North Carolina Nutrient Criteria Development Plan

v.2

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Submitted to the

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by the

North Carolina Department of Environmental Quality

Division of Water Resources

Raleigh, North Carolina

List of Acronyms

Acronym	Definition
APA	Administrative Procedure Act
APNEP	Albemarle-Pamlico National Estuary Partnership
CCMP	Comprehensive Conservation Management Plan
CGIA	Center for Geographic Information and Analysis
DO	Dissolved Oxygen
DWR	Division of Water Resources
EMC	Environmental Management Commission
EPA	Environmental Protection Agency
FTE	Full Time Equivalent
HRL	High Rock Lake
NC	North Carolina
NCDP	Nutrient Criteria Development Plan
NCIP	Nutrient Criteria Implementation Plan
NNC	Numeric Nutrient Criteria
NSW	Nutrient Sensitive Waters (a NC supplemental water quality classification)
SAC	Scientific Advisory Council (to be established as part of this NCDP)
STAC	Science and Technical Advisory Committee (an APNEP committee)
STORET	STOrage and RETrieval Data Warehouse
TAC	Technical Advisory Committee (HRL committee)
TMDL	Total Maximum Daily Load
USGS	United States Geological Survey
WQC	Water Quality Committee (a subcommittee of the EMC)

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North Carolina Nutrient Criteria Development Plan

Introduction

Nutrient criteria management plans were strongly encouraged by the Environmental Protection Agency (EPA)[1] for all states through a Federal Register notice issued in 2001 and by subsequent EPA memoranda and actions. North Carolina (NC) developed a nutrient criteria plan, the Nutrient Criteria Implementation Plan (NCIP) in response to the 2001 register notice, which was mutually agreed upon in 2004. In order to re-establish mutual agreement with the EPA, the 2004 NCIP was updated and amended in June 2014 to reflect commitment and a schedule of progress toward the adoption of nutrient criteria for all state waters. The new plan, the Nutrient Criteria Development Plan (NCDP), established a Scientific Advisory Council (SAC) to develop scientifically-defensible criteria for three water body types, lakes and reservoirs, rivers and streams, and estuaries. For each water body type, a pilot water body was identified for nutrient criteria development along with a schedule for completion. These water bodies included High Rock Lake, the central portion of the Cape Fear River, and the Albemarle Sound. This North Carolina Nutrient Criteria Development Plan (NCDP) is a revision of the 2014 NCDP and revises the role of the SAC, recognizes the Criteria Implementation Committee (CIC), and provides updates to criteria development schedules.

Historically, North Carolina had established itself as a leader in the field of site-specific, flexible nutrient control strategies through the implementation of a chlorophyll-*a* standard and the development of a supplemental classification of 'Nutrient Sensitive Waters' (NSW). Although these strategies have been noteworthy, nutrients continue to affect water quality and have the potential of impacting aquatic life, the public's use of surface waters for recreation, and drinking water supplies. Therefore, additional nutrient management strategies, including water body specific numeric nutrient criteria as appropriate for protection of designated uses for all water body types, must be developed.

The North Carolina Division of Water Resources (DWR) developed its 2014 NCDP after holding a Nutrient Forum in 2012 and from input of stakeholders expressed during four public forums and written comments obtained from December 2012 through February 2014. Comments reflected the need for:

- Establishing a scientific advisory council (SAC).
- Flexible (i.e., site-specific or water body specific) nutrient criteria.
- Stakeholder involvement.
- Allowing all existing nutrient management rules and total maximum daily loads (TMDLs) to proceed as currently written.
- Establishing a balance between the best science on nutrient management and the cost-effectiveness of implementation.

Based upon that input, the 2014 plan:

- Outlined the creation of the SAC.
- Identified three areas for the development of nutrient criteria in the near future:
    - High Rock Lake
    - Albemarle Sound
    - Central portion of the Cape Fear River
- Identified a process through which the DWR will evaluate nutrients throughout NC.
- Affirmed the DWR commitment to implementing the NCDP.

[1] A table of acronyms is on page 18.

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Numeric Nutrient Criteria

The focus of the 2014 strategy, to develop nutrient criteria based primarily on the linkage between nutrient related parameters and protection of designated uses, will be maintained. For the purposes of this document, "numeric nutrient criteria" and "nutrient criteria" are defined as either of the following:

- Causal and response variables expressed as numerical concentrations and/or mass quantities or loadings.
- Causal and response variables expressed as narrative statements with a scientifically defensible translator mechanism to derive or calculate numerical concentrations and/or mass quantities or loadings. Rule language will clarify that the translator will be used by the implementing programs.

Priority parameters for consideration are provided in Table 1.

Table 1. Response and causal variables for consideration. (Others may be considered.)

Response variables	Causal variables
Chlorophyll-*a*	Nitrogen
Phytoplankton	Phosphorus
Periphyton	
Macrophytes	
Diurnal dissolved oxygen (DO) range	
Minimum DO	
Diurnal pH range	
Water clarity	

When developing nutrient standards, we will consider all of the above nutrient criteria and causal and response variables as well as other nutrient related criteria and variables if appropriate. The use of biological confirmation will also be considered, in accordance with the EPA's Guiding Principles[2].

Evaluating Nutrients throughout North Carolina

The DWR will continue its commitment to evaluating nutrients and developing nutrient criteria throughout North Carolina on a site-specific basis. Nutrient criteria development efforts will be directed to the three specific water body types: 1) reservoirs/lakes, 2) rivers/streams and 3) estuaries. Our first priority will be to develop nutrient criteria on a specific water body within each water body type: 1) High Rock Lake, 2) the Central Portion of the Cape Fear River and 3) Albemarle Sound. Draft criteria for High Rock Lake have been completed. Following the development of criteria for these water bodies, the applicability of these criteria will be assessed for respective water body types through the state on a site-specific basis to ensure coverage of waters statewide.

Timeline:

We anticipate development and adoption of nutrient criteria for the three water bodies specified in this plan by 2025. Adoption of nutrient criteria statewide is anticipated by 2029.

[2] http://www2.epa.gov/sites/production/files/2013-09/documents/guiding-principles.pdf

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Timelines

Implementing this NCDP will require collaborative work among the DWR, EPA, SAC, other agencies, local governments and universities. The DWR considers this to be an interactive and adaptive plan and will continue to work with EPA Region 4. The estimated timelines may need to be modified in future revisions of the NCDP, given research, resource changes or unforeseen delays. The greatest challenge continues to be obtaining sufficient funding and personnel resources to support this endeavor. The DWR will keep the EPA informed of any delays and will negotiate new timelines as the need arises through annual Clean Water Act - Section 106 workplan development. All timelines are summarized in a Gantt chart in Appendix 1.

DWR Commitments in Implementing the NCDP

The DWR is committing four full time equivalents (FTEs) to the implementation of the NCDP. Staff resources will come from the Water Sciences Section and the Water Planning Section, with the following anticipated allocation between the sections:

- Water Sciences Section
    - Ecosystems Branch – 1.0 FTE
- Water Planning Section
    - Classifications & Standards/Rules Review Branch – 0.5 FTE
    - Modeling & Assessment Branch – 2.0 FTE
    - Nonpoint Source Planning Branch– 0.5 FTE

Input and participation from other DWR sections (e.g. Water Quality Permitting Section) and DWR Branches (e.g., Complex Permitting) will be necessary especially during the discussion of management strategies.

The DWR plans to maintain this level of commitment throughout the nutrient criteria development process. However, our greatest challenge is to maintain sufficient funding and trained personnel to complete the tasks outlined in this plan. Nothing in this plan obligates the DWR to a course of action in the absence of program resources.

NCDP Projects

The remainder of this document outlines seven projects discussed in chronological order regarding work efforts:

1. Review and amend as necessary the membership of the Scientific Advisory Council and the Criteria Implementation Committee
2. Complete nutrient criteria development for High Rock Lake
3. Nutrient criteria development for Chowan River/Albemarle Sound
4. Nutrient criteria development for the Central Portion of the Cape Fear River
5. Nutrient criteria development for estuaries statewide
6. Nutrient criteria development for reservoirs and lakes statewide
7. Nutrient criteria development for rivers and streams statewide

Each project has a task list with an anticipated completion date. A Gantt chart for all tasks is appended.

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1. Scientific Advisory Council

The Scientific Advisory Council (SAC) was established in the 2014 NCDP to assist the DWR and stakeholder groups with the development of nutrient criteria. Members include individuals with expertise in areas related specifically to water quality, nutrient response variables, nutrient management, and point and non-point source nutrient abatement. The EPA was asked to participate on the SAC.

DWR recognizes that the composition of the SAC is essential to the successful development of nutrient criteria. DWR staff consulted with the EPA-Region 4 and the Albemarle Pamlico National Estuary Partnership (APNEP) regarding the creation of effective advisory groups such as a SAC. It may be necessary to periodically revise the membership of the SAC due to specific water body expertise and changing professional responsibilities. The DWR Director will select members based on the nominations and recommendations from staff. Each member will nominate an alternate to serve on the SAC in the event that the regular member is unable to attend. All alternates must be approved by the Director.

The SAC's duties may include:

- Reviewing the quality and relevance of nutrient data.
- Identifying data gaps in the scientific and technical information being used.
- Recommending measures to address data gaps (e.g., monitoring and data collection).
- Advising on criteria development approach for each waterbody type.
- Reviewing proposed causal and response variable criteria developed by DWR.
- Periodically assisting in the preparation of reports that present the progress of developing nutrient criteria.

Timeline:

A 12-member SAC was established in late 2014. DWR will continue to fill vacancies and revise membership as necessary to address expertise needs and facilitate criteria development.

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2. **Criteria Implementation Committee**

The Criteria Implementation Committee (CIC) was established in 2015 to advise DWR on the social and fiscal impacts of proposed nutrient criteria. Members include persons with expertise in point and/or non-point source pollution, water quality/nutrient management economics, local government, and agriculture.

CIC members will accurately represent all stakeholder groups that are likely to be affected by nutrient criteria. Comments and analysis from this group will inform the development of any fiscal notes developed as part of DWR's rulemaking process. It may be necessary to periodically revise the membership of the CIC due to specific water body expertise and changing professional responsibilities. The DWR Director will select members based on the nominations and recommendations from staff.

The CIC's duties may include:

- Advising DWR on the potential social, economic, and environmental implications of adopting the proposed criteria to all stakeholders and the DWR.
- Assisting DWR with the development of fiscal documents as required by the Administrative Procedure Act (APA-Rulemaking) process.
- Periodically assisting in the preparation of reports that present the progress of developing nutrient criteria.
- Carrying out other relevant duties identified by the DWR.

Timeline:

An 8-member CIC was established in mid-2015. DWR will continue to fill vacancies and revise membership as necessary to address expertise needs and facilitate criteria development.

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3. **Reservoirs/Lakes - High Rock Lake**

North Carolina has approximately 250,000 acres of freshwater lakes and reservoirs. High Rock Lake is a 15,180-acre reservoir with a 3,974 mi^2 drainage area located on the Yadkin River (Figure 1).

Nutrient impact concerns have been documented in High Rock Lake since the mid-1970s when the EPA conducted the National Eutrophication Survey. High Rock Lake was the most eutrophic of the 16 North Carolina lakes studied. Since 2005, the DWR has been working with a Technical Advisory Committee (TAC) to develop tools to evaluate sources of nutrient loading to High Rock Lake and resulting chlorophyll-*a* concentrations. The TAC is comprised of local stakeholders and DWR staff is charged with developing the tools that will be used to develop the Nutrient Management Strategy. Table 2 provides a summary of past nutrient management efforts (Tasks 1-7) and future steps (Tasks 8-12). New tasks and their schedules will be modified based upon a stakeholder process.

Impairments: High Rock Lake is currently on NC's list of impaired or threatened waters as required under Section 303(d) of the Clean Water Act. The entire lake is impaired for chlorophyll-*a* and parts of the lake are impaired for pH and turbidity.

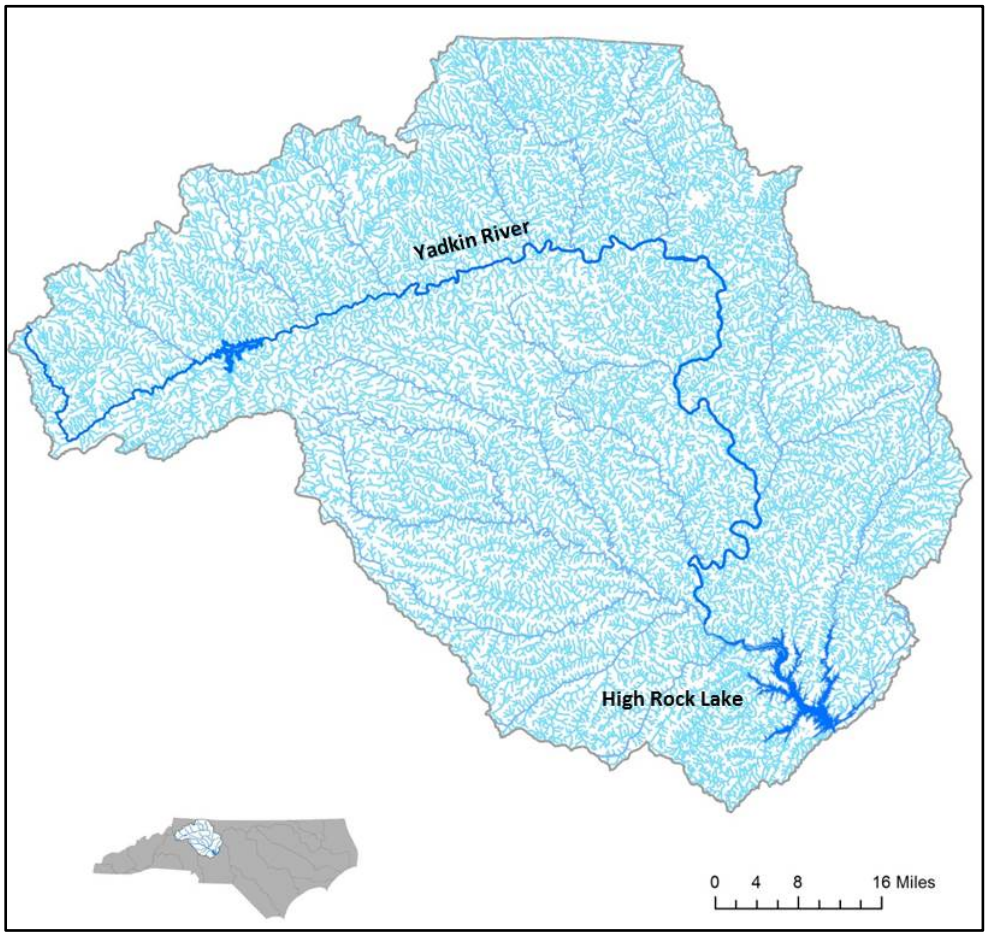

Figure 1. High Rock Lake watershed.

Tasks and Timelines:

Table 2. Brief summary of past events and future efforts in High Rock Lake.

Task No.[1]	Task	Anticipated Completion Date
1	High Rock Lake – Impaired for chlorophyll-*a.* Ongoing eutrophication concerns led to recommendations for a nutrient management strategy for High Rock Lake (HRL) in the early 1990s. HRL was first listed as impaired for chlorophyll-*a* in 2004.	Not applicable
2	Technical Advisory Committee. The TAC was established in 2005 and continues to meet. The TAC is comprised of local stakeholders and DWR staff.	Completed 2005
3	319 Project - *Updated Land Cover.* Contract awarded to the NC Center for Geographic Information and Analysis (CGIA) to update land cover for the HRL watershed.	Completed 2007
4	319 Project - *Intensive Monitoring.* Contract awarded to Yadkin Pee Dee River Basin Association. Data collection was conducted from April 2008-April 2010. Samples were collected in the lake and watershed on a routine basis, as well as in response to high flow events in the watershed. Data were used to characterize both the lake and watershed responses to various stimuli, including seasonal weather changes.	Completed 2008
5	Intensive Monitoring Report - Final Report on intensive monitoring completed.	Completed 2009
6	HRL Watershed Model Development. The watershed model links conditions and activities on the land surface to responses in the streams and delivery to the lake.	Completed 2012
7	HRL Watershed Model Report. Final report issued August 12, 2012.	Completed 2012
8	Initiate discussions with the EPA regarding the current status of the efforts in developing nutrient criteria for HRL. These discussions will include the results and conclusions of the HRL Watershed Model Report, potential approaches for numeric nutrient criteria development, and the roles and responsibilities of the established SAC.	Completed June 2014
9	HRL Nutrient Response Model Development. TAC provides comments on HRL Nutrient Response Model The nutrient response model provides information on the responses of the receiving water body (i.e. High Rock Lake) to nutrient loading.	Completed November 2014

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Task No.[1]	Task		Anticipated Completion Date
10	HRL Nutrient Response Model Report		Completed October 2016
11	NNC development began after the nutrient response model was completed. Every other month meetings began in May 2015. Consultations with the SAC included a potential approach to be used in developing statewide nutrient criteria for lakes and reservoirs based on the modeling results.		
	a. Began consultation with the SAC	May 2015	
	b. HRL Stakeholder Meetings (All Completed):		
	1. HRL Stakeholder Mtg. 1	January 2015	
	2. HRL Stakeholder Mtg. 2	April 2015	
	3. HRL Stakeholder Mtg. 3	July 2015	
	4. HRL Stakeholder Mtg. 4	October 2015	
	5. HRL Stakeholder Mtg. 5	January 2016	
	c. Present draft criteria to CIC		October 2019
	d. Receive CIC's comments		January 2020
	e. Present proposed NNC to WQC		March 2020
	f. Present proposed NNC to EMC		July 2020
12	Adoption of nutrient criteria for HRL per NC APA		January 2022

[1] Only tasks 11c-12 are depicted in the Gantt chart (Appendix 1).

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4. Estuaries – Chowan River/Albemarle Sound

North Carolina has approximately 2,130,000 acres of estuaries. The Albemarle Sound (Fig. 2) is part of the Albemarle-Pamlico Estuarine System, one of the largest and most important estuarine systems in the United States. The sound and a significant portion of its basin are within the programmatic areas of the Albemarle-Pamlico National Estuary Partnership (APNEP). As is required for all units of EPA's National Estuary Program, APNEP's activities are guided by a Comprehensive Conservation Management Plan (CCMP). One of the three goals within APNEP's 2012-2022 CCMP is "*a region where water quantity and quality maintain ecological integrity*" with one of this goal's outcomes being "*nutrients and pathogens do not harm species that depend on the waters*" as a priority for the next 18 years.

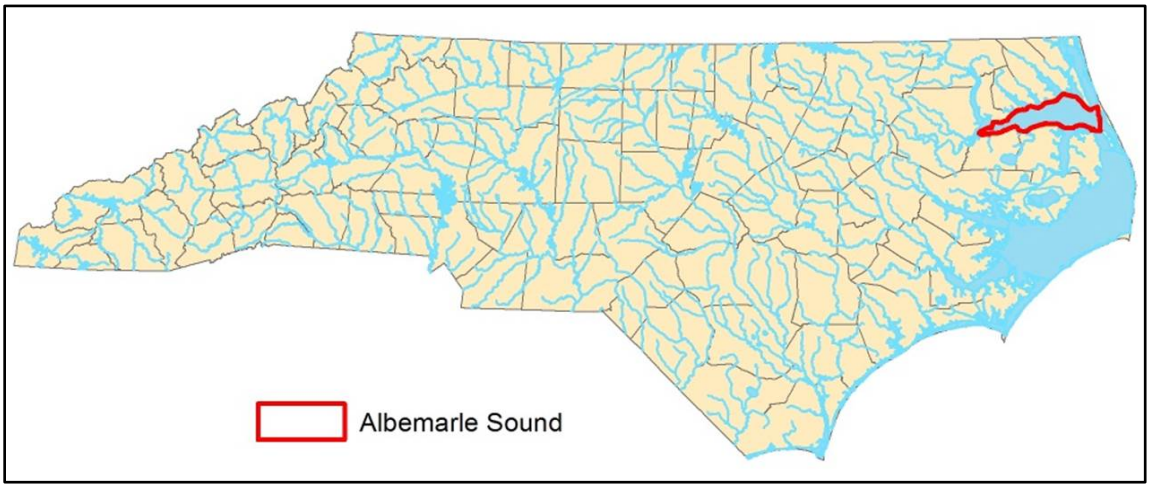

Figure 2. General location of the Albemarle Sound

Stakeholder interest is high in this area based on APNEP's work and associated activities in the region. The United States Geological Survey (USGS) has conducted monitoring projects in the Albemarle Sound and collecting a variety of environmental data, including nutrients and phytoplankton. In addition, the DWR is working with APNEP and EPA Region 4 to obtain funding for the development of nutrient criteria for the Albemarle Sound.

Data reviewed as part of APNEP's Ecosystem Assessment[3] indicated that chlorophyll-*a* concentrations, as reported by the DWR in STORET, do not show trends in the Albemarle Sound between 1980 and 2010. However, sampling data collected by the USGS during 2012 and 2013 indicate the presence of algal blooms throughout the growing season and academic researchers have noted continued increases in nutrient and chlorophyll *a* concentrations. Furthermore, episodic cyanobacteria algae blooms in the Chowan River have been regular occurrences since 2015 with some blooms producing cyanotoxins at levels that may impact human health. Local stakeholder groups, academic researchers, and local government representatives have joined together to advocate for further research in the Chowan River/Albemarle Sound in an effort to find the cause(s) of the algal blooms.

[3] APNEP. 2012. 2012 Albemarle-Pamlico Ecosystem Assessment. Albemarle-Pamlico National Estuary Partnership. www.apnep.org

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Due to the high interest in the Albemarle Sound and continued algal blooms in the Chowan River, DWR will pair these two water bodies for development of numeric nutrient criteria. This will allow for a more holistic nutrient criteria development strategy for the watershed.

Impairments: Parts of the sound are impaired for pH and copper. The Chowan River is classified as a Nutrient Sensitive Waters [15A NCAC 02B .0202(49) - Nutrient sensitive waters mean those waters which are so designated in the classification schedule in order to limit the discharge of nutrients (usually nitrogen and phosphorus). They are designated by "NSW" following the water classification.].

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Tasks and Timelines:

Table 3. Task list for the Chowan River/Albemarle Sound.

Task No. [1]	Task	Anticipated Completion Date
1	DWR initiates discussions with APNEP's Science & Technical Advisory Committee (STAC) and Policy Board regarding the Nutrient Criteria Development Plan.	Completed August 2014
2	APNEP convenes an Albemarle Sound workgroup of water quality specialists, interdisciplinary scientists, and local stakeholders to advance Albemarle Sound portions of the NCDP in support of its Comprehensive Conservation and Management Plan. Work on Task 5 begins.	Completed August 2014
3	APNEP, DWR and EPA representatives discuss the necessity and availability of additional federal resources for initial project tasks, including technical support for the Albemarle Sound workgroup, facilitation support for the SAC, and support for SAC members. (Note: external funding is crucial for progress on further NCDP development).	Completed June 2015
4	Albemarle Sound workgroup recommends focus area of study for the Albemarle Sound criteria development.	Completed October 2014
5	Albemarle Sound workgroup meets quarterly (or more often as necessary) to develop its Preliminary Phase I report. Meeting No. 1 August 2014 Meeting No. 2 October 2014 Meeting No. 3 April 2015 Meeting No. 4 November 2015 Meeting No. 5 January 2016 Meeting No. 6 March 2016 Meeting No. 7 May 2016 Meeting No. 8 July 2016 Meeting No. 9 September 2016	Completed September 2016

Task No. [1]	Task	Anticipated Completion Date
6	Preliminary Phase I report completed. Report includes: • A bibliography and a summary of relevant findings that will inform the development of estuarine nutrient criteria in North Carolina's estuarine waters. • An analysis and summary of available water quality data for causal (N and P) and response variables (Table 1) in Albemarle Sound. The report will discuss the quality of the data available for Albemarle Sound and identify any spatial and temporal patterns. • If necessary, identification of research or monitoring needs for establishing scientifically defensible NNC. • Appropriate numeric thresholds will be reported for all variables that have scientifically defensible information supporting them, and recommendations regarding their use as NNC will be provided to DWR.	Completed January 2018
7	With consultation from the Albemarle Sound workgroup, U.S. Geological Survey completes the Albemarle Sound pilot study of the National Monitoring Network for U.S. Coastal Waters and their Tributaries. Workgroup recommendations and report will be revised, if necessary.	Completed January 2017
8	Present preliminary workgroup phase I report to the SAC and APNEP's STAC for review and comment.	Completed January 2018
9	Provide a formal status update to the EPA.	Completed February 2018
10	The Albemarle Sound workgroup adopts its final phase I report.	Completed February 2018
11	Based on final report recommendations and subject to available resources, perform additional monitoring, research and/or modeling to inform criteria development. The timeline for this step may be revised or accelerated depending on research, monitoring and/or modeling timelines proposed in the phase I report.	September 2019
12	The SAC, CIC, and DWR evaluate new monitoring, research and modeling information in addition to findings from the Phase I report. Nutrient criteria recommendations are developed and documented in a phase II report. *Upon completion of the phase II report, the SAC and CIC will have advised DWR all causal and response variables in Table 1 for use as nutrient criteria.*	April 2022

Task No. [1]	Task	Anticipated Completion Date
13	Adoption of nutrient criteria for the Chowan River/Albemarle Sound per NC APA.	January 2024

[1] Only tasks 11-13 are depicted in the Gantt chart (Appendix 1).

5. Rivers/Streams - Central portion of Cape Fear River Basin

North Carolina has approximately 63,000 miles of rivers and streams. The central portion of the Cape Fear River basin contains approximately 6,050 miles of rivers and streams and is defined from below the B. Everett Jordan Reservoir dam along the Haw River, and below the Randleman Lake dam along the Deep River to Lock and Dam #1 (Figure 3). This area has been identified as a priority for nutrient management since the early 2000s. This is one of the fastest growing regions of the state, and there will be a need to determine allocations for waste assimilation, assess the effects and management of nutrients discharged from point and non-point sources, and develop new drinking water sources in this region.

The central portion of the Cape Fear River has a history of high nutrients. Algal blooms and high chlorophyll-*a* concentrations occur behind Buckhorn Dam and Lock and Dams 1, 2 and 3, particularly during years with low precipitation. Nutrients have been an item of discussion within each of the three monitoring coalitions in the Cape Fear basin: the Upper Cape Fear River Basin Association, the Middle Cape Fear Basin Association and the Lower Cape Fear River Program. Additionally, the Rocky River Heritage Foundation[4,5], The Nature Conservancy, North Carolina State University and the University of North Carolina – Wilmington have expressed interest in nutrients.

Several municipalities have water supply intakes on this portion of the river. Algal blooms have increased drinking water treatment costs for the City of Wilmington; hence, there is a high level of stakeholder interest in this region. The Nature Conservancy is trying to start a process for addressing nutrients; additionally, the Middle Cape Fear Basin Association has expressed interest in working with the DWR on nutrient issues. Researchers from the University of North Carolina – Wilmington have also been studying the algal blooms and algal toxins along portions of the middle and lower Cape Fear River[6]. These events have stimulated considerable stakeholder interest regarding the effects of nutrients and nutrient management.

Impairments: Portions of the Rocky River are listed as impaired for chlorophyll-*a.*

[4] http://www.rockyriverchatham.org

[5] http://www.rockyriverchatham.org/files/RRPost_Mar3_2013-2.pdf

[6] Isaacs, J.D. et al. 2014. Microcystins and two new micropeptin cyanopeptides produced by unprecedented *Microcystis aeruginosa* blooms in North Carolina's Cape Fear River. Harmful Algae 31:82-86 http://www.sciencedirect.com/science/article/pii/S156898831300139X

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Figure 3. Cape Fear River Basin. (Areas in color represent the Central portion of the Cape Fear River Basin for which nutrient criteria are proposed. L&D = Lock and Dam)

Notes: The subwatersheds in gray either have nutrient management plans (i.e., Jordan Lake and Randleman Lake) or are areas that have streams draining to the portion of the Cape Fear River downstream of Lock and Dam 1 (i.e., Lower Cape Fear). Thus, the areas in gray are not in the area designated as the Central portion of the Cape Fear River Basin. The subwatersheds in color are either listed as impaired for chlorophyll-*a,* or are of concern for nutrient over enrichment and comprise the "Central Portion of the Cape Fear River Basin."

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Tasks and Timelines:

Table 4. Task list for the central portion of the Cape Fear River Basin.

Task No.	Task		Anticipated Completion Date
1	Collect, compile, and review water quality data for causal (N and P) and response variables (Table 1). An initial review will focus on data quality, determining spatial and temporal patterns, and data gaps.		Completed December 2014
2	Present results of the data review to the SAC.		Completed January 2015
3	The SAC identifies additional data needs.		Completed March 2015
4	Additional monitoring to support modeling (January 2019 – December 2020).		December 2020
5	Nutrient response model development and report.		July 2021
6	Discuss with the EPA the results of the nutrient response model development and report.		July 2021
7	Establish stakeholder group. Quarterly meetings are planned, to begin July 2021. Nutrient criteria development with the SAC and stakeholder input. Consultation with the SAC will include the potential approach used in developing statewide rivers and streams based on the modeling results.		
	a. Begin consultation with the SAC	July 2021	
	b. Present tentative NNC to SAC	June 2022	
	c. Present refined NNC to SAC	October 2022	
	d. Present proposed NNC to WQC	January 2023	
	e. Present proposed NNC to EMC	April 2023	April 2023
8	Adoption of nutrient criteria for the central portion of the Cape Fear River Basin per NC APA.		October 2024

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6. Activities proposed to prioritize estuaries statewide

The DWR will review any monitoring data that are available to develop priorities for nutrient criteria development. These tasks (Table 5) will be conducted concurrently with those activities in the Albemarle Sound.

Table 5. Tasks for estuaries criteria prioritization.

Task No.	Task	Anticipated Completion Date.
1	Data review and summary for estuaries. Collect, compile and review water quality data for causal (N and P) and response variables (Table 1). An initial review will focus on data quality, determining any spatial and temporal patterns and if there are any data gaps.	April 2020
2	Based upon the water quality data review estuaries will be summarized by watershed characteristics with SAC input.	October 2020
3	Present findings to the SAC.	November 2020
4	Prioritize specific estuaries for nutrient criteria and confirm approaches proposed in the Albemarle Sound nutrient criteria development process with SAC involvement.	October 2021
5	Review progress to date and make revisions to the NCDP if necessary.	November 2021
6	Develop nutrient criteria with SAC involvement using the confirmed approaches: a. Begin consultation with the SAC — November 2021 b. Present tentative NNC to SAC — January 2023 c. Present refined NNC to SAC — July 2023 d. Present proposed NNC to WQC — September 2023 e. Present proposed NNC to EMC — November 2023	November 2023
7	Adopt nutrient criteria per NC APA.	April 2025

7. Activities proposed to prioritize reservoirs/lakes statewide

The DWR will review any monitoring data that are available to develop priorities for nutrient criteria development.

Table 6. Tasks for statewide reservoirs/lakes nutrient criteria prioritization.

Task No.	Task	Anticipated Completion Date.
1	Data review and summary for reservoirs and lakes. Collect, compile and review water quality data for causal (N and P) and response variables (Table 1). An initial review will focus on data quality, determining spatial and temporal patterns, and data gaps.	June 2023
2	Based upon the water quality data review, reservoirs and lakes will be summarized by size, morphological and other characteristics with SAC input.	December 2023
3	Present findings to the SAC.	January 2024
4	Prioritize specific reservoirs/lakes for nutrient criteria, and confirm the approaches proposed during adoption of the nutrient criteria in HRL with the SAC involvement.	December 2024
5	Review progress to date and make revisions to the NCDP if necessary.	January 2025
6	Develop nutrient criteria with the SAC's involvement using confirmed approaches: a. Begin consultation with the SAC — January 2025 b. Present tentative NNC to SAC — March 2026 c. Present refined NNC to SAC — May 2026 d. Present proposed NNC to WQC — October 2026 e. Present proposed NNC to EMC — December 2026	December 2026
7	Adoption of nutrient criteria per NC APA.	May 2028

8. Activities proposed to prioritize rivers/streams statewide

The DWR will review any monitoring data that are available to develop priorities for nutrient criteria development.

Table 7. Tasks for statewide river/stream criteria prioritization.

Task No.	Task	Anticipated Completion Date.
1	Data review and summary for rivers and streams. Collect, compile and review water quality data for causal (N and P) and response variables (Table 1). An initial review will focus on data quality, determining spatial and temporal patterns, and data gaps.	June 2024
2	Based upon the water quality data review river and stream will be summarized by stream order, watershed size and other characteristics with SAC input.	December 2024
3	Present findings to the SAC.	January 2025
4	Prioritize specific rivers/streams for nutrient criteria with the SAC's involvement and confirm the approaches proposed during adoption of the nutrient criteria in the Cape Fear Basin.	December 2025
5	Review progress to date and make revisions to the NCDP if necessary.	January 2026
6	Develop nutrient criteria with the SAC involvement using the confirmed approaches: a. Begin consultation with the SAC — January 2026 b. Present tentative NNC to SAC — March 2027 c. Present refined NNC to SAC — May 2027 d. Present proposed NNC to WQC — September 2027 e. Present proposed NNC to EMC — November 2023	November 2023
7	Adoption of nutrient criteria per NC APA	June 2029

Appendix 1. Gantt chart illustrating NCDP schedule. Diamonds represent milestones.

Task Name	2019				2020				2021				2022				2023				2024				2025				2026				2027				2028				2029			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
High Rock Lake																																											
11c Present draft criteria to CIC				◆																																							
11d Receive CIC comments					◆																																						
11e Present proposed NNC to WQC						◆																																					
11f Present proposed NNC to EMC							◆																																				
12 Adoption of NNC per NC APA																																											
Chowan River/Albemarle Sound																																											
11 Perform additional monitoring/research,																																											
12 NNC developed/documented in Phase II rept																																											
13 Adoption of NNC per NC APA																																											
Central Portion of the Cape Fear River																																											
4 Additional monitoring to support modeling																																											
5 Nutrient response modeling devel/rept																																											
6 Discuss results of model with EPA												◆																																
7 NNC development																																											
7a Begin consultation with SAC																																											
7b Present tentative NNC to SAC															◆																													
7c Present refined NNC to SAC																◆																													
7d Present proposed NNC to WQC																		◆																											
7e Present proposed NNC to EMC																				◆																									
8 Adoption of NNC per NC APA																																											
Statewide estuaries																																											
1 Summarize water quality data																																											
2 Summarize estuary characteristics																																											
3 Present findings to SAC																																											
4 Develop priorities for NNC with SAC																																											
5 Review progress and make revisions																																											
6 Develop NNC with SAC																																											
6a Consultation with SAC																																											
6b Present tentative NNC to SAC																																											
6c Present refined NNC to SAC																																											
6d Present proposed NNC to WQC																																											
6e Present proposed NNC to EMC																																											
7 Adoption of NNC per NCAPA																																											
Statewide Reservoirs/Lakes																																											
1 Summarize water quality data																																											
2 Summarize by size/morphology																																											
3 Present findings to SAC																																											
4 Develop priorities for NNC with SAC																																											
5 Review progress and make revisions																																											
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6d Present proposed NNC to WQC																																											
6e Present proposed NNC to EMC																																											
7 Adoption of NNC per NCAPA																																											
Statewide Rivers and Streams																																											
1 Summarize water quality data																																											
2 Summarize stream characteristics																																											
3 Present findings to SAC																																											
4 Develop priorities for NNC with SAC																																											
5 Review progress and make revisions																																											
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