitoring.
- D3.2 Facilitate the development and implementation of basin-wide water management plans to ensure no less than minimum in-stream flows are maintained.
- D3.3 Provide assistance to state, regional, and local governments to incorporate climate change and sea level rise considerations into their planning processes.

MONITOR

- E1.1 Facilitate the development and implementation of an integrated monitoring network through the guidance of regional monitoring and assessment teams.
- E1.2 Assess the value of information for measuring ecosystem and CCMP implementation outcomes.
- E1.3 Facilitate the expansion of volunteer monitoring into a core element of the integrated monitoring network.
- E2.1 Facilitate the design and content acquisition of a regional database based on partners' data and information needs.
- E2.2 Develop and maintain an online resource that clearly conveys regional information in support of ecosystem-based management.

APPENDIX C: 2020-21 Approved Budget

For the time frame of October 1, 2020 to September 30, 2021, APNEP anticipates receiving a grant award of \$662,500 from the EPA to support activities geared towards implementing the Partnership’s CCMP and its mission.

The proposed uses for this funding are highlighted below. Detailed information about each funding category is described within the work plan.

Activity or Project	2020-21 Budget
New Undesignated Projects	\$20,000
Ecological Flows Pilot Project	\$50,000
Shad in Classroom	\$20,000
Teacher Institute	\$20,000
Events & Sponsorships	\$6,000
Supplemental Funding: Resiliency Project	-
Administration	\$476,551
Travel	\$12,000
Subtotal	\$604,551
Indirect Cost (15.7%)*	\$57,949
Total Grant Funds	\$ 662,500

**Includes: N.C. 2019-20 Benefits are based on Social Security (7.65 %), Retirement (19.7 %) of position’s annual salary and Medical Insurance Plan rate of \$6,306 per year per person. Indirect Costs are based on a negotiated rate of 15.7 % of federal salaries under “Water Resources”.*