Albemarle-Pamlico
National Estuary Partnership

2021-2022 Progress Report
&
Work Plan Proposal for 2022-2023

US EPA 320
Cooperative Agreement CE-00D95519

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www.apnep.org

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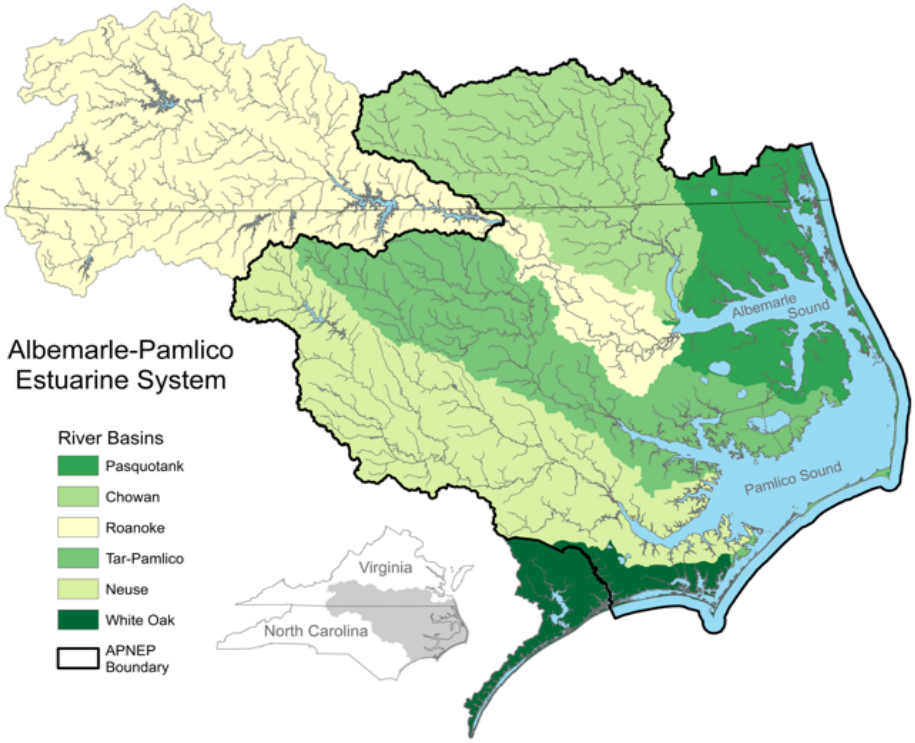
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Albemarle-Pamlico National Estuary Partnership

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 NC 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. A revised CCMP was created in 2012 through a stakeholder-driven process with an ecosystem-based management approach. The Partnership Office is advised by a Management Conference as currently authorized under North Carolina Governor's Executive Order #250 (2022).

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.



Executive Summary

Purpose

This document is a compilation of two distinct reports:

2021-2022 Progress Report (mid-year)

The report presents information about APNEP's completed and ongoing projects from May 2021 to October 2022 under cooperative agreement *CE-00D95519.* Descriptions of projects completed prior to May 2021 under *CE-00D95519* may be found in previous years' reports that are available at APNEP.org

2022-2023 Work Plan and Budget Proposal

This report presents the 2022-2023 Annual Work Plan, associated budget, and proposed projects for the fiscal year beginning on October 1, 2022. This Work Plan and the associated grant application represent a funding increase request of $700,000 for year four (10/1/22 to 9/30/23) under cooperative agreement *CE-00D95519* between the US Environmental Protection Agency and the North Carolina Department of Environmental Quality.

Cooperative Agreement (*0D95519*)

This report addresses actions under EPA/NC-DEQ Cooperative Agreement *CE-0D95519* to support implementation of the management strategies recommended in APNEP's 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.

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2021-2022 Key Accomplishments

Key accomplishments from May 2021 to April 2022 are listed below. Additional details about these and other projects can be found in the Activities and Projects 2021-2022 section of this document.

Focus Areas and Activities

The Covid-19 pandemic created many challenges for APNEP since March 2020. However, the Partnership continued its attention on CCMP focus areas and activities as directed by the Leadership Council during the January 2020 strategic planning meeting. These actions led to activities primarily focused on submerged aquatic vegetation (SAV), water quality, coastal habitats, and resilience; all consistent with the CCMP and APNEP mission. During this time the staff worked with the Management Conference and our many partners to continue business as usual where possible. The result was many remote workdays and many virtual meetings for staff, Management Conference members, and our partners.

Additionally, the Partnership continues work on further development of its monitoring plan and amending the CCMP to reflect changes since 2012. Staff are currently working with partners to develop the updated water quality component of the monitoring plan. A priority for much of the remaining fiscal year is to complete the update/amendment to the CCMP by year's end.

Submerged Aquatic Vegetation (SAV)

SAV Metric Report - Assessment

APNEP published a report showing a net loss in the extent of high-salinity SAV habitat in North Carolina's sounds between 2006-2007 and 2013. While the data also confirm 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% 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 - Monitoring

During 2020-2021 APNEP coordinated with the North Carolina Department of Transportation and other partners on the APNEP SAV Team to gather SAV data via aerial imagery and boat-based surveys. In addition to this information supporting the creation of an updated map of high-salinity SAV for the Albemarle-Pamlico Estuarine System, this effort in 2021 marked the initial implementation of APNEP's Integrated Monitoring Plan by focusing on several indicator metrics reflecting the condition of the region's coastal SAV resource. The water quality component of this Integrated Monitoring Plan is discussed next. Learn more.

SAV Communications - Assessment

- **SAV Economic Valuation:** APNEP contracted with the NC State University Center for Environmental and Resource Economic Policy to fund an analysis of SAV's economic value within the Albemarle-Pamlico region. The final report is available here.

- **SAV Press and Outreach:** In February 2021, a high-salinity SAV extent metric report was released (see above) along with a 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, WITN, Public Radio East, and the Carolina Public Press. In addition, APNEP's summer 2021 intern created infographics (one for the public, one for local governments) and a webpage to assist with communications regarding the SAV economic valuation report (see above). She also assisted in developing and sharing a series of social media posts related to various SAV topics.

Water Quality

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 with an initial scope focused on coastal SAV and estuarine water quality metrics associated with SAV habitats. The initial plan was accepted by the Leadership Council in March 2021, and work is currently underway on enhancing the water quality monitoring aspects of the plan.

Research Study to Support Water Clarity Metrics for SAV Protection

Water clarity indicator research 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 the concentrations of optical constituents and SAV light requirements are needed. Under a contract with APNEP, Dr. Nathan Hall of the UNC Institute of Marine Sciences has developed scientifically defensible chlorophyll-*a* and turbidity threshold concentrations that when considered together lead to water clarity that is protective of SAV in high-salinity zones. This information will help guide the decisions made through the NC Nutrient Criteria Development Plan and the NC Coastal Habitat Protection Plan. Learn more.

NC Nutrient Criteria Development Plan Support

APNEP staff and select STAC members are active in the NC Nutrient Criteria Development Plan (NCDP) process, now focused on the Albemarle Sound and Chowan River. Staff assisted the NC Division of Water Resources (NCDWR) with gaining a complete understanding of the system and recommended candidates for the NCDP's Scientific Advisory Council who are experts in high- and low-salinity SAV, and SAV impacts on fish productivity, as well as water quality issues. NCDWR has selected SAV as a biological indicator for the health of the Albemarle Sound and Chowan River. APNEP staff will continue to actively participate in nutrient criteria development for the Albemarle Sound and Chowan River until

recommendations are accepted by NCDWR and approved the NC Environmental Management Commission and submitted to EPA.

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. The Partnership funded several projects in support of this mission. Through support for Sound River's Swim Guide program and NC Division of Marine Fisheries' Recreational Water Quality Monitoring Program, APNEP is expanding the collection of water quality data for our region 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.

Coastal Habitats

2021 NC Coastal Habitat Protection Plan Amendment

In late 2021, an amendment to the NC Coastal Habitat Protection Plan (CHPP) was adopted by the three NC regulatory bodies with water quality and fisheries oversight – Coastal Resources, Environmental Management and Marine Fisheries Commissions. The amendment focuses on and identifies five primary areas where improving water quality is critical. The five priority issues in the 2021 CHPP Amendment include:

1. SAV protection and restoration through water quality improvements
2. Wetland protection and restoration through nature-based solutions
3. Environmental rule compliance to protect coastal habitats
4. Wastewater infrastructure solutions for water quality improvement
5. Coastal habitat mapping and monitoring to assess status and trends.

To support CHPP implementation, the amendment includes a recommendation that at public-private partnership be formed with NC-DEQ and several non-governmental organizations. This partnership would be able to seek out additional funding sources that NC-DEQ and APNEP are currently unable to pursue as public entities, as well as explore and prioritize non-regulatory approaches towards implementing recommendations identified in the Amendment. Learn more.

Resilience

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 NC 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 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 creating partnerships and building the groundwork for a sustainable program. The second phase of the project was initiated in 2022. Learn more.

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

APNEP has participated on a Virginia Institute of Marine Sciences (VIMS)-led team on a NOAA-funded Coastal Resilience project which began in 2017. The project team developed a spatial analysis tool for Virginia local governments to identify opportunities and criteria for using Natural and Nature Based Features (NNBFs) that increase resilience to flooding and generate credits for local governments in water quality and hazard mitigation programs. The tool was released on ADAPTVA in 2021. APNEP has worked with the project team and other partners to evaluate the tool's applicability in NC coastal localities as a possible extension of the guidance to areas beyond coastal Virginia. APNEP developed a scope of work to assess NC locality needs, build a template tool comparison database, and develop outreach materials and resources that NC local government staff can use to compare tools and the types of NNBFs that can meet their needs. APNEP has contracted with Wetlands Watch to complete this remaining phase of the project in 2022. Learn more.

NC Executive Order 80 Implementation

APNEP staff continue to participate in activities stemming from implementation of the 2020 NC Climate Risk and Resilience Plan, including the Natural and Working Lands Stakeholder Team, Coastal Habitats and Pocosin Wetlands Subcommittees, and the Coastal Resilience Community of Practice. APNEP's involvement in these efforts have led to identification needs for integrating resilience activities with existing programs and initiatives, including working closely with NC Division of Marine Fisheries staff to develop actions that complement the goals and objectives of both APNEP's CCMP and the NC CHPP. APNEP's facilitation of its SAV team and resulting mapping, monitoring, metric development, and economic valuation studies have all contributed significantly towards protection of SAV, which is included as a resilience strategy in the state plans. In addition, the Tribal Coastal Resilience Project (see above) stemmed from APNEP participation on various workgroups and committees. Staff continue to explore options to assist with implementation of the actions recommended in the NC Climate Risk and Resilience Plan. Staff are also working closely with other partners on resilience initiatives including the NNBF project for local governments described above, and other projects that will inform development of resilience strategies including Ecological Flows and the Scuppernong Regional Water Management Study.

Water Level Monitoring Stations (non-320 funds)

APNEP supported placement of additional NC Flood Inundation Mapping and Alert Network (FIMAN) remote monitoring stations in Newport and Havelock through the NC Division of Emergency Management. Data from gauges located within the Albemarle-Pamlico watershed contribute to knowledge that can be used to address future water management actions in the watershed as well as increase real-time knowledge of water levels and flow conditions in the Albemarle-Pamlico region. Learn more

Engagement and Stewardship

Continuation of Long-Term Watershed Engagement Projects

APNEP continued long-term support and funding for education and engagement projects "Shad in the Classroom" and the "Summer Teacher Institute" through summer 2021 and initiated a new open request for proposal (RFP) process that will be used to fund targeted outreach and engagement initiatives.

- **2021 Summer Teacher Institute:** In summer 2021, APNEP continued its long-term support for the Summer Teacher Institute, a multi-day environmental education professional development opportunity for the region's educators led by the UNC-Institute for the Environment. The program has reached approximately 25 teachers annually since its inception in 2004. The 2021 Institute was held in person. Learn more.

- **2021 Shad in the Classroom (Virtual):** Long-term APNEP support for the NC Museum of Natural Science's Shad in the Classroom program has resulted in this initiative reaching approximately 30 educators and their 1000-plus students annually since 2011. From 2010 (pre-APNEP funding) to 2018, the program has grown from 13 to 30 classrooms annually across the region. In 2021, the program was again conducted via the internet among students and educators. However, live shad fry were still released in area rivers as part of the event. With most participating schools having returned to in-person learning, the program and most schools held release events with students in 2022. Learn more.

- **Engagement and Stewardship 2021 Request for Projects:** With input from its Engagement and Stewardship Action Team, APNEP released an RFP during summer 2021 and received 10 proposals. An independent review committee of environmental education and outreach professionals selected the following two projects through a competitive evaluation and ranking process:
  - ***Following the River: An Exploration of the Virginia Southern Watersheds/ Pasquotank River Basin***: Lynhaven River Now (LRNow) will create a resource guide and lesson plans for educators in southeastern Virginia and northeastern North Carolina to increase knowledge about the unique history and natural resources of the region and connections of the shared waterways between the two states. The program will also consist of two unique, immersive teacher training experiences in the southern watersheds of Virginia Beach that flow into North Carolina's Pasquotank River Basin and the Albemarle Sound.

  - ***Shad in the Classroom***: The Friends of North Carolina Museum of Natural Sciences was awarded funds to support the Museum in continuing their "Shad in the Classroom" program described above. The program engages students in hands-on learning about American Shad and North Carolina's River Basins. It is also designed to foster an appreciation and understanding of the natural world, as well as to inspire the next generation of biologists and

conservationists. The program will train teachers to facilitate classroom learning about water quality, American Shad ecology, riverine and coastal ecosystems, and careers in science. The project will also consist of workshops for teachers and field experiences for students.

Partnership-Building and Regional Coordination

NC Aquatic Nuisance Species Management Plan Committee Coordination

APNEP staff continued working with the NC Aquatic Nuisance Species Management Plan Steering Committee to revise the Plan for federal approval, and afterwards identify next stepsfor Plan implementation. This state plan for coordinated management, research, and outreach of aquatic nuisance species, once finalized and federally approved, will make NC 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 NC. Learn more.

North Carolina - Virginia Memorandum of Understanding (2020)

APNEP facilitated a renewed Memorandum of Understanding (MOU) between six environmental andnatural resources agencies from North Carolina and Virginia. The MOU, released in September 2020, builds upon the MOU signed in 2017 and reaffirms the agencies' commitments to foster interstate collaboration within the shared waterways of the Albemarle-Pamlico region. The MOU required a report on coordination, data-sharing, and assessment of interstate initiatives by March 2021, which was circulated to the agency designees in summer 2021. The designees agreed upon climate resilience as an overarching theme for MOU implementation, with an initial focus on working together in the Chowan River Basin. A final recommendation regarding interstate joint-management strategies will be delivered to the signatories in 2022. Learn more.

Currituck Sound Coalition

This initiative is being led by Audubon North Carolina 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 and wildlife in and around the Currituck Sound watershed. Together the coalition can effectively inform planning, advance policy, and lead on-the-ground projects that demonstrate the capacity of nature-based solutions toaddress the most pressing coastal challenges in northeastern North Carolina. APNEP staff participate on the Coalition's Wetlands Working Group, which released a Marsh Conservation Plan in 2021. APNEP staff are working with Coalition members to develop strategies for outreach with Virginia partners. Learn more.

Scuppernong Regional Water Management Study

In partnership with Washington and Tyrell Counties, APNEP submitted a grant application to the NC Water Resources Development Grant fund on behalf of Washington County in Fall 2019 to conduct a hydrologic study of the headwaters of the Scuppernong River, Lake Phelps, Pocosin Lakes National Wildlife Refuge, and surrounding land. The grant was awarded to Washington County in Fall 2020, and a contract is currently being developed with the Albemarle Commission who will serve as the grant administrator. APNEP continues working with these local governments who have requested assistance with addressing flooding and resilience planning. APNEP has been working to secure match commitments from project partners and identify potential technical partners that have the capacity to conduct the water budget and modeling work. The outcomes from the study will be utilized to build a more comprehensive, collaborative regional water management strategy 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.

Partnership Priorities 2020-2023

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 be focused primarily on SAV, Water Quality, Coastal Habitats, and Resilience consistent with the CCMP and the APNEP mission as well as further development of our monitoring and assessment efforts.

Infrastructure Investment and Jobs Act of 2021

APNEP anticipates receiving additional funds from EPA under the Infrastructure Investment and Jobs Act, which was passed by Congress in November 2021. This Act known as the Bipartisan Infrastructure Law (BIL) is designed to be a significant investment in the nation's infrastructure and resilience.

The BIL references EPA's underlying authority under CWA §320 to fund the implementation of the National Estuary Programs (NEPs) CCMPs. As with annual appropriations distributed to NEPs to implement CWA §320, the funds distributed_under the BIL must be directed to implement a management conference and EPA approved CCMP and workplan. The BIL funding is available to the NEPs until fully expended and will be distributed over five years.

In signing the final bill into law (Executive Order 14052 - Implementation of the Infrastructure Investment and Jobs Act), the President identified six priorities that should be implemented by all federal agencies. As such, EPA expects NEPs to prioritize projects within CCMPs that are consistent with these six priorities:

- Invest public dollars efficiently, avoid waste, and focus on measurable outcomes for the American people;
- Increase the competitiveness of the United States economy, including through implementing the Act's Made-in-America requirements and bolstering United States manufacturing and supply chains;
- Improve job opportunities for millions of Americans by focusing on high labor standards for these jobs, including prevailing wages and the free and fair chance to join a union;
- Invest public dollars equitably, including through the Justice40 Initiative, which is a government-wide effort toward a goal that 40 percent of the overall benefits from Federal investments in climate and clean energy flow to disadvantaged communities;
- Build resilient infrastructure that can withstand the impacts of climate change and help combat the climate crisis; and
- Coordinate effectively with State, local, Tribal, and territorial governments in implementing these critical investments.

APNEP anticipates receiving final guidance for the application and implementation of these funds within the next few months. APNEP staff will be developing an implementation proposal and budget for the Leadership Council's review later in 2022.

Proposed Grant Budget for 2022-2023

For the timeframe of October 1, 2022 to September 30, 2023, 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 under the current Cooperative Agreement. Funding received for 2021-22 was $700,000*.

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

Activity	2022-2023 Grant Budget
Following the River (Year II)	$ 20,000
Shad in Classroom (Year II)	$ 20,000
SAV Assessment & Monitoring	$ 16,000
APNEP-NCSG Joint Fellowship	$ 5,000
Events & Sponsorships	$ 2,000
Program Administration**	$ 585,955
Travel	$ 10,000
Subtotal	$ 658,955
Indirect Cost (*10.2%*)***	$ 41,045
Total Grant Funds	$ **700,000**

**A copy of the 2021-22 budget is available in Appendix C.*

***Includes personnel, supplies, equipment, and fringe benefits that are based on Social Security (7.65 %), Retirement (24.10 %) of position's annual salary and Medical Insurance Plan rate of $7,019 per year per person (as of 1 May 2022 NC DEQ).*

****Indirect Costs are based on an EPA negotiated rate of federal salaries under "Water Resources" currently based on 2021-22 agreement from May 2021. A new agreement is pending.*

Activities & Projects

The following narrative provides an overview of the status of APNEP's projects and activities under Cooperative Agreement CE-0D20614. The section provides a description of progress on projects since the last annual work plan was approved on May 9, 2021. Ongoing projects are those that began during or before the last fiscal year, and which APNEP expects to continue through the current fiscal year as well as new projects for 2022-23.

Diversity, Equity, and Inclusion

Objectives: Engage communities and stakeholders that are representative of the broader populations within our programmatic boundaries to implement the CCMP and the Partnership's mission.

Description: APNEP affirmed its diversity, equity, and inclusion statement in 2020, which included commitments to engage diverse communities and populations in the organization's decisions and diversify the perspectives represented within all of Partnership's management and citizen advisory groups. The commitment includes a requirement to report annually on actions taken to enact these commitments in our Annual Work Plan. Learn more.

Progress to Date:

- APNEP continues to partner with representatives from Tribal coastal plain communities, universities, and agencies through the Tribal Coastal Resilience Connections project described elsewhere. The project was initiated using supplemental funds from EPA designated for work with underserved communities on CCMP actions in NEP watersheds.
- STAC leadership in Spring 2021 formed an ad-hoc subcommittee to promote DEI opportunities within the science & technology community. A subcommittee representative briefed the greater STAC during their June 2021 meeting on a draft proposal outline to conduct an exploratory spatial analysis to investigate relations between indicators of human well-being and ecosystem health among disadvantaged communities within the APNEP Region.
- Staff continually seek opportunities to assist communities that lack the capacity and resources to deal with environmental issues, particularly in rural areas in eastern NC.
- Staff received numerous trainings on diversity and bias from NC-DEQ Human Resources.
- APNEP's Summer 2021 intern Abby McNaughton developed a document entitled *Recommendations for Incorporating Diversity, Equity, Inclusion, and Justice in APNEP Communications & Outreach*. She interviewed APNEP staff and partners including the NC Office of Environmental Education which assist with the NC-DEQ Diversity and Inclusion committee and conducted online research. Her recommendations included starting with social media and grants. She assisted with diversifying outreach and targeting new audiences for the 2021 Engagement & Stewardship RFP which was released during her tenure. APNEP staff have begun implementing other recommendations including updating website content and will be considering them during the 2022 CCMP revision. Staff will include the document in the next update to its Engagement Strategy.

FY2022-2023 Plans:

- Incorporate diversity, equity, and broad community inclusion as an ecosystem outcome(s) with associated objectives and actions into the 2022-2032 amendment of the CCMP.
- Conduct an internal organizational diversity, equity, and inclusion self-assessment and provide externally facilitated trainings for management and citizen advisory groups and staff as warranted.
- Develop targeted strategies for social media.

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 NC 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 NC to conduct applied research within the NC portion of the APNEP management boundary. Fellows must conduct research that addresses focus areas identified in the CCMP and the NCSG Strategic Plan. Learn more.

Year(s):	2015 – present
Partners:	NC Sea Grant (Lead)
Outputs/Deliverables:	Final report, presentations, maps, data
Outcomes:	Increased capacity to address CCMP implementation actions
FY2021-22 Cost:	$5,000
FY2022-23 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:

- **2019:** In January 2019, fellow Erin Voigt (NC State University) began studying how native and non-native invasive mash species and wave exposure affect shoreline erosion and the availability of nursery habitat in Currituck, Albemarle, and Pamlico Sounds.
- **2020:** In January 2020, fellow Haley Plaas (UNC-Chapel Hill) began studying cyanobacteria toxins in the Chowan River and Albemarle Sound.
- **2021:** In January 2021, fellow Stacy Trackenberg (East Carolina University) began studying how restored seagrass beds in coastal North Carolina are functioning as habitat for faunal communities across varying depths.
- **2022:** In January 2022, fellow Joshua Himmelstein (UNC-Chapel Hill) began studying sediment delivery in North Carolina saltmarshes using low-cost, open-source sensors.

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. Develop recommendations for the NC Division of Water Resources to inform development of ecological flows for the coastal plain.

Description: APNEP has led an Ecological Flows Action Team since 2015 at the request of partners that participated in the NC Ecological Flows Science Advisory Board (EFSAB) to address data gaps and needs identified by members of EFSAB's Coastal Ecological Flows Working Group. The EFSAB was established in response to 2010 legislation directing the former NC 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
Partners:	East Carolina University, APNEP Ecological Flows Team members (multiple partners), NC Land of Water (NCLOW)
Outputs/Deliverables:	Phase II Pilot Study & Summary Report.
Outcomes:	Refinement of data needed to develop recommendations for the NC Division of Water Resources for ecological flows in the NC coastal plain. Development of an evaluation process, decision tree, or matrix that can be replicated in other waterbodies.
FY2020-22 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 began in spring 2021.

In 2021-2022, the ECU team conducted hydrological/water quality data collection along the Trent River, performed initial data analysis, and engaged with community stakeholders to help develop ecological flow guidance for the Trent River system and evaluate approaches to facilitate applying this guidance to similar coastal watersheds in the Albemarle-Pamlico Estuary system. ECU met with

the Ecological Flows Team to brief them on project progress and solicit input on sampling locations in July 2021 and April 2022.

FY2022-2023 Plans:

- ECU will complete in 2022 a first year of hydrological/water quality data collection and analysis and conduct additional stakeholder engagement surveys.
- ECU will plan and conduct in 2023 a second year of sampling and may be able to expand into the Tar-Pamlico basin, leveraging funds from another ECU project funded by NSF.
- ECU will submit a report documenting the available data, noticeable data gaps, data collection sites, synthesis of data, literature review, and stakeholder perspectives. The report will address the framework for coastal ecological flows (NCEFSAB 2013). The report will include:
    - Recommendations to DWR and APNEP regarding the establishment of ecological flows in the Trent River watershed and document process.
    - Evaluation process that can be transferred to other basins.
    - Recommendations for further research, monitoring to fill data gaps if needed.
    - A spreadsheet with water quality, geomorphological, meteorological, ecological, flow alteration, water use, and flow data points.
    - A map documenting locations of field data collection sites
- APNEP staff will consider project expansion using BIL funds

Milestones:

- Data and literature review (Jan. 2021-May 2021)
- Prepare database (Jan.2021-May 2021)
- Field data collection (April 2022- Sept. 2022)
- Geospatial Analysis (April 2022 – Sept. 2022)
- First Year Progress Update (April 2022)
- Mid-Year Progress Update (Nov. 2022)
- Final Report (March 2023)

Development of scientifically defensible chlorophyll-*a* standards for protection of SAV

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 PAR attenuation in both low and high salinity estuarine waters at locations throughout the 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

4) Combine diffuse attenuation coefficient and bathymetry data sets from sites throughout 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: To set SAV protection and restoration goals 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 estuarine system through four objectives listed above.

Year(s)	2020-2021 (Complete)
Partners:	UNC Institute of Marine Sciences, APNEP SAV Team
Outputs/Deliverables:	A final report that provides 1) a description of chlorophyll-*a* and turbidity 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 NCDP-SAC, 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 APES. 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

FY2022-2023 Plans: The project is complete and the final report and information will help guide the decisions made through the NC Nutrient Criteria Development Plan and the NC Coastal Habitat Protection Plan.

Calibration of a bio-optical model for low-salinity SAV

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 PAR data from select NC Ambient Monitoring System (AMS) stations in Chowan River, Albemarle Sound, Pamlico River, and Neuse River.
2. Calibrate a bio-optical model for low-salinity SAV in APES 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 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 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 APES high-salinity waters 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 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. 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 CHPP and NCDP.

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 findings to the APNEP management conference, the NC NCDP-SAC and other groups decided by APNEP.
Outcomes:	Scientifically defensible chlorophyll-*a* and turbidity standards that are protective of SAV within APES low-salinity zones.
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:	(5) protecting wetlands, (6) protecting coastal waters through the National Estuary Program
EPA Element(s):	Habitats, Water Quality

Progress to Date:

- **2021:** APNEP met several times with NC-DWR and Dr. Nathan Hall of UNC IMS regarding collaboration on this project, developing a workplan, and formalizing the roles and responsibilities of APNEP, NC-DWR, and UNC IMS relative to specific tasks needed to complete the project. In May 2021, data collection began.

FY2022-2023 Plans: Data collection will continue through October 2022 to capture the full seasonal dynamics of the water clarity metrics of interest. A final report is expected December 2022.

Fill Data Gaps on Optical Water Quality Constituents in Currituck Sound

Objectives:

1. Post-calibrate continuously monitored CDOM and chlorophyll *a* fluorescence dataset collected by the US Army Corps of Engineers Field Research Facility (USACE-FRF) and East Carolina University Coastal Studies Institute (ECU-CSI) to produce a high temporal resolution and spatially expansive dataset of the optically active constituents in the appropriate units necessary for modeling K_{dPAR} in Currituck Sound.
2. Measure the absorbance and scattering spectra of the dissolved and particulate fractions of Currituck Sound waters to contribute data for recalibration of the bio-optical model for low-salinity SAV habitats.
3. Integrate results into ongoing work to recalibrate a bio-optical model to establish chlorophyll-*a* and turbidity thresholds for the protection of low-salinity SAV habitats. Data products from accomplishment of objectives 1 and 2 will be utilized for the ongoing project funded by APNEP to recalibrate the bio-optical model and develop scientifically defensible thresholds for chlorophyll *a* and turbidity for low-salinity SAV habitats throughout APES.

Description: Currituck Sound historically hosted expansive low-salinity SAV that provided critical habitats for fish and forage for migratory waterfowl. Since the 1960's, reductions in water clarity deterioration due to non-point source nutrient and sediment pollution have caused significant declines in SAV coverage but the remaining SAV of Currituck Sound still constitute an important fraction of North Carolina's low-salinity SAV habitats. Understanding the causes of light attenuation for SAV in Currituck Sound is important for developing strategies to restore SAV coverage but this goal is hampered by a general lack of useable data on the optical water quality constituents that drive light attenuation. Additionally, the bio-optical model that is being used to develop water quality thresholds for protecting SAV within APES does not currently perform well in low-salinity SAV waters like Currituck Sound and requires recalibration for low-salinity estuarine waters (see previous project). The USACE-FRF in Duck, NC and the ECU-CSI deployed continuous monitoring instrumentation to produce an extensive dataset of these water quality parameters with turbidity as NTU but both CDOM and chlorophyll *a* were measured in arbitrary fluorescent units (AFU) and are currently unusable for quantifying light attenuation and defining thresholds for protecting SAV. USACE-FRF collected high temporal resolution (15-minute), turbidity (NTU), CDOM (AFU), chlorophyll *a* (AFU), and diffuse attenuation of photosynthetically active radiation (K_{dPAR}) datasets at five research platforms in Currituck Sound from 2016 to 2018. Additionally, from 2018 to 2019, ECU-CSI and USACE-FRF partnered to deploy two instrumented benthic landers that measured these parameters in the same units.

Year(s):	2022 – present
Partners:	UNC IMS, ECU CSI, USACE, APNEP SAV Team, APNEP Water Quality MAT
Outputs/Deliverables:	The final report for the larger bio-optical model recalibration project (see above) will incorporate the results funded by this supplement.
Outcomes:	Scientifically defensible chlorophyll-*a* and turbidity standards that are protective of SAV within APES low-salinity zones.
FY2021-22 Cost:	$ 4,993
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:	(5) protecting wetlands, (6) protecting coastal waters through the National Estuary Program
EPA Element(s):	Habitats, Water Quality

Progress to Date: This project is scheduled to begin on May 15, 2022.

FY2022-2023 Plans: A final report in conjunction with the previous project is expected in December 2022.

NC Aquatic Nuisance Species Management Plan Development

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

Description: The NC Aquatic Nuisance Species Management Plan (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, NC never submitted the plan for federal approval to become eligible for external funding under the Aquatic Nuisance Species Prevention and Control Act (1990). Given the 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 staff 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 NC eligible to receive federal funding for invasive species management.

Year(s):	2015-2016, 2018 - Present
Partners:	NC-DEQ, NC Wildlife Resources Commission, NC Dept. of Agriculture and Consumer Services, NC Dept. of Natural

	and Cultural Resources, US Fish and Wildlife Services, NCSU, The Nature Conservancy, NCSG
Outputs/Deliverables:	State plan for coordinated management, research, and outreach on aquatic nuisance species.
Outcomes:	Federal approval of this plan will make NC eligible to receive federal funding (~$40K/year) to support the plan's implementation. Improved coordination and collaboration across state agencies will leverage limited resources available for invasive species management in NC. The NC-ANSMP will also compliment Virginia's equivalent plan, thereby better enabling coordinated management actions between the two states under the 2020 MOU.
FY2021-22 Cost:	Staff Time
Estimated Leverage:	$12,000
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 adopted in 2015 and have been co-facilitating, along with NCDWR, an update of the Plan through the NC-ANSMP Steering Committee in 2018-2022.

FY2022-2023 Plans:

Estimated Cost: Staff Time

Milestones: APNEP staff will continue to co-facilitate the coordination of revisions to the NC-ANSMP in 2022, with the goal of having the NC Governor's Office submit the revised Plan to the federal Aquatic Nuisance Species Task Force by late 2022 or early 2023. 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.

NC Coastal Habitat Protection Plan Implementation Support

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

Description: The NC Coastal Habitat Protection Plan (CHPP), adopted by the Coastal Resources, Environmental Management, and Marine Fisheries Commissions, has seen routine development since its implementation began in 2004. The 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 was adopted by the three commissions in November 2021.

Year(s):	2004 - Present
Partners:	NC-DEQ, NC Coastal Resources Commission, NC Environmental Management Commission, NC Marine Fisheries Commission,
Outputs/Deliverables:	CHPP Annual Report
Outcomes:	Coordinated activities and regulation across NC state agencies to improve estuarine habitats.
FY2021-22 Cost:	Staff Time
Estimated Leverage:	$76,000
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:

- APNEP's projects and initiatives related to SAV monitoring and assessment are strongly tied to CHPP implementation. See SAV Monitoring and Assessment project description for more information.
- APNEP staff participate in efforts and initiatives to support CHPP implementation including the NC Oyster Blueprint and the Living Shorelines Action Team. Past APNEP efforts in support of CHPP implementation have included:
    - Funding economic studies that have assisted in generating financial support from the NC General Assembly
    - Long-term efforts to facilitate the use and construction of living shorelines including education and outreach initiatives which have led to streamlined permitting processes and increased demand.
- APNEP staff were involved in the development of the 2021 CHPP Amendment, Issue Papers, and workshops throughout 2020-2021. The draft CHPP update was released for agency and public review in the summer of 2021 and was adopted by the three commissions in late November of 2021.
- APNEP staff were involved in a series of webinars to create public outreach for the CHPP Update and to receive public comment on the amendment in 2021. APNEP also assisted with social media outreach to raise awareness about the CHPP and solicit public comment.
- To support CHPP implementation, the amendment includes a recommendation that at public-private partnership be formed with NC-DEQ and several non-governmental organizations. This partnership would be able to seek out additional funding sources that NC-DEQ and APNEP are currently unable to pursue as public entities, as well as explore and

prioritize non-regulatory approaches towards implementing recommendations identified in the Amendment.

FY2022-2023 Plans:

Estimated Cost: Staff Time

Milestones:

- Water Quality Summit in Fall 2022 (hosted by the NC Coastal Federation)
- Formation of the formal public-private partnership as called for in the 2021 CHPP Amendment
- A timeline for recommendations is enumerated in the CHPP 2021 CHPP Amendment

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 plans and assessment deliverables.

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. In 2017, APNEP re-convened seven Monitoring and Assessment Teams (MATs) to assist in developing (1) integrated monitoring plans that collectively describe 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, and (2) assessment deliverables in the form of metric reports, indicator reports, and ecosystem assessments; based on the higher-quality monitoring data available and targeted to technically-inclined stakeholders.

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
FY2021-22 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

FY2022-2023 Plans: For FY22-23 the MATs and Action Teams receiving staff facilitation priority will be those who most closely align with the further development of the monitoring plan and the focus areas (SAV, Water Quality, Coastal Habitats, & Resilience) as directed by the Leadership Council.

Building Climate Resilience Capacity in Tribal Communities

Objectives: Support tribal communities in the Albemarle-Pamlico region with considering climate risk and resilience 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 NC 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:	NC Commission of Indian Affairs, NCSU, Virginia Coastal Policy Center, Duke University
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 resilience plans.
Outcomes:	Increase in the number of communities in the APNEP region that incorporate resilience into local planning processes.
FY2019-22 Cost:	$37,500
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: Through extensive coordination with tribal representatives, community leaders, and organizations including the NC Office of Recovery and Resilience, APNEP developed a project proposal which was approved by the Leadership Council in fall 2019 and the NC 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.

Phase I included research on tribal climate adaptation plans, online experimentations with tribal engagement, field work, partnership and network development, and continued discussions on tribal engagement issues in Virginia and NC. The TCRC team continued its social media (#WaterStory) campaign launched 2020 on Indigenous People's Day to share information about climate science, and resilience and adaptation planning. This platform provided a way during Covid to engage virtually about climate issues of concern to Tribal communities, collect stories about Indigenous connections to the land and waterways of the coastal plain in Virginia and NC, and share resilience and adaptation work being conducted by Tribes. Team members conducted outreach through presentations and panels at around fifteen events. In addition to engaging with Tribal communities about climate resilience, the team is using success stories from coastal tribal communities in and adjacent to the Albemarle-Pamlico region as well as those throughout Turtle Island to build awareness around what is working well and could be. A final report is being finalized by the team.

Phase II will narrow the scope and focus on engagement with Tribal communities in the shared waterways of the Albemarle-Pamlico region between Virginia and North Carolina (also supporting implementation of APNEP's MOU), building upon a Climate Risk Analysis conducted by the Climate Service for the NCCIA in Phase I with the Nottoway Indian Tribe of Virginia and Meherrin Indian Nation. It will expand tools identified in Phase 1 (Terrastories, GIS Storymapping, and WAMPUM) and utilize geospatial mapping platforms to collect water stories and present climate threats and vulnerabilities identified by Tribal communities in this region. 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 facilitated a panel discussion highlighting the team's work at the May 2021 Carolinas Climate Resilience Conference. Staff are working to ensure tribes are included in regional resilience planning efforts and will ensure that recommendations from the project are incorporated into reports and workplans that result from the Virginia/NC MOU.

FY2022-2023 Plans:

- Continue toolbox development described above
- In-person engagement with Tribal community members
- Outreach at events and conferences
- Capacity building through GIS training for tribal members
- Propose expansion of project using BIL funds

Event Participation and Sponsorships

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

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

Year(s):	Ongoing
Partners:	Varies
Outputs/Deliverables:	Event sponsorship.
Outcomes:	CCMP implementation, increased visibility, and improved partner relationships.
FY2022-2023 Cost:	$2,000
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:

- 2022 I Heart Estuaries (social media, February)
- 2021 National Estuary Week (social media, September)
- 2021 CHPP webinars
- APNEP served as a sponsor for the May 2021 Carolinas Climate Resilience Conference, and organized and facilitated a panel with the Tribal Coastal Resilience Team.
- Staff participated in the 2022 Envirothon
- APNEP staff served as a sponsor for the 2022 WRRI conference and hosted a booth. Staff also assisted with judging the student poster competition. Several partners gave talks on APNEP sponsored initiatives including:
    - Sara Sutherland, Duke University, The Economic Value of SAV
    - Nathan Hall, UNC-Chapel Hill, Development of Water Quality Thresholds for Protection of SAV in APES
    - Robert Christian, East Carolina (Emeritus), Transdisciplinary Approach to Understanding Low Flows and Their Consequences in a Coastal Plain River
    - Jaclyn Best, East Carolina University, Engaging with Stakeholders to Determine Ecological Flow Guidelines in Eastern NC

FY2022-2023 Plans:

Staff will evaluate participation in events as they are announced. Known or planned scheduled events for 2022-23 include:

- NC Sea Grant Conference (November 2022)

- NC Coastal Federation Water Quality Summit (X 2022)
- Virginia Coastal Policy Annual Conference (Tribal Coastal Resilience Project) (Fall 2022)
- WRRI Annual Conference (March 2023)
- 2022 National Estuary Week (social media)
- 2023 I Heart Estuaries (social media)

Communications and Engagement

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. Develop targeted communications strategies and materials for specific initiatives such as SAV and incorporating DEI in social media.

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 update 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
FY2021-22 Cost:	Staff Time; cost for printed materials to be determined
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. Overall capacity for these efforts has been reduced with the return of the Communications and Outreach Specialist to graduate school in 2020 and lack of a full-time person in the position.

- 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.

- Print communications materials were updated in 2020; printing has been on hold due to restrictions on in-person events due to COVID.
- A targeted communications strategy for SAV was developed in 2020-2021.
    - In February 2021, a high-salinity SAV extent metric report was released.
    - Summer intern Abby McNaughton created infographics (one for the public, one for local governments) and a webpage to assist with communications regarding the SAV economic valuation report.
- APNEP has hosted a Science Communications and Outreach intern through the Department of Administration State of NC Internship since 2018. Past interns have developed storymaps, GIS-based project maps for our website, analysis of communication and outreach strategies for aquatic invasive and nuisance species, strategies for SAV, and recommendations for Diversity, Equity, Justice, and Inclusion into the Partnership's outreach activities.

FY2022-2023 Plans:

- APNEP will continue to improve and maintain its new website, including its GIS map of past projects. Social media platforms, e-newsletter, and other digital products will be updated on an ongoing basis pending staff capacity due to vacancies and changes to position descriptions.
- An intern will be hired for Summer 2022 to assist with communications and outreach. Specific projects and workplan will be developed in partnership with the selected intern.
- Update Engagement Strategy for the Partnership in-line with the planned CCMP amendment and DEI recommendations.
- Develop a communications workplan pending capacity if vacant positions are filled.

Continuation of Long-Term Watershed Engagement Projects

APNEP continued long-term support and funding for education and engagement projects "Shad in the Classroom" and the "Summer Teacher Institute" through summer 2021 and initiated a new open request for proposal (RFP) process to fund targeted outreach and engagement initiatives in 2022. These long-term projects are described below with closeout information noting that both projects demonstrating that funds will be discontinued and posted to the new RFP process. Since Shad in the Classroom was chosen again under the new process the detail is included in the 2021 section, along with specific plans for FY22-23 under the new RFP.

Summer Teacher Institute (2021)

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. The project was discontinued following summer 2021 as funds were posted to an RFP for new education and engagement activities.

Year(s):	2004 – 2021 Complete
Partners:	UNC Institute for the Environment (Lead), NC Museum of Natural Sciences, North Carolina Coastal Federation, EPA, NCSG, NC Aquariums
Outputs/Deliverables:	Approximately 25 teachers trained in hands-on, outdoor environmental education, water quality, and watershed curricula.
Outcomes:	Increased use of environmental education curricula in North Carolina schools.
FY2021-22 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:

In summer 2021, APNEP continued its long-term support for the Summer Teacher Institute, a multi-day environmental education professional development opportunity for the region's educators led by the UNC-Institute for the Environment. The program has reached approximately 25 teachers annually since its inception in 2004. The institute was held in person. Learn more.

FY2022-2023 Plans:

Project to be discontinued and funds posted to RFP.

Shad in the Classroom (2021)

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 NC Wildlife Resource Commission's goals for

restoring American shad populations in these river basins. The collaborative project provides students with an understanding of the scientific process, an inspiration for careers in science, and a desire to protect our waterways.

Year(s):	2011-2021 Complete
Partners:	NC Museum of Natural Sciences (Lead), US Fish and Wildlife Service, NC Wildlife Resources Commission, NCSU, ECU
Outputs/Deliverables:	American shad fry released into the Neuse River in conjunction with USFWS and NCWRC restoration efforts, ~30 educators/year trained on rearing and releasing American shad, 1000+ students participating/year.
Outcomes:	Increased community involvement in water quality and habitat protection.
FY2021-22 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 NC 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.

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

Milestones:

- January-March 2021: Applications reviewed, teachers selected, supplies purchased, teacher training session scheduled and facilitated, shad weeks scheduled with USFWS, NC 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 submitted

FY2022-2023 Plans:

The project will be continued under a new contract using funds posted to the RFP. See more information under the 2022 project about FY22-23 plans below.

Engagement and Stewardship 2021 Request for Proposals

With input from its Engagement and Stewardship Action Team, APNEP released an RFP during summer 2021 and received 10 proposals. An independent review committee of environmental education and outreach professionals selected the following two projects through a competitive evaluation and ranking process: Following the River: An Exploration of the Virginia Southern Watersheds/Pasquotank River Basin and Shad in the Classroom.

Following the River: An Exploration of the Virginia Southern Watersheds/ Pasquotank River Basin (Year I)

Objectives: Engaging teachers in the Virginia Southern Watershed to incorporate APES- specific curriculum into annual student lesson plans.

Description: Lynhaven River Now (LRNow) will create a resource guide and lesson plans for educators in southeastern Virginia and northeastern NC to increase knowledge about the unique history and natural resources of the region and connections of the shared waterways between the two states. There is a lack of resources geared towards the "Southern Watersheds" in Virginia Beach and the Pasquotank River Basin in NC, and Virginia educators are often unaware that their waterways drain into Albemarle Sound and not the Chesapeake Bay. The project will increase knowledge of the connections to APES and the shared waterways between the two states. The program will also consist of two unique, immersive teacher training experiences in the southern watersheds of Virginia Beach that flow into NC's Pasquotank River Basin and the Albemarle Sound.

The first training will take a cohort of five 9-12th grade teachers on a five- to six-day (dependent on weather and tides) sail throughout the entire watershed to learn all about the habitats, history, economics, land use, and problems that this watershed faces. As they follow the river, teachers will become more familiar with the rich resources that are in NC and form relationships that might lead to Zoom talks, internships, and data collection projects for the students.

The second training will be a two-day workshop for five more 9th-12th grade teachers to learn about the history and natural history of the North Landing River and Back Bay sub-watersheds. This group of teachers will be learning about the unique habitats found in this region—the North Landing River is considered to be the most biodiverse area in Virginia east of the Blue Ridge Mountains.

After the trainings, both groups will join at False Cape State Park and Back Bay NWR to create a resource guide and lesson plans for Virginia and NC educators on the Virginia Southern Watersheds/Pasquotank River Basin.
The goal is to create materials about the upper part of the watershed in Virginia that would be available online for both NC and Virginia Beach teachers. The team also hopes to expand the NC

Pasquotank River Basin booklet to include maps and information about the Virginia portion of this river basin.

Year(s):	2021-22 (Year 1)
Partners:	Lynnhaven River NOW, US Fish and Wildlife Back Bay, Weasel Creek Watershed Expeditions, VA Department of Conservation and Recreation
Outputs/Deliverables:	Two unique immersive teacher trainings. Create a resource guide and lesson plans about the upper part of the watershed in Virginia that would be available online for both NC and Virginia Beach teachers. Expand upon existing NC Pasquotank River Basin booklets to include maps and information about the Virginia portion of this river basin.
Outcomes:	Increased awareness and understanding of Virginia's connection to APES.
FY2021-22 Cost:	$ 20,000
FY2022-23 Cost:	$ 20,000
Estimated Leverage:	$ 27,970
CCMP Actions:	D1.1, D2.1, D2.2
CCMP Outcomes:	1a, 1b, 1d, 2a, 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:

Lynhaven River Now has recruited teachers, scheduled trips, and developed itineraries for both training experiences. Working through APNEP staff and partners, they have established a network in NC and will be stopping to meet with experts and visit sites such as museums, nature areas, and historic sites along the way. A pre-sail workshop was held April 2022 for teachers to learn about the boat, basics of sailing and an overview of the watershed. APNEP staff and partners participated.

Milestones:

- April 2022: Virtual pre-sail workshop held with first co-hort of teachers.
- June 2022: Sailing trip throughout the Albemarle-Pamlico watershed.
- July 2022: Workshop at False Cape State Parks / Back Bay NWR.

FY2022-2023 Plans:

Plans for Year II will be initiated in Fall 2022 after evaluations and reporting is complete for Year 1

Shad in the Classroom (Year I)

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

Year(s):	2021-22 (Year 1)
Partners:	NC Museum of Natural Sciences (Lead), US Fish and Wildlife Service, NC Wildlife Resources Commission, NCSU, ECU
Outputs/Deliverables:	American shad fry released into the Neuse River in conjunction with USFWS and NCWRC restoration efforts, ~30 educators/year trained on rearing and releasing American shad, 1000+ students participating/year.
Outcomes:	Increased community involvement in water quality and habitat protection.
FY2021-22 Cost:	$ 20,000
FY2022-23 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

Milestones:

- January-March 2022: Applications reviewed, teachers selected, supplies purchased, teacher training session scheduled and facilitated, shad weeks scheduled with USFWS, NC WRC, classrooms, and extension educational activities coordinated.
- April-May 2022: Shad delivered to classrooms, raised, and released. Extension education activities coordinated. Hatchery field trip for teachers.
- June 2022: Evaluations returned from classrooms and summary of program completed.
- It is anticipated that the final report will be submitted in September 2022.

FY2022-2023 Plans:

Plans for Year II will be initiated in Fall 2022 after evaluations and reporting is complete for Year 1.

Virginia-North Carolina Memorandum of Understanding Implementation

Objectives: Facilitate and strengthen partnerships between NC 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 APNEP, six environmental and natural resources agencies from NC and Virginia signed a 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 climate resilience, nonpoint source pollution, restoring fish passage and spawning habitat, and controlling invasive species. Agencies included: NC-DEQ, 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.

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 NC 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. 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 was circulated to the

agency designees in summer 2021. The designees agreed upon climate resilience as an overarching theme for MOU implementation, with an initial focus on working together in the Chowan River Basin.

Progress was 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 was developed by the designees and sent for 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.

Progress on the Governor's agreement and MOU implementation has stalled pending changes in agency leadership with the incoming Virginia administration. Staff have developed a transition document to brief the new agency heads once they have all been appointed. A final recommendation regarding interstate joint-management strategies will be delivered to the signatories in 2022.

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.
- **Coordination with Congresswoman Luria:** APNEP has been participating in an Albemarle-Pamlico Roundtable hosted by Virginia Representative Luria since March 2021 to foster federal support and resources for the shared waterways. The Roundtable primarily includes members of Virginia based organizations including Back Bay Restoration Foundation, Wetlands Watch, the Virginia Chapter of The Nature Conservancy, and Lynhaven River Now but also includes other Congressional members and staff from the APNEP region including Representatives Murphy and McEachin. Other participating agencies and organizations include Back Bay and Dismal Swamp National Wildlife Refuges, Virginia Cooperative Extension, USACE. Staff have worked to connect other regional partners to the roundtable including NC Wildlife Refuge staff, Audubon, and others.
- **Grant Coordination:** APNEP was invited to collaborate on a NFWF proposal with VIMS and Virginia Dept of Wildlife Resources. Staff continue to seek opportunities to collaborate with regional partners to submit grants that further MOU implementation and write support letters when requested.

FY2022-2023 Plans:

- Maintain momentum on the MOU despite changes in administration. Work with co-lead from VA NHP to ensure the incoming leadership is briefed on the MOU.
- Deliver transition document to designees for review in 2022.
- Tribal Community Resilience: the second phase of the project funded by APNEP will focus on engaging with tribes in the shared waterways in the Chowan and Pasquotank basins.
- Currituck Sound Coalition: APNEP will assist coalition members with outreach to Virginia partners to implement the Marsh Conservation Plan.
- Finalize report required by MOU in 2022.

Integrated Monitoring Plan & Ecosystem Indicator Development

Objectives: Facilitate the development and implementation of an integrated monitoring network (ecosystem observatory) 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 (MATs), 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 for monitoring plan implementation.

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 APES, detection of environmental changes in support of CCMP implementation.
FY2021-23Cost:	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:

By the start of 2019, each MAT 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 STAC, staff and SAV Team monitoring leaders 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 in March 2021. During the current evaluation period, other MATs are using the SAV monitoring plan as a model to develop monitoring plans for their ecosystem component, with the highest priority of staff in 2022 being a monitoring plan for estuarine waters.

FY2022-2023 Plans:

In addition to refining the initial SAV and Water Resources monitoring plans, staff will continue to engage with members on the respective MATs to generate initial monitoring plans for the five remaining ecosystem components: Air Resources, Aquatic Fauna, Human Dimensions, Terrestrial Resources, and Wetland Resources.

Milestones:

- SAV Monitoring Plan 1.0 (March 2021)
- Water Resources Monitoring Plan 1.0 (Summer 2022)

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.
FY2021-23Cost:	$ 12,007 (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:

This is a continuation of 26 APNEP swimming sites will be sampled 19 times throughout the year totaling 494 samples with bacteriological results posted immediately to the NC Recreational Water Quality website.

Three APNEP sites will be sampled 31 times throughout the year totaling 93 samples with bacteriological results posted immediately to the website.

o date a total of 3,579 samples have been analyzed in order to inform the citizens of North Carolina about the *Enterococci* levels throughout the Albemarle Pamlico Watershed.

FY2022-2023 Plans:

NC-DMF will continue routine water quality monitoring within APES though the summer season. APNEP work to with NC-DEQ and others to find funds to continue support of NC-DMF's Recreational Water Quality Monitoring Program. Staff anticipates that this program will be addressed in the upcoming APNEP monitoring plan for estuarine waters.

Coastal Submerged Aquatic Vegetation Monitoring and Mapping

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, NC Department of Transportation, NC-DWR, UNC-Wilmington, UNC-Chapel Hill, 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
FY2022-23Cost:	$ 16,000
Estimated Leverage:	$27,000
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 SAV and trends in overall extent and spatial cover classes. Monitoring coastal 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 spring 2022 a high-salinity SAV map based on 2019-2020 aerial surveys, a substantial decrease in process time between data acquisition and map publication.

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.

A significant milestone was achieved in 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.

FY2022-2023 Plans:

Estimated Cost: $16,000 with additional funds provided by NC-DEQ pending.
The overall project includes the following: A bi-seasonal Tier 1 high-salinity survey, 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 spring 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.
- Planned enhancement of the SAV monitoring plan based on knowledge gained during the 2021 and 2022 field seasons.
- Building on the SAV monitoring plan, 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 Core Sound 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 NC 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):	2018-2021 - Complete
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.

- 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/
- Swim Guide Map and Stations

Supplemental Projects (Non-320 Funds)

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

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 NC.

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 NC 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 NC and Virginia data sources; workshops and meetings with partners in NC. Report and template resilience database/toolbox for local governments. Factsheets on CHPP habitats.
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 Addressed:	(4) addressing diffuse, nonpoint sources of pollution, (6) protecting coastal waters through the National Estuary Program
EPA Element(s):	Direct Assistance, Healthy Communities

Progress to Date:

In 2021, the project team completed the analysis and map viewer which is available on ADAPTVA. The project team conducted outreach with Virginia localities throughout 2021. APNEP staff conducted virtual meetings and other outreach opportunities to solicit feedback from NC agency personnel and other partners throughout 2020-21 and participated in outreach events led by the project team. APNEP contracted with Wetlands Watch in to compare the Virginia based tool with

those that exist in North Carolina. They are also conducting a needs assessment and outlining resources that North Carolina local government staff can use to compare tools and the types of NNBFs that can meet their needs (which also helps further implementation of actions in the NC Risk and Resilience Plan and Natural and Working Lands Plan related to developing interstate toolboxes and resources for local government). Outreach with NC partners for this portion of the project began summer 2021 is expected to be completed late 2022. The scope of this effort is generally focused on our shared waterways with Virginia, and results will be included in future reporting done for the MOU and to NC-DEQ and NCORR regarding EO80 implementation. APNEP is participating on a statewide Resilience Toolbox Committee and will be providing the results of the project to the group for consideration. Deliverables from the project also include fact sheets on CHPP habitats.

FY2022-23 Plans:

Milestones:

- Finalize contract with Wetlands Watch spring 2022.
- Complete outreach with NC partners in 2022.
- Report and deliverables expected late 2022 or early 2023.

Water Level Monitoring Stations

Objectives: Placing additional water-level monitoring stations within APES.
Description: Each station is equipped with meteorological monitoring equipment and maintained by NC 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, NC Department of Emergency Management, NC 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 NC-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:

In 2021, APNEP contracted with NC Department of Emergency Management to install additional water- level monitoring stations in the Albemarle-Pamlico region's coastal plain in Newport, Carteret County, Slocum Creek near Havelock, Craven County. 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.

Staff anticipates that this program will be addressed in the upcoming APNEP monitoring plan for estuarine waters.

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. APNEP under cooperative agreement with NC 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:	NC 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 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 NC Department of Transportation acquired aerial imagery submerged aquatic vegetation. APNEP and NC-DMF will provide the photo interpretation.

Status:	In progress
Partners:	NC 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
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, but APNEP contracted additional expertise to finish the interpretation required. The 2020 SAV mapping layer is expected to be published in May 2022.

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 NC 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 NC Division of State Parks and USFWS 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 and a contract is currently being developed with the Albemarle Commission who will serve as the grant administrator. 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, NC Department of Agriculture and Consumer Services, Washington County, NC Division of State Parks, USFWS, NC 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 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 (Awarded 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

Progress to Date

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. A contract is currently being developed with the Albemarle Commission who will serve as the grant administrator. APNEP continues to work with these local governments who have requested assistance with technical and grant administrative capacity to address flooding and resilience planning. APNEP has developed a Memorandum of Agreement to outline its roles and responsibilities as a project partner and has been working to secure match commitments from project partners and identify potential technical that have the capacity to conduct the water budget and modeling work.

Administration and Program Implementation

Programmatic 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 APES. 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

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

Administrative Costs

Overall administration costs under the federal grant during FY2021-22 are estimated at approximately $585,955 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. APNEP maintain two boats. Operational costs and maintenance is covered under projects where the vessel is used. Maintenance costs are associated with supplies.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 EPA, indirect rate is 10.2% of all salaries supported by this federal grant (May 2021). Estimated indirect costs will be $41,045 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 NC-DEQ Headquarters. This site houses the Director, Program Scientist, Program Manager, Project Manager, Policy and Engagement Manager, Quantitative Ecologist, and Program Associate. The APNEP field office in Washington, NC houses the Coastal Habitats Coordinator. 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 NC 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 implementation of APNEP's Engagement Strategy, 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.

Program Associate Specialist
This position assists in the implementation of the CCMP and mission. The position supports staff functions with various administrative, programmatic tasks, functions, and logistics. The position engages in field and boat-based work to enhance APNEP monitoring and research efforts. The position is also responsible for maintenance of the website and social media platforms. The position is currently vacant and anticipated to be filled in the next month.

Quantitative Ecologist
The Quantitative Ecologist provides support for the development and implementation of science-based management across all ecosystems with the Albemarle-Pamlico watershed and building linkages across APNEP's conservation strategies. The position 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, development of research for application of funds to fill data needs, 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 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 NC 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.*

Project 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 also works towards implementation of the CHPP with the APNEP Coastal Habitats Coordinator. The position is currently vacant and anticipated to be filled in the next month. *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 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.

- 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 EPA §320 funds for travel, NEPs should use the least expensive means of travel whenever possible.
- EPA §320 and matching funds <u>are not</u> 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, MAT, 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 MAT 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 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.

2021-22 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	10/1/21 to 9/ 30/22	Routine Program Activities/ meetings/ projects/ workshops/ conferences/ fieldwork/ MC meetings	APNEP area	4,000
			Total*	$ 4,000

2022-23 Projected Travel

All travel is allocated into three categories: In-State, Out-of-State, and 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., council 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.

2022-23 Projected Travel (320 Funds)

Personnel	Date	Purpose	Location	Estimated Cost
APNEP Staff, Management Conference, and Volunteers	10/2022 – 9/2023	Normal program activities	Albemarle-Pamlico region	$6,000
APNEP Staff	10/2022 – 12/2023	EPA/NEP National Fall Meeting	TBA	$2,000
APNEP Staff	1/2023 – 7/2023	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)	$ 195,618
Water Quality Improvement Project(s) Expenditures:	$ 504,382
TOTAL:	**$ 700,000**

1) **In-kind Services**: NC-DEQ intends to provide $ 195,618 as part of the required 1:1 non-federal match for federal fiscal year October 1, 2022 to September 30, 2023. 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 $ 504,382 as part of the 1:1 non-federal match for federal fiscal year October 1, 2022 to September 30, 2023. 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 NC Division of Water Infrastructure.

Division of Water Infrastructure

The NC 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 and supportive funding sources for 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 NC conservation-funding sources were developed in response to research funded by the Albemarle-Pamlico Estuarine Study, such as the NC Clean Water Management Trust Fund.

2021-22

During the 2021 federal fiscal year (October 1, 2021 - September 30, 2022), APNEP continued to seek partners and additional opportunities for partners in targeting actions and funds towards CCMP implementation. APNEP submitted its leverage results in September 2021 to the EPA *NEPORT* database: total leverage was $1,454 for every dollar provided by the EPA §320 grant, with $ 1,017,780,131 of that tied to APNEP efforts with partners (primary and significant, based on data from *NEPORT accessed* on May 12, 2022).

2022-23

In 2022-23, 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 work to maintain our goal of a minimum of 8:1 leverage for the coming year.

Core Partnership Entities

Host

The main APNEP office is located within the NC-DEQ Office of Secretary in Raleigh, NC, with additional personnel in Washington. In the past, the Virginia Department of Environmental Quality provided support through a position to working with APNEP, but the position has either been vacant, or staff directed to focus on other priorities (namely Chesapeake Bay) for several years. However, staff from the Virginia Department of Conservation and Recreation Natural Heritage

Program have been functionally serving in this role and assisting with implementation support for the VA-NC Memorandum of Understanding.

Management Conference

Leadership Council

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

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.

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 MATs whose missions each addressed a major sub-system of the Albemarle-Pamlico regional ecosystem. For FY22-23 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.

Contracts and Grants Summary Table Completed

Projects

Activity Category	CCMP Actions Addressed	Program Title	320 Funds	Match Funds	Total
Engagement	D2.1, D2.2, D2.3	2021 Shad in the Classroom	$20,000	$11,000	$31,000
Engagement	D2.1, D2.2, D2.3	2021 Summer Teacher Institute	$20,000	$11,000	$31,000
Outreach	A2.1, B2.6, D1.3	Aquatic Invasive Species Communication & Outreach Strategy Development	$2,000	N/A	$2,000
Protect & Restore	B2.2, C3.3	SAV Economic Analysis	$68,193	$0	$68,193
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-*a* 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-NC Sea Grant Joint Graduate Fellowship in Estuarine Research	$5, 000	$5,000	$10,000
Protect & Restore	A2.1, B2.6, C3.1, D1.3	NC 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, 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	NC Coastal Habitat Protection Plan Implementation Support	$0	$24,000	24,000
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
Engage	All	APNEP Action Team Facilitation	$0	$12,000	$12,000
Engage	All	Event Participation & Sponsorship	$2,000	$30,000	$38,500
Engage	All	Public Outreach & Print Media	$0	$300	$300
Engage	D1.1, D2.1, D2.2	Following the River: An Exploration of the Virginia Southern Watersheds/Pasquotank River Basin	$20,000	$27, 970	$47,970
Engage	1a, 1b, 1d, 2a, 2c, 3b	Shad in the Classroom	$20,000	$11,000	$31,000
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	$12,007	$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: CCMP Goals & 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: 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: 2021-22 Approved Grant Budget

For the time frame of October 1, 2021 to September 30, 2022, APNEP anticipates receiving a grant award of $700,000 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	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**

***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.*