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Chapter 6 Water Quality Initiatives and Funding

The future of our rivers, streams, wetlands and estuaries are closely linked to land use decisions made on both a public and private scale with private landowners playing a major role in protecting waters of the state through conservation and various land use management practices. This chapter explores various options for protecting natural resources and includes general information as it relates to local, regional and state initiatives along with planning resources and funding opportunities.

6.1 Local and Regional Initiatives

Working at the local level, local organizations and agencies can combine professional expertise in a watershed. Involving a wide array of people in water resource projects brings together a wide range of knowledge and interests and encourages others to become involved and invested in protecting water resources in their own backyard. Local initiatives are essential because people within the immediate area can make decisions that affect change in their own community. It also encourages the community to understand holistically the challenges and opportunities for protecting these resources. Working in coordination across jurisdictional and agency lines can also open the door for more funding opportunities. More diversified funding allows local entities to do more work and be involved in more activities.

The collaboration of local efforts is key to water quality improvements and there are good examples of local agencies and groups using these cooperative strategies throughout the state to protect natural resources. The Division of Water Resources' (DWR) Basin Planning Branch (BPB) applauds and supports the foresight and proactive response of local watershed groups and local governments to protect and manage water resources.

6.1.1 Albemarle Resource Conservation & Development Council, Inc. (ARCD)

The Albemarle Resource Conservation & Development Council, Inc. (ARCD) has collaborated for many years with local governments, universities, and private landowners to construct stormwater wetlands to improve water management and protect water quality throughout the Albemarle region. ARCD's mission is to "conserve natural resources and create opportunities for positive economic and community development, thereby enhancing the quality of life in Camden, Chowan, Currituck, Dare, Gates, Hyde, Pasquotank, Perquimans, Tyrrell and Washington counties" (ARCD, n.d.-a).

For more than 40 years, ARCD and Soil and Water Conservation Districts (SWCDs) have collaborated on projects to improve drainage and protect water quality. The Albemarle region is unique in that in addition to each county having a SWCD office, it has the Albemarle SWCD. The Albemarle SWCD is the only multi-county SWCD in the state and consists of the SWCDs from Camden, Chowan, Currituck, Pasquotank and Perquimans counties. Collectively, the SWCDs work to "protect and preserve the region's natural resources through conservation minded practices and environmental education" (Albemarle SWCD, n.d.). Examples of projects in the Albemarle region include:

- Living Shorelines: In 2008, ARCD collaborated with the Perquimans SWCD, the Natural Resource Conservation Service (NRCS) and Perquimans County to construct approximately 1,000 linear feet

of living shoreline at the Perquimans County Community Center on the Perquimans River in the Pasquotank River basin. The shoreline was severely damage by Hurricane Isabel and compounded by several additional storm events after Hurricane Isabel. The design was based on a shoreline demonstration project on the adjacent Newbold White House property, which tested three stabilization methods. Rock sills was the only method that could withstand storm events along the shoreline (ARCD, n.d.-c).

- Restoration Planning and Project Implementation: Since 2015, the ARCD and SWCDs has been following a 9-element watershed restoration plan to improve water quality in the Little River watershed, also in the Pasquotank River basin. It includes an eight-mile stretch of the Little River that has been listed as impaired for chlorophyll-*a* (ARCD, n.d.-b).
- Citizen Science Water Quality Data Collection: Currently, ARCD is collaborating with the Albemarle Commission Council of Government (COG), SWCDs, and several other partners on a regional approach to water management and water quality protection. Citizen scientists are collecting water samples from key locations in the Chowan and Pasquotank River basins with a focus on determining the cause of algal blooms. With the samples being collected, ARCD is continuously working with researchers to quantitatively assess the relative importance of potential nutrient sources and evaluate the likelihood of increases from each source in contributing nutrients to the recurring algal blooms. The current study is also evaluating trends in the trophic status of the Chowan River and Albemarle Sound. This regional effort is partly funded by a grant from the Clean Water Management Trust Fund (CWMTF). Results and written reports are available on the ARCD website.
- Resolution to Strengthen Critical Drainage and Water Quality Infrastructure: Eight county boards of commissions around the Albemarle Sound and the Albemarle SWCD have adopted and sent to legislators a resolution to strengthen critical drainage and water quality infrastructure in the region. The resolution calls on state leaders to increase financial assistance to help manage and protect drainage systems and water quality due to more frequent and stronger storm and flooding events. The resolution also calls for financial incentives to encourage owners of swamp forests to conserve a minimum 100-foot buffer along creeks and rivers to protect drainage systems and water quality. In addition, it includes a request to support additional monitoring in the region to help identify potential sources of nutrients and sediment entering the waterways and contributing to the resurgence of algal blooms.

More information about the resolution, as well as other projects underway to help combat water resource issues in the region, can be found on ARCD's "Fighting Algal Blooms" webpage.

6.1.2 Chowan-Edenton Environmental Group (CEEG)

The Chowan-Edenton Environmental Group (CEEG) is a local non-profit group of citizens working together to address environmental matters and to educate residents of Chowan County on how to be good stewards of the Earth. The CEEG's mission since 2007 is to encourage discussion related to community and regional environmental issues, to provide expertise and current research pertaining to critical environmental concerns, and to support actions that serve to reduce or correct local environmental problems. In 2014, the CEEG partnered with NC Sea Grant to collect information about the presence of hydrilla (*Hydrilla verticillata*), an invasive aquatic plant, in the Chowan River. As a result, CEEG developed the Hydrilla Citizen Science Project, a model project that can be replicated by other rural counties bordering North Carolina's sounds and rivers. The CEEG is currently volunteering their time with the ARCD

to collect samples in the Chowan and Pasquotank river basins to identify areas of excessive nutrients. Volunteers are collecting weekly samples from Arrowhead Beach, the Chowan River Bridge, Edenton Town Dock, and the fish and wildlife dock near Edenton Airport to send to NOAA Phytoplankton Monitoring Network (PMN). Digital micrographs as well as water samples (when the blooms are extreme) are sent for analysis.

The CEEG also works with the North Carolina NOAA lab at Morehead City to send tissue and water samples for analysis, as well as chlorophyll-a filters from the sampling points listed above. In 2019, the CEEG, along with university and local partners, were awarded two Community Collaboration Research Grants (CCRG) in 2019. "Using Citizen Science to Understand Nutrient Limitation of Algal Blooms on the Chowan River: Filling Critical Data Gaps and Promoting Community Engagement" is responding to community questions about the resurgence of blue-green algal blooms in the Chowan River. The project aims to use citizen science, as well as samples collected by universities, to determine the nutrient status of the cyanobacteria blooms in Edenton Bay. Partners include University of North Carolina (UNC) – Chapel Hill, UNC Institute of Marine Sciences, CEEG, APNEP, the Town of Edenton and North Carolina State University (NCSU). The "Food Web Transfer of Cyanobacterial Toxins in the Chowan River and Western Albemarle Sound" will examine cyanotoxin accumulation within common fish and shellfish in the Chowan River. Findings will help determine if there is a risk to toxin exposure for people who consume seafood from the Chowan River. Partners include NCSU, NC Department of Environmental Quality (DEQ), North Carolina Sea Grant and CEEG. More information about the CCRG is available online. More information about the results can be found on North Carolina Sea Grant's website.

In the summer of 2020, the CEEG partnered with researchers from the Paerl Lab at UNC-IMS on an APNEP and NC Sea Grant funded project to examine the extent of aerosol toxins present when cyanobacteria blooms occurred in local waters. The CEEG works collaboratively with citizen groups in Perquimans and Pasquotank counties to provide citizen science training and research opportunities, as well as planning and promoting local environmental awareness events. We actively encourage other local counties to establish citizen monitoring groups.

6.1.3 Green $aves Green

Green $aves Green is a non-partisan, non-profit, all-volunteer, local environmental action group. It believes that the Albemarle Region is uniquely positioned to be the model "Green Region" of the state. Its projects are designed to build community support for renewable energy, conservation, and environmental protection. Green $aves Green is currently collaborating with the ARCD to monitor water quality in the region.

6.1.4 Councils of Governments (COG)

Regional councils of governments (COG) are multi-county planning and development agencies serving different areas of the state. Membership in these councils is voluntary. In North Carolina, 17 councils serve regions that share similar economic, physical and social characteristics. Their function is to aid, assist and improve the capabilities of local governments in administration, planning, fiscal management and development.

Three COGs serve counties in the Chowan River basin. The Upper Coastal Plain COG (Region L) serves Edgecombe, Halifax, Nash, Northampton, and Wilson counties; the Albemarle Commission (Region R) serves Camden, Chowan, Currituck, Dare, Gates, Hyde, Pasquotank, Perquimans, Tyrrell and Washington

counties; and the Mid-East Commission (Region Q) serves Bertie, Beaufort, Hertford, Martin and Pitt counties. The Albemarle Commission partnered with the ARCD in 2015 to develop a 9-element watershed restoration plan for the Little River watershed using fund available through the US Environmental Agency's (EPA) Clean Water Act (CWA) Section 205(j) grant. More information about the COGs serving counties in the Chowan River basin can be found on either the North Carolina Association of Regional Councils of Governments (NCARCOG) website or on each COGs respective website.

6.1.5 Albemarle-Pamlico National Estuary Partnership (APNEP)

The Albemarle-Pamlico National Estuary Partnership (APNEP) works collaboratively to identify, protect, and restore the significant resources of the Albemarle-Pamlico estuarine system. Covering 23,803 square miles, the APNEP management region is the largest in the National Estuary Program. The watershed contains six major river basins draining from 43 counties in North Carolina and 38 counties in Virginia.

APNEP works with multiple partners to understand water resource concerns in the region and participates on outreach efforts to educate local leaders and the general public about coastal watershed and estuarine issues. APNEP's efforts are guided by its Comprehensive Conservation and Management Plan (CCMP), developed in collaboration with regional partners and stakeholders. The CCMP directs APNEP to accomplish 58 targeted "actions" that cover topics such as outdoor education, water quality, invasive species, oysters, habitat restoration, and water flow. APNEP's current CCMP was published in 2012 and is scheduled to be revised in 2022.

APNEP has supported or assisted with many of the initiatives mentioned in this chapter, providing resources towards:

- Monitoring: With the input of its Science and Technical Advisory Committee (STAC), APNEP plans to complete development of an initial Monitoring Plan in 2020, as well as identify high-priority ecosystem indicators and report on their status in the Albemarle-Pamlico region. Once the plan is adopted, APNEP will work with partners to identify ways to continue and support actions to protect and restore water resources in the Chowan basin.
- Algal Bloom Outreach and Research: APNEP has partnered with many of the organizations listed in this chapter, providing resources and financial support for projects, ranging from purchasing rapid response test kits to test for algal blooms to signs for public outreach in areas experiencing algal blooms.
- Research Study to Develop Chlorophyll-*a* Standards to Protect Submerged Aquatic Vegetation (SAV): APNEP is funding a project through the UNC Institute for Marine Sciences to develop recommendations for scientifically defensible chlorophyll-*a* standards that are protective of SAV in high- and low-salinity zones of the Albemarle-Pamlico Sound Estuarine System.
- SAV Monitoring: APNEP has facilitated an SAV Team since the early 2000's to coordinate monitoring, mapping, and outreach efforts. The team established sentinel sites in the Chowan River basin that were surveyed from 2016-2019 utilizing grant funds. Currently, there are no long-term commitments from a partner to continue monitoring efforts.
- APNEP/NC Sea Grant Graduate Fellow in Estuarine Research: A graduate fellow began studying multiple issues related to cyanobacteria toxins in the Chowan River and Albemarle Sound in September 2019. A report is anticipated in 2021.

During the summer of 2015, APNEP participated in the US Environmental Protection Agency's (EPA) National Coastal Condition Assessment (NCCA), a nationwide estuarine monitoring program to assess the health of the nation's estuarine systems.

In November 2017, a Memorandum of Understanding (MOU) between the NC Department of Environmental Quality (DEQ), NC Department of Natural and Cultural Resources (DNCR), and the Virginia Secretary of Natural Resources was signed to renew the shared commitment to collaboratively address environmental issues in the shared river basins between the two states. The MOU specifically calls for tackling regional issues such as nonpoint source pollution, restoring fish passage and spawning habitat, controlling invasive species, and incorporating climate change and sea level rise into local planning processes. APNEP and partners have been actively working to revitalize efforts in Virginia, with current emphasis in the following areas in the Chowan River basin:

- Data Sharing: APNEP, DWR, and staff who participate in the Watershed Restoration Improvement Team (WRIT), an interagency team working to protect and improve water resources, continually coordinate to identify opportunities to implement the MOU, with discussions largely being focused initially on sharing information and data across state lines. APNEP facilitated connections between basin planners and local partners with staff from the Virginia Department of Environmental Quality (VADEQ) to share data for the basin plan and the CWMTF project and continues to work together with DWR to identify opportunities to improve data and information sharing in the shared waterways.
- Healthy Waters Initiative: APNEP is working with the Virginia DNCR Natural Heritage Program and other partners to explore opportunities to implement the Chowan Healthy Watersheds Plan and protect conservation land in the Virginia's southern watersheds. APNEP staff have also continued to attempt to engage with partners to support and reinitiate the Albemarle Chowan Watershed Roundtable (inactive since 2017) with limited success. A champion in Virginia will be needed to reboot this effort, coordinate, and administer VA based roundtable funding (available through VADEQ's 319 Nonpoint Source Program) for the southern watersheds.

6.1.6 Coastal Habitat Protection Plan (CHPP)

The North Carolina Coastal Habitat Protection Plan (CHPP) is the result of North Carolina's Fisheries Reform Act (FRA) passed by the General Assembly in 1997. The CHPP is a guidance document that addresses habitat and water quality efforts needed to protect, enhance and restore fish habitat along North Carolina's coasts and aligns closely with APNEP's CCMP. Several agencies within DEQ have jurisdiction over marine fisheries, water quality and coastal management. Representatives from these agencies, along with several agencies outside DEQ, develop and implement the CHPP. The Division of Marine Fisheries (DMF), however, is the lead agency.

There are four major goals with multiple recommendations under each to achieve the overarching goal of long-term improvement of coastal fisheries through habitat protection and enhancement efforts. To implement recommendations in CHPP, the CHPP team develops specific actions in a separate implementation plan. The most recent implementation was developed for 2018-2020. DWR has participated in several of the recommendations identified in the CHPP (Table 6-1).

Table 6-1 Implementation of Recommendations Identified in the 2018-2020 CHPP Implementation Plan

RECOMMENDATION: Provide information to focus students in K-12 understanding of biodiversity in lakes, streams, and estuaries.
ACTIONS: ▪ Project WET* ▪ It's Our Water* ▪ NC Stream Watch* ▪ Watershed Wisdom* **More information and interactive links to these programs can be found in the Statewide Initiatives section of this Chapter.*
RECOMMENDATION: Assess invasive submerged aquatic vegetation (SAV) in the APNEP region annually and continue to coordinate invasive SAV treatment with DMF and APNEP.
ACTIONS: ▪ The DWR Aquatic Weed Control Program (AWCP) maintains a database serving as an archive of management activities. The database contains a query tool to allow users to access data by searching by project name. The AWCP database can be accessed here. Full list of plants designated by DEQ as noxious aquatic weeds can be found here.
RECOMMENDATION: DWR and the Division of Mitigation Services (DMS) will support and pursue aquatic passage barrier removal policies and projects where appropriate.
ACTIONS: ▪ DWR and DMS support and participate in the NC Aquatic Connectivity Team, the lead organization for aquatic passage improvements in NC. The DWR grant program managers (Section 319 & Water Resources Development Program) and the 401 Permitting Unit provide information to the NC Aquatic Connectivity Team about aquatic barrier removal projects. The Southeast Aquatic Resources Partnership (SARP) maintains a comprehensive list of known dam removal projects in North Carolina and throughout the Southeastern United States.

Currently the CHPP is being amended as called for in the FRA of 1997. The focus of the amendment will be on environmental rule compliance to: protect habitat; monitoring habitat to assess status and regulatory effectiveness; SAV protection and restoration, focusing on water quality improvements, wetland protection and enhancement using nature-based methods; and reducing inflow and infiltration associated with wastewater infrastructure to improve coastal water quality.

The goal is to have the amendment finalized and voted on by the three regulatory commissions (Marine Fisheries, Coastal Management, and Environmental Management) during the summer of 2021 for final adoption. Prior to the amendment being adopted, it will be reviewed by DEQ and a series of public hearings will be held. It is anticipated that no changes will be made to CHPP's source document. More information about CHPP and the implementation plans can be found on CHPP's website.

6.1.7 NC Coastal Land Trust

The North Carolina Coastal Land Trust is a non-profit organization formed in 1992 to help protect locally and regionally valuable natural areas. Since its inception, the Coastal Land Trust has protected over 40,000

acres of barrier island beaches, riparian corridors, and other special natural areas. In August 2017, the Coastal Land Trust purchased 1,000 acres in Bertie County along 3.5 miles of Salmon Creek that was recognized as ecologically significant by the North Carolina Natural Heritage Program (NHP). Before the Coastal Land Trust bought the land, it was permitted for multi-unit development and a marina. The land was given to the State of North Carolina in December 2018 to create the Salmon Creek State Natural Area. More information about the NC Coastal Land Trust can be found on their website.

6.2 Statewide Initiatives

In addition to local and regional projects and initiatives, there are several state and federal agencies that work statewide to protect and educate people about our natural resources. Examples of a few such initiatives are identified here.

6.2.1 Stream Watch

Stream Watch is housed within DWR, but it relies on information collected by citizens across the state. The program encourages neighbors, civic groups and businesses to adopt a local stream, keep an eye out for any problems that might occur, and work together to ensure that the stream is healthy and able to support wildlife habitat, recreation and other uses. For more information about Stream Watch and how to get involved, visit the Stream Watch website.

6.2.2 It's Our Water

It's Our Water is a complete curriculum divided into five modules. Each module begins with a short video that presents a water quality topic, reviews scientific principles, shows real-life examples of current water issues, and introduces students to various professions related to water. Classroom demonstrations, discussions, homework, quizzes, and hands-on activities reinforce major concepts and prepare students for field investigation. Students develop an understanding of how these water resource issues affect them directly by investigating the stream nearest their school. The skills and knowledge required in each module build on earlier modules. Students will work towards completing a final project that examines the status of the water quality in their stream and offers recommendations for managing the stream. More information about It's Our Water can be found here.

6.2.3 Project WET

Project WET aims to engage children, parents, teachers and members of the community in water resources education by advocating awareness of water and community involvement in water-related issues. This program achieves this by facilitating training workshops and community events that bring together science, social studies and health education topics. The end result of these community level engagement efforts is a connected network of citizens, professionals and scientists. More information on how to participate in Project WET can be found here.

6.2.4 Watershed Wisdom

Watershed Wisdom is a UNC-TV science-based curriculum, geared toward 4th and 5th grade but useable for all ages, that combines hands-on projects and interactive components to provide a robust blended lesson that introduces the value of water and maintaining healthy watershed ecosystems.
Watershed Wisdom was developed in partnership with North Carolina Sea Grant, Project Wet, North Carolina Watershed Stewardship Network (WSN), and North Carolina Resources Institute (PBS Learning Media and UNC TV, 2020).

6.3 Growth Management and Land-Use Planning

Growth management can be defined as the application of strategies and practices that help achieve sustainable urban development and redevelopment while also conserving environmental qualities and features. Growth management tools range from on-the-ground best management practices (BMPs), such as stormwater wetlands, living shorelines, cisterns and vegetated (riparian) buffers, to establishing water, wastewater and/or stormwater authorities.

Several resources are available for protecting and managing water resources and include information about how to incorporate management strategies into existing and new development or changes in land use. Some examples include:

Watershed Academy: The Watershed Academy is available online through EPA's website. Online training modules, webcasts and publications are available for review.

Center for Watershed Protection (CWP): The Center for Watershed Protection (CWP), also referred to as the Center, is a nonprofit organization dedicated to research and education on the impacts of land use on watersheds throughout the nation. Several articles, reports, etc., are available through an online watershed library (OWL).

Low Impact Development (LID) Center: The Low Impact Development (LID) Center is a nonprofit national research organization that focuses on sustainable stormwater management solutions. Several projects are available for review.

Stormwater Design Manual: The Stormwater Design Manual, developed by the North Carolina Division of Energy, Mineral and Land Resources (DEMLR), is a technical guidance document about implementing the rules pertaining to post-construction stormwater measures. The companion manual, Stormwater Control Measure (SCM) Credit Document, includes the state's estimation of each SCM's effectiveness in protecting hydrology and removing pollutants.

Green Growth Toolbox (GGT): The Green Growth Toolbox (GGT) is a technical assistance tool designed to help communities conserve high-quality habitats as municipalities continue to grow. The toolbox is the result of a cooperative, non-regulatory effort led by the Wildlife Diversity program of the North Carolina Wildlife Resources Commission (WRC). A handbook, GIS dataset, training workshops and technical assistance are available for review and download.

Living Shorelines Academy: The Living Shoreline Academy has created tools to "evaluate the understanding, importance and practice of using living shorelines to enhance on-the-ground storm resiliency and create wetlands." The Academy provides training modules and includes a database of white papers and reports on existing living shoreline projects, a library of living shoreline resources and a map highlighting living shoreline projects across the United States. The Academy was developed in partnership by the NC Coastal Federation, Restore America's Estuaries, the Southern Environmental Law Center, and the Environmental Protection Agency (EPA). The NC Coastal Federation and DEQ's Division of Coastal Management (DCM) (Coastal Management Estuarine Shorelines) also has several resources available their websites.

6.3.1 Forest Management and Reforestation

Private forest landowners can work with the North Carolina Forest Service (NCFS) and/or forestry consultants to plan the management of their resources. NCFS offers several types of plans that can be prepared depending on landowner objectives. The two most frequently used plans are Forest Management and Stewardship Plans. NCFS personnel often prepare Forest Management Plans for landowners who want to generate revenue by harvesting timber. These plans provide written prescriptions for specific forestry activities and may include recommendations for avoiding impacts to water quality. In these plans, landowners are also made aware of applicable environmental regulations. Stewardship Plans are prepared for landowners who want to enhance natural areas on their property. Examples include wildlife habitat, soil quality, recreational opportunities, timber production, and natural beauty.

Between July 2007 and June 2012, the NCFS assisted with 506 Forest Management Plans on 35,281 total acres, and 18 Stewardship Plans on 2,053 total acres.

Between July 2012 to June 2017, the NCFS assisted with 454 Forest Management Plans on 26,341 total acres, and 11 Stewardship Plans on 2,660 total acres (Table 6-2) (Coats, 2017).

Table 6-2 Forest Management and Stewardship Plans

Time Period	Forest Management Plans	Total Acres	Stewardship Plans	Total Acres
07/2007 - 06/2012	506	35,281	18	2,053
07/2012 - 06/2017	454	26,341	11	2,660

The NCFS also administers the Forest Development Program (FDP). The FDP is a reforestation, afforestation, and forest-stand improvement cost-sharing program. To qualify, a landowner must have a forest management plan approved by NCFS. A forest management plan may be written by an NCFS forester or ranger, private consulting forester, natural resource professional, or the landowner. Under the FDP, a landowner is partially reimbursed for the costs of site preparation, seedling purchase, tree planting, release of desirable seedlings from competing vegetation, or any other work needed to establish a new forest. Reforestation may occur directly after a timber harvest or on a tract of land that has been without forest cover for an extended period. The FDP can complement federal cost-share programs such as the Conservation Reserve Program (CRP) through the U.S. Department of Agriculture (USDA).

Between July 2007 and June 2012, the NCFS assisted with reforestation after 514 harvests, on a total of 20,995 acres, and at 37 additional non-forested tracts, on a total of 468 acres.

Between July 2012 and June 2017, the NCFS assisted with reforestation after 555 harvests, on a total of 26,530 acres, and at 13 additional non-forested tracts, on a total of 123 acres. The values do not include tracts that may have been reforested without NCFS assistance, converted to other uses, or left alone to revegetate naturally (Table 6-3) (Coats, 2017).

Table 6-3 Forest Development Program (FDP) in the Chowan River Basin

Time Period	Reforestation (After Harvests)	Total Acres	Non-Forested Tracts	Total Acres
07/2007 - 06/2012	514 Harvests	20,995	37	468
07/2012 - 06/2017	555 Harvests	26,530	13	123

More information about forestry in the Chowan River basin can be found in Chapter 1 which provides an overview of basin characteristics including land use and potential impacts from nonpoint source pollution.

6.3.2 Conservation and Preservation

Conservation and preservation are closely linked and both involve a degree of protection, but conservation is generally thought of as the "proper use of nature" and preservation "protects nature from (human) use" (NPS, 2019). Both have many benefits especially in headwater areas and along stream corridors. Both preserve open and green spaces, preserve fish, wildlife and rare species habitat, promote biodiversity, and protect water and air quality. Both also maintain scenic landscapes and recreational amenities, prevents soil erosion, reduces flooding, and limits fragmentation.

There are several federal and state funding sources for land conservation available to public and private landowners. State programs that offer funds for land conservation include the Parks and Recreation Trust Fund through the NC Department of Natural and Cultural Resources' (DNCR) Division of Parks and Recreation (DPR), the Environmental Enhancement Grant (EEG) Program through the Attorney General's Office, and the Agricultural Development and Farmland Preservation (ADFP) Trust Fund administered by the NCDA&CS. Federal programs include the US Department of Agriculture's (USDA) Agricultural Conservation Easement Program (ACEP) administered by the Natural Resource Conservation Service (NRCS) and the Conservation Reserve Enhancement Program (CREP) administered by the Farm Service Agency (FSA). For forest land, there is also the Forest Legacy Program (FLP) administered by the NCFS for conserving environmental important working forests. Funding is provided by the USDA Forest Service FLP.

Just over 43,600 acres are conserved by federal, state, and private entities in the Chowan River basin (NHP, January 2020). Conservation properties in the Chowan River basin have a range of management priorities that include managing for biodiversity (95%) and managing for multiuse purposes (5%) such as logging, mining or all-terrain vehicle use. The largest tracts of land are managed by the NC Wildlife Resource Commission (WRC) and include the Chowan Swamp Game Lands along the upper portion of the Chowan River (NHP, January 2020). Properties managed for biodiversity may mimic or prevent the suppression of natural disturbance like fire, while other properties managed for biodiversity suppress natural disturbance events. More information about managed areas in North Carolina can be found on the Natural Heritage Program's (NHP) website.

6.4 Grants and Funding Opportunities

DWR's Use Restoration Watershed (URW) Program was established to help restore the beneficial uses of impaired waters of the state while also ensuring that protective measures are in place to prevent future degradation. Several guidance documents are available online including factsheets about watershed planning and how to develop a watershed plan. The program also has a list of financial resources available through federal, state and private entities. Examples of financial resources include the Nonpoint Source EPA Section 319 Grant, Clean Water Management Trust Fund (CWMTF), Water Resources Development Grant (WRDG), Z. Smith Reynolds Foundation, and voluntary cost share programs managed by the North Carolina Department of Agriculture & Consumer Services (NCDA&CS) Division of Soil & Water Conservation (DSWC). Additional information about each of these funding sources can be found on each program's website.

6.4.1 Water Quality

Several grants are administered by DWR. A brief overview of the EPA Section 319(h) and 205(j) grants and the Water Resources Development Grant (WRDG) are included here.

6.4.1.1 Section 319(h) Grants

Through Section 319(h) of the Clean Water Act, EPA provides funds to state, territory and tribal agencies to reduce nonpoint source pollution. Funds must be used to help restore waterbodies currently impaired by nonpoint source pollution. The waterbody must also be located in an area with an approved watershed restoration plan (9 Element Watershed Restoration Plan). Funds are allocated through a competitive grant process and are used to implement stormwater and agricultural BMPs and restoration projects on impaired waterbodies. More information about the program can be found on DWR's 319 Grant Program's website.

6.4.1.2 205(j) Water Quality Management Planning Grants

The 205(j) Grant Program is also funded through EPA and provides funding to complete water quality management planning projects. Projects can involve identifying the nature, extent and cause of water quality problems or developing plans to address these problems (i.e., 9 Element Watershed Restoration Plan). Limited competitive funding is available to regional COGs for water quality management planning efforts. More information can be found on DWR's 205(j) Grant Program's website.

6.4.2 Water Resources Development Grants (WRDG)

The purpose of the Water Resources Development (WRDG) Program is to provide cost-share grants and technical assistance to local governments throughout the state. Applications for grants are accepted for seven eligible project types: general navigation, recreational navigation, water management, stream restoration, water-based recreation, Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP) stream restoration projects, and feasibility/engineering studies. The non-navigation projects are collectively referred to as state and local projects. The program provides 50% cost share on approved projects.

6.4.3 Clean Water Management Trust Fund (CWMTF)

Created in 1996, the Clean Water Management Trust Fund (CWMTF) provides grants to local governments, state agencies and conservation non-profits to help finance projects that specifically address protecting and restoring North Carolina's land and water resources. These projects include land acquisitions, capital improvements to wastewater and stormwater infrastructure, and stream restoration projects. CWMTF is managed within the NC Department of Natural and Cultural Resources (DNCR), Division of Land and Water Stewardship . More information (including eligibility requirements) can be found on the CWMTF webpage.

6.4.4 Division of Water Infrastructure (DWI)

DEQ's Division of Water Infrastructure (DWI) provides financial assistance for projects that improve water quality. Programs administered by DWI fund wastewater collection and treatment systems, drinking water treatment and distribution systems, stormwater quality management systems, and stream restoration. The division also supports the nine-member State Water Infrastructure Authority (Authority) which was created by the North Carolina General Assembly in 2013 under General Statute 159G-70. The Authority is an independent body with primary responsibility for awarding federal and state funds for

water and wastewater infrastructure projects, recommending ways to maximize the use of available funding resources, and recommending best and emerging utility management practices.

In 2017, the Authority published North Carolina's Statewide Water and Wastewater Infrastructure Master Plan: The Road to Viability. The master plan presents the state's roadmap for viable water and wastewater utilities that safeguard public health, protect the environment, support vibrant communities, and encourage economic growth and development. The three key areas that require focus to move toward viability are in long-term infrastructure management, organizational management and financial management. The master plan applies broadly to owners and operators of water and wastewater utilities and systems that serve the public, and emphasizes that local elected officials, town and county managers, utility governing boards, customers and stakeholders, as well as the public, play key roles in achieving viable utilities.

6.4.4.1 Loans and Grants Administered by the Division of Water Infrastructure (DWI)

DWI administers financial assistance programs for projects that improve water quality through low-interest loans and grants to local governments and certain other non-profit entities for water and wastewater infrastructure. Programs within the division include the Clean Water State Revolving Fund (CWSRF), the Drinking Water State Revolving Fund (DWSRF), the Community Development Block Grant-Infrastructure (CDBG-I) Program, the State Wastewater and Drinking Water Reserve Programs, Asset Inventory and Assessment Grant Program, and Merger/Regionalization Feasibility Grant Program. More information about each of these programs can be found on DWI's website under "I Need Funding". Projects funded by the State Water Infrastructure Authority can be found in Table 6-4.

6.4.4.1.1 Clean Water State Revolving Fund (CWSRF)

The Clean Water State Revolving Fund receives federal funding through the US Environmental Protection Agency (EPA) under the Clean Water Act (CWA). This program is available for local governments (counties, cities, towns, sanitary districts, etc.) for wastewater treatment, wastewater collection, reclaimed water, stormwater quality BMPs, stream restoration, and energy efficiency projects for treatment works or collection systems. The CWSRF provides funding through low-interest loans and limited-amount principal interest loans.

6.4.4.1.2 Drinking Water State Revolving Fund (DWSRF)

The Drinking Water State Revolving Fund (DWSRF) receives federal funding through the EPA under the Safe Drinking Water Act (SDWA). This program is available for local governments (counties, cities, towns, sanitary districts, etc.) and certain other non-profit entities for source, treatment, storage, transmission and distribution systems. The DWSRF provides funding through low-interest loans and limited-amount principal interest loans.

6.4.4.1.3 Community Development Block Grant-Infrastructure (CDBG-I)

Funding for the federal Community Development Block Grant-Infrastructure (CDBG-I) Program is provided by the US Department of Housing and Urban Development (HUD). The program provides grants to local government units to address water and wastewater infrastructure needs in HUD-qualified low- to moderate-income communities.

6.4.4.1.4 State Wastewater and Drinking Water Reserve Program

Funding for the State Wastewater Reserve and Drinking Water Reserve Program is provided by the North Carolina General Assembly. The program provides grants and loans for design and construction of critical

water and wastewater infrastructure. Funds can be used by units of local government for wastewater collection and treatment projects and public water system projects.

6.4.4.1.5 Asset Inventory and Assessment (AIA) Grant Program

Funding for the Asset Inventory and Assessment (AIA) Grant Program is provided by the North Carolina General Assembly. The program provides grants for developing asset inventories, condition assessment of critical assets and other components of a comprehensive asset management program.

6.4.4.1.6 Merger/Regionalization Feasibility (MRF) Grant Program

Funding for the Merger/Regionalization Feasibility (MRF) Grant Program is provided by the North Carolina General Assembly. The program provides grants for studies to evaluate the potential consolidation of two or more systems, the potential for interconnection with another system for regional wastewater treatment or regional water supply, and the managerial consolidation of systems without physical interconnection.

Table 6-4 Infrastructure Projects Funded by State Water Infrastructure Authority using State and Federal Loans and Grants in the Chowan River Basin (January 2014 – July 2020)

PWS ID	Applicant	Project Description	Amount	Funding Program*	Date	County	Council of Government (COG)
04-46-010	Ahoskie	AMR system	$953,000	DWSRF	January 2014	Hertford	Mid-East
04-08-015	Aulander	Sewer System Improvements	$1,741,549	CDBG-I	January 2016	Bertie	Mid-East
04-08-015	Aulander	Water Asset Management Plan	$78,304	AIA	January 2017	Bertie	Mid-East
04-08-015	Aulander	Wastewater System Improvements	$2,000,000	CDBG-I	March 2019	Bertie	Mid-East
04-08-015	Aulander	Sewer System Improvements	$690,000	CWSRF	July 2019	Bertie	Mid-East
04-08-085	Bertie Co. Water Dist. II	Water Loss Reduction Project	$1,339,350	DWSRF	January 2016	Bertie	Mid-East
04-08-085	Bertie Co. Water Dist. II	Water AIA	$84,200	AIA	January 2017	Bertie	Mid-East
04-08-085	Bertie Co. Water Dist. III	Water System AIA	$65,800	AIA	March 2019	Bertie	Mid-East
04-08-085	Bertie Co. Water Dist. III	Water AIA	$150,000	AIA	March 2019	Bertie	Mid-East
04-08-085	Bertie Co. Water Dist. IV	Roxobel Merger/ Consolidation	$1,678,550	DWSRF	January 2016	Bertie	Mid-East
04-08-085	Bertie Co. Water Dist. IV	Drinking Water AIA	$88,800	AIA	July 2016	Bertie	Mid-East
04-08-085	Bertie Co. Water. Dist. I	Water AIA	$150,000	AIA	February 2020	Bertie	Mid-East

PWS ID	Applicant	Project Description	Amount	Funding Program*	Date	County	Council of Government (COG)
04-21-015	Chowan County	Valhalla WTP Solids Handling	$8,562,000	DWSRF & DWSR-G	February 2018	Chowan	Albemarle Commission
04-21-015	Chowan County	Water System AIA	$150,000	AIA	March 2019	Chowan	Albemarle Commission
04-21-015	Chowan County	Water Supply MRF	$50,000	MRF	February 2020	Chowan	Albemarle Commission
04-46-015	Murfreesboro	Sewer System Rehabilitation	$1,223,000	CWSRF	March 2019	Hertford	Mid-East
04-46-015	Murfreesboro	Wastewater AIA	$150,000	AIA	March 2019	Hertford	Mid-East
04-46-015	Murfreesboro	Sewer System Rehabilitation	$1,839,475	CWSRF	February 2020	Hertford	Mid-East
	Northampton County	Water System AIA	$150,000	AIA	March 2019	Northampton	Upper Coastal Plain
04-66-035	Seaboard	Sewer Extension & Improvements	$655,848	CDBG-I	December 2014	Northampton	Upper Coastal Plain
04-66-035	Seaboard	CDBG-I Town Wide Sewer	$1,344,152	CDBG-I	January 2017	Northampton	Upper Coastal Plain
04-66-035	Seaboard	Water Distribution System Improvements	$1,654,492	DWSR-G	July 2017	Northampton	Upper Coastal Plain
04-66-035	Seaboard	Water Distribution System Improvements	$999,280	DWSRF	July 2019	Northampton	Upper Coastal Plain
04-66-035	Seaboard	Water Line Replacement	$1,429,500	DWSRF	July 2020	Northampton	Upper Coastal Plain
04-46-020	Windsor	Sewer Rehab	$820,640	CWSRF	May 2015	Bertie	Mid-East

PWS ID	Applicant	Project Description	Amount	Funding Program*	Date	County	Council of Government (COG)
04-46-020	Windsor	Wastewater System Improvements	$1,914,900	CWSRF	March 2019	Bertie	Mid-East
04-66-040	Woodland	Sanitary Sewer Evaluation Study	$46,600	WWTAG	December 2014	Northampton	Upper Coastal Plain
04-66-040	Woodland	Well Replacement	$663,550	DWSRF	January 2016	Northampton	Upper Coastal Plain
04-66-040	Woodland	Wastewater System AIA	$76,000	AIA	January 2017	Northampton	Upper Coastal Plain
04-66-040	Woodland	Sewer System Improvements	$983,500	CDBG-I	February 2020	Northampton	Upper Coastal Plain
04-66-040	Woodland	Sewer System Improvements	$2,000,000	CWSRF	July 2020	Northampton	Upper Coastal Plain

(*) Funding Program:

WWTAG	Wastewater Technical Assistance Grant (Discontinued in 2015)
DWHUC	Drinking Water High Unit Cost Grant (Discontinued in 2015)
DWTAG	Drinking Water Technical Assistance Grant (Discontinued in 2015)
CDBG-I	Community Development Block Grant - Infrastructure (Federal grant)
CWSRF	Clean Water State Revolving Fund (Federal loan)
DWSRF	Drinking Water State Revolving Fund (Federal loan)
WWSR-G	Wastewater State Reserve Grant (State grant)
DWSR-G	Drinking Water State Reserve Grant (State grant)
WWSR-L	Wastewater State Reserve Grant Loan (State loan)
DWSR-L	Drinking Water State Reserve Loan (State loan)
AIA	Asset Inventory and Assessment (State grant)
MRF	Merger/Regionalization Feasibility Study (State grant)

6.4.4 Cost Share Programs for Best Management Practices (BMPs)

Several cost share programs are available through both federal and state agencies. The Division of Soil & Water Conservation (DSWC) in the North Carolina Department of Agriculture & Consumer Services (NCDA&CS) administers multiple state cost share programs while the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) administers several federal cost share programs. The programs typically offer 75% cost share assistance to applicants for the installation of BMPs to protect or improve natural resource concerns. The applicant is responsible for the remaining 25% of the costs, which can include the use of existing material and labor (in-kind services) and/or monetary contributions. There are some cost share and acreage restrictions depending on the BMPs used, the type of operation involved, and/or policies set by the local SWCD or the North Carolina Soil and Water Conservation Commission (SWCC). Cost share incentive payments are also available to encourage the use of certain agronomic management practices. More information about the cost share programs managed by the state can be found on the DSWC's website.

6.4.4.2 Agriculture Cost Share Program (ACSP)

The North Carolina Agriculture Cost Share Program (ACSP) was established in 1984 to help reduce nonpoint source runoff and provide guidance to owners and producers on ways to improve their on-farm management of water resources and BMPs. The first BMPs implemented through the program were in the Chowan River basin. The program is administered by DSWC but managed by the local SWCD. The local SWCD reviews and identifies priorities on an annual basis and calls upon federal, state, local, non-profit, non-government and natural resource groups for technical, financial, planning and implementation support to restore, enhance and/or maintain natural resources throughout their jurisdictional area. BMPs include vegetative, structural or management systems that can improve the efficiency of farming operations while reducing the potential impacts to surface water and/or groundwater. Applications for cost share assistance through ACSP are ranked based on resource concerns identified by the SWCD.

Just over $1.2 million was spent on ACSP BMPs in the Chowan River basin between July 2010 and June 2020 (Table 6-5). This amount includes the amount invested by the owner of the agricultural operation or producer. Each BMP installed has water quality benefits associated with it and tools are in place to calculate how many acres are affected, how much soil was saved, and the total amount of nitrogen and phosphorus saved. These numbers are reported in Table 6-6.

6.4.4.3 Community Conservation Assistance Program (CCAP)

The Community Conservation Assistance Program (CCAP) is designed to improve water quality through the installation of various BMPs on urban, suburban and rural lands, not directly involved in agricultural production. CCAP provides educational, technical and financial assistance to landowners through the local SWCDs. This program is open to homeowners, businesses, schools, parks, churches and community groups.

6.4.4.4 Agricultural Water Resource Assistance Program (AgWRAP)

The Agricultural Water Resource Assistance Program (AgWRAP) is designed to identify opportunities to increase water use efficiency and available storage, implement BMPs to protect water resources, increase water efficiency, and increase water storage for agriculture. Funding resources are allocated at 60% for BMPs and 40% for water efficiency and storage projects such as new ponds, pond repair/retrofits, water collection and reuse systems.

Table 6-5 Best Management Practices Funded by State Cost Share Programs in the Chowan River Basin (July 2010 – June 2020)

Best Management Practice	Units of Measure	July 2010 to June 2015	July 2015 to June 2020	Total Amounts
Erosion and Nutrient Management				
Conservation Tillage (3 Year)	Acre	1,756	0	1,756
Cover Crops	Acre	20,741	1,179	21,920
Critical Area Planting	Acre	2	0	2
Crop Residue Management	Acre	10,758	28	10,786
Cropland Conversion - Trees	Acre	8	0	8
Diversion	Linear Feet	4,000	0	4,000
Land Smoothing	Acre	3,025	64	3,088
Long-Term No-Till	Acre	0	45	45
Nutrient Scavenger Crop	Acre	0	485	485
Rooftop Runoff Management System	Each	0	1	1
Sod-Based Rotation - 3 Year SBR (17 months)	Acre	0	18	18
Sod-Based Rotation - 5 Year SBR (41 months)	Acre	0	24	24
Three Year Conservation Tillage for Grain and Cotton	Acre	309	300	609
Three Year Conservation Tillage for Peanuts, Sweet Corn, Tobacco & Vegetables	Acre	60	0	60
Sediment and Nutrient Management				
Abandoned Well Closure	Each	2	0	2
Agricultural Road Repair/Stabilization	Linear Feet	0	400	400
Agricultural Pond Sediment Removal	Each	1	0	1
Field Border	Acre	74	0	74
Filter Strip	Acre	3	0	3
Grade Stabilization Structure	Each	1	0	1
Grassed Waterway	Acre	77	0	77
Non-Field Farm Road Repair	Each	0	3	3
Precision Agrichemical Application	Each	0	1	1
Precision Nutrient Management	Acre	1,000	666	1,666
Rock-lined Outlet	Each	0	1	1
Water Control Structure	Each	93	0	93
Water Conservation				
Agricultural Pond Restoration/Repair	Each	3	0	3
Agriculture Pond Repair/Retrofit	Each	1	0	1

Best Management Practice	Units of Measure	July 2010 to June 2015	July 2015 to June 2020	Total Amounts
Conservation Irrigation Retrofit	Square Feet	6,085	0	6,085
Irrigation Well	Each	2	0	2
Water Supply Well & Pump	Each	1	0	1
Well-Confined Animal Water Supply	Each	1	0	1
Waste Management				
Waste Application Systems - Underground Main and Hydrant System	Each	0	1	1
CCAP				
Abandoned Well Closure	Each	6	0	6
Backyard Rain Garden	Each	1,750	0	1,750
Pet Waste Receptacle	Each	4	0	4
Total Cost Share Funds Spent		**$746,509**	**$479,358**	**$1,225,867**

Table 6-6 Benefits Reported for BMPs Implemented in the Chowan River Basin

Dates	HUC	Acres Affected (Acres)	Nitrogen Saved (lbs)	Phosphorus Saved (lbs)	Soil Saved (Tons)	Waste Nitrogen Managed (lbs)	Waste Phosphorus Managed (lbs)
7/1/2010-6/30/2015	Chowan	17,893	119,684	10,089	12,741	42,190	67,945
	Meherrin	2,916	13,381	1,603	1,112	973	6,976
	Totals	20,809	133,066	11,692	13,853	43,162	74,921
7/1/2015-6/30/2020	Chowan	3,872	1,532	6,756	10,624	120,468	164,390
	Meherrin	815	103	4,388	7,712	0	0
	Totals	4,687	1,635	11,144	18,336	120,468	164,390

6.4.4.5 USDA-NRCS Environmental Quality Incentives Program (EQIP)

Through the Environmental Quality Incentives Program (EQIP), the Natural Resources Conservation Service (NRCS) provides financial assistance to cover costs associated with implementing conservation measures. NRCS also provides one-on-one help in planning, constructing and managing conservation measures. Common conservation practices include cover crops, timber or forest improvement, prescribed grazing and irrigation practices. In addition to EQIP, NRCS has funds available through the Conservation Stewardship Program (CSP). Information about financial assistance programs to help conserve natural resources on agricultural lands can be found on NRCS's website. Summary data is available for BMPs installed in the Chowan River basin. This data did not, however, include the amount of cost share money spent on BMPs in the basin (Table 6-7).

Table 6-7 Best Management Practices Funded by Federal Cost Share Programs (October 2006 – November 2019)

Best Management Practice (BMP)	Units of Measurement	Total
Agrichemical Pollution Prevention	Number	3
Composting Facility	Number	15
Cover Crops	Number	10,814
Critical Area Planting	Acre	28
Diversion	Acre	620
Dry Stack	Number	18
Fencing	Feet	24,400
Field Border	Acre	47,827
Forest Stand Improvement	Acre	2,342
Grassed Waterway	Acre	1
High Tunnel System	Square Feet	7,645
Irrigation Water Management	Acre	230
Irrigation Water Management	Feet	587
Nutrient Management	Acre	10,824
Prescribed Grazing	Acre	123
Residue & Tillage Management	Acre	10,878
Riparian Buffer	Acre	218
Sod-based Rotation	Acre	6,803
Waste Facility Closure	Number	11
Waste Treatment Lagoon	Number	4
Water Control Structure	Number	2

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