

Executive Summary

Basinwide planning is a watershed-based approach to identify areas across the state where water resource concerns should be addressed. The planning process identifies areas that need additional protection, restoration, or preservation to ensure waters of the state are meeting their designated use. The 2021 Pasquotank River Basin Water Resources Plan (“basin plan”) is a reflection of this planning process and serves as a summary document for the river basin.

Basin plans are required under [North Carolina General Statute \(NCGS\) 143-215.8B](#) and are approved by the Environmental Management Commission (EMC) every 10 years ([Session Law 2012-200](#)). Updates are provided throughout the 10-year period to address changes in water resources and modeling methodology, to report changes to wastewater permits, and to share advances in scientific knowledge. While these plans are prepared by the North Carolina Department of Environmental Quality’s (NCDEQ’s) Division of Water Resources (DWR), their implementation and the protection of water resources entail the coordinated efforts of federal and state agencies, local governments, and stakeholder groups across the state.

The 2021 basin plan is the fourth document to be developed for the Pasquotank River basin by DEQ. The plan includes nine chapters covering water quality and quantity issues in the basin. Because a hydrologic (or water supply) model has not been developed for the basin, local water-use information was collected from various programs, including the Central Coastal Plain Capacity Use Area (CCPCUA), Local Water Supply Plans (LWSP), Water Withdrawal & Transfer Registration (WWATR), and the 2018 Agricultural Water Use Survey published by the North Carolina Department of Agriculture and Consumer Services (NCDA&CS).

The Pasquotank River basin includes southeastern Virginia and northeastern North Carolina. This river basin contains the Albemarle, Currituck, Roanoke, Croatan and Pamlico sounds, as well as, the Pasquotank, Little, Perquimans, Alligator, Scuppernong and Yeopim rivers and numerous small watersheds. This basin also contains the Albemarle Sound that is part of the Albemarle-Pamlico Estuarine System. In the Albemarle-Pamlico Estuary, environmental stress can be seen in the form of declining fisheries, increasing occurrences of algal blooms, closure of shellfish waters, loss of historical submerged aquatic vegetation beds, and degradation of wetlands, fish and upland habitats.

Pollutant sources fall into two general categories: point sources and nonpoint sources. Most often the source is based on the predominant land cover in a watershed. The NC portion of the Pasquotank River basin spans 3,367 square miles (mi²) with primarily open water (37.4%), wetlands (33.1%), agriculture (19.9%), forest (5.1%), developed lands (3.4%), scrub/shrub (0.5%), barren land (0.3%), and grassland/herbaceous (0.2%) land cover. Many unknown sources can also impact water quality. Agriculture, forestry, stormwater, failing septic systems, altered hydrology, and projected change in climate have all been identified as potentially impacting water quality in this basin.

As per NCGS 143-215.8B, this report contains a review of wastewater facilities, septic tank systems, stormwater management systems, golf courses, farms that use fertilizers, atmospheric deposition, and animal operations information. This review was coupled with water quality monitoring data collected between 2006 and 2019 from benthic macroinvertebrate communities, algae and aquatic plants, surface

waters, lakes, groundwater, and sanitary surveys for waters of the Pasquotank River basin. As of 2018, certain waters are on the impaired waters list for copper, nickel, benthos, chlorophyll-*a*, pH, dissolved oxygen, dioxin, enterococcus, and shellfish growing area status. This report pays special attention to the nitrogen species [nitrate, ammonia, and organic nitrogen], total phosphorus, chlorophyll-*a*, and algal bloom data over time throughout the Pasquotank River basin in an effort to communicate the changes in the instream nutrient concentrations.

The indices for monitoring biological communities in large, non-wadeable coastal plain rivers and coastal plain fish community sites have not been developed due to staffing and other limitations. Accordingly, there are unratable biological and fish community sites located in the Pasquotank River basin. Overall, between 2006 and 2015, the biological communities in the Pasquotank River basin were rated Moderate, Not Impaired, or Not Rated. Fish community sites have not been sampled since 2000 or earlier. Fish kill assessment field reports since 2008 have generally shown elevated occurrences of reported fish kills; especially in 2017 and 2018. This could be attributed to either hurricanes, which caused dissolved oxygen (DO) levels in many systems to be depleted to concentrations lethal to aquatic life, or the ease of reporting kills via the DWR mobile app ([link](#)).

Since 2015, the Albemarle Resource Conservation & Development Council, Inc. (ARCD) and Soil and Water Conservation Districts (SWCDs) have been following a 9-element watershed restoration plan to improve water quality in the [Little River](#) watershed in the Pasquotank River basin. It includes an eight-mile stretch of the Little River that has been listed as impaired for chlorophyll-*a*. Citizen scientists, including the Chowan-Edenton Environmental Group (CEEG) and Green Saves Green, are also collecting water samples from key locations in the Chowan and Pasquotank river basins with a focus on determining the cause of algal blooms. CEEG volunteers are also sending digital micrographs as well as water samples (when the blooms are extreme) to the National Oceanic and Atmospheric Administration (NOAA) Phytoplankton Monitoring Network for analysis. In collaboration with the NOAA lab at Morehead City they send tissue and water samples for analysis, as well as chlorophyll-*a* filters. The Albemarle-Pamlico National Estuary Partnership (APNEP) is also active in this region, providing resources towards monitoring, algal bloom outreach and research, and submerged aquatic vegetation monitoring. APNEP, in partnership with Washington and Tyrrell counties, are currently collaborating on the Scuppernong Regional Water Management Study. The goal of this study is to develop a collaborative approach for a hydrologic study and regional water management strategy for the Scuppernong Coastal System on the Northern Albemarle-Pamlico Peninsula.

There are a total of 47 national pollutant discharge elimination system (NPDES) permitted facilities, 39 NPDES Non-discharge permits, 448 land application sites, 106 stormwater permits, and 15 animal operation permits in the Pasquotank River basin. On-site septic systems are common throughout the Pasquotank River basin. Three of every four houses in this basin uses septic systems to treat and dispose of their household wastewater. Between 2014 and 2020, the Division of Water Infrastructure funded approximately \$34 million for infrastructure projects in Chowan, Dare, Pasquotank, Tyrrell, and Washington counties. Between 2012 to 2020, the State Cost Share Program funded nearly \$2 million in best management practices (BMPs) in the Pasquotank River basin. Eight county boards of commissioners 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.

Maintenance and continual improvements in water quality and quantity are dependent on proactive planning. Currently, the Nutrient Criteria Development Plan (NCDP) Scientific Advisory Council (SAC) is working to develop appropriate protective criteria recommendations for the Albemarle Sound and Chowan River. This may include modifications of current criteria, such as chlorophyll-*a*, and the development of instream nitrogen and phosphorus criteria. While developing these protective criteria recommendations, there is a critical need for technology that can distinguish a specific nitrogen signature in order to identify a specific source such as agricultural animal types, domestic waste or a background forest/sediment signature. The DWR encourages researchers to continue to work toward a method viable to use on a watershed scale system. This would assist in the development of appropriate BMPs to reduce the load of nutrients into the system.

Reducing nitrogen and phosphorus loading in the Pasquotank River basin will require broad partnerships. These partnerships should include local nonprofits, county governments, Soil and Water Conservation Districts, state agencies (North Carolina and Virginia), and universities. Together we should continue to monitor water quality and quantity in northeast North Carolina, invest in nutrient reducing activities, and determine and address the causes of the excess nutrients and algal blooms in the Pasquotank River basin.