North Carolina Nutrient Criteria Development Plan

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by the

North Carolina Department of Environment and Natural Resources

Division of Water Resources

Raleigh, North Carolina

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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. In 2004, North Carolina (NC) developed a nutrient criteria plan 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 plan has been updated and amended to reflect commitment and a schedule of progress toward the adoption of nutrient criteria for all state waters. Thus, this North Carolina Nutrient Criteria Development Plan (NCDP) is a revision of the 2004 Nutrient Criteria Implementation Plan (NCIP).

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 NCDP after holding a Nutrient Forum in 2010 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, this revised plan:

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

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

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Conceptual Approach

The focus of this revised strategy will be to develop nutrient criteria based primarily on the linkage between nutrient concentrations and protection of designated uses. For the purposes of this document, "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	

When developing nutrient standards, we will consider all of the above nutrient criteria and causal and response variables. 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 is committed 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. 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 in order 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 2021. Adoption of nutrient criteria statewide is anticipated by 2025.

[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 will be to obtain 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. Establishing a Scientific Advisory Council
2. Nutrient criteria development for High Rock Lake
3. Nutrient criteria development for 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

A Scientific Advisory Council (SAC) will be established to assist the DWR and stakeholder groups with the development of nutrient criteria. Members will be individuals with expertise in areas related specifically to water quality, nutrient response variables, nutrient management, and point and non-point source nutrient abatement. Nominations will be solicited for individuals who meet these criteria. The EPA will be asked to participate on the SAC.

The 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. Further consultation will occur as the DWR develops the SAC. The DWR Director will select members based on the nominations and recommendations from staff.

The SAC will be responsible for:

- Reviewing the quality and relevance of nutrient data.
- Identifying data gaps in the scientific and technical information being used.
- Recommending additional monitoring and data collection.
- Helping develop the management approach for each water body type.
- Reviewing proposed nutrient criteria, including revised chlorophyll-*a* criteria for new (not existing) nutrient management strategies.
- Periodically assisting in the preparation of reports that present the progress of developing nutrient criteria.
- Advising the DWR on social and economic issues pertaining to nutrient management and implementation.

Timeline:

Establishment of the SAC will be completed by November 2014.

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2. **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: The entire lake is currently impaired for chlorophyll-*a* and parts of the lake are impaired for pH.

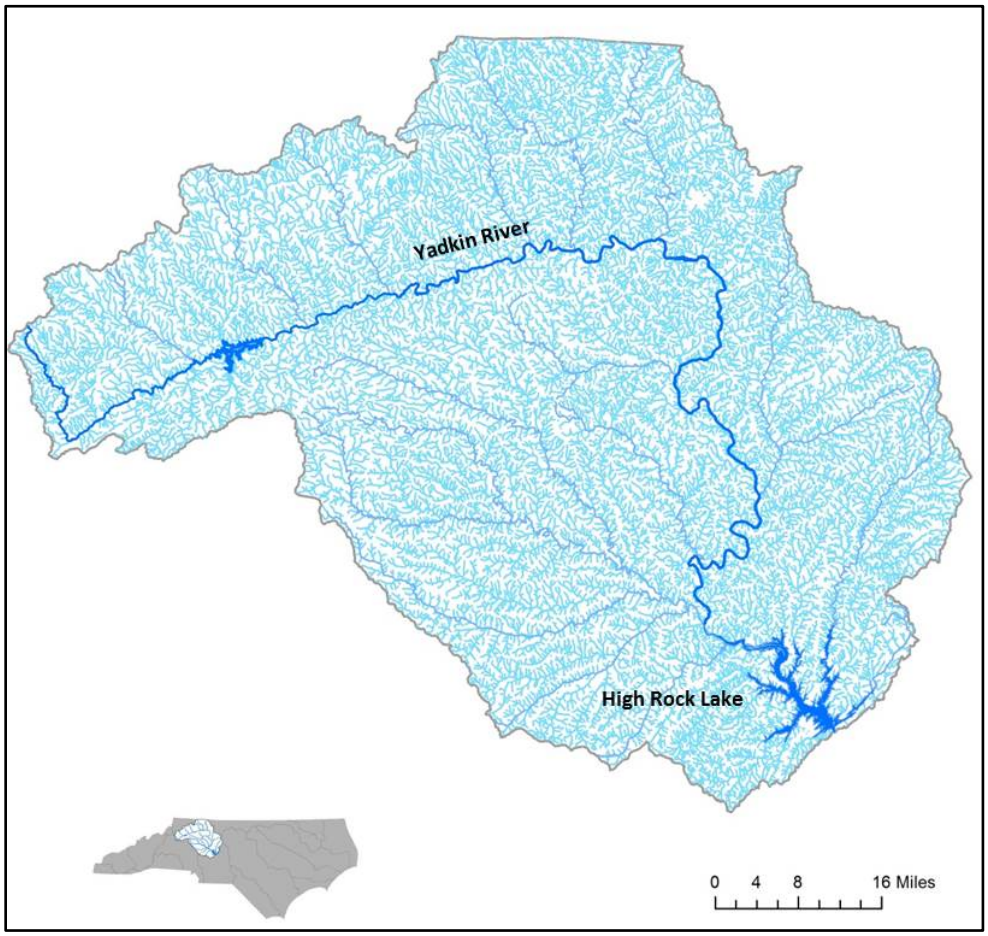

Figure 1. High Rock Lake watershed.

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.	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.	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.	2008
5	Intensive Monitoring Report - Final Report on intensive monitoring 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.	2012
7	HRL Watershed Model Report. Final report issued August 12, 2012.	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.	June 2014
9	HRL Nutrient Response Model Development. Currently being finalized in response to the TAC's review comments. The nutrient response model provides information on the responses of the receiving water body (i.e. High Rock Lake) to nutrient loading.	November 2014
10	HRL Nutrient Response Model Report - Under development.	November 2014

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Task No.[1]	Task		Anticipated Completion Date
11	The stakeholder process will begin after the nutrient response model is completed. Quarterly meetings are planned and will begin January 2015. Nutrient criteria development with the SAC and stakeholder input. The consultations with the SAC will include the potential approach to be used in developing statewide nutrient criteria for lakes and reservoirs based on the modeling results.		
	a. Begin consultation with the SAC	January 2015	
	b. HRL Stakeholder Meetings:		
	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 tentative NNC[2] to SAC	February 2016	
	d. Present refined NNC to SAC	April 2016	
	e. Present proposed NNC to WQ Committee	July 2016	December 2016
	f. Present proposed NNC to EMC	November 2016	
12	Adoption of nutrient criteria for HRL per NC Administrative Procedure Act (APA)		July 2018

[1] Only tasks 8-12 are depicted in the Gantt chart (Appendix 1).
[2] NNC = Numeric Nutrient Criteria

3. **Estuaries - 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.

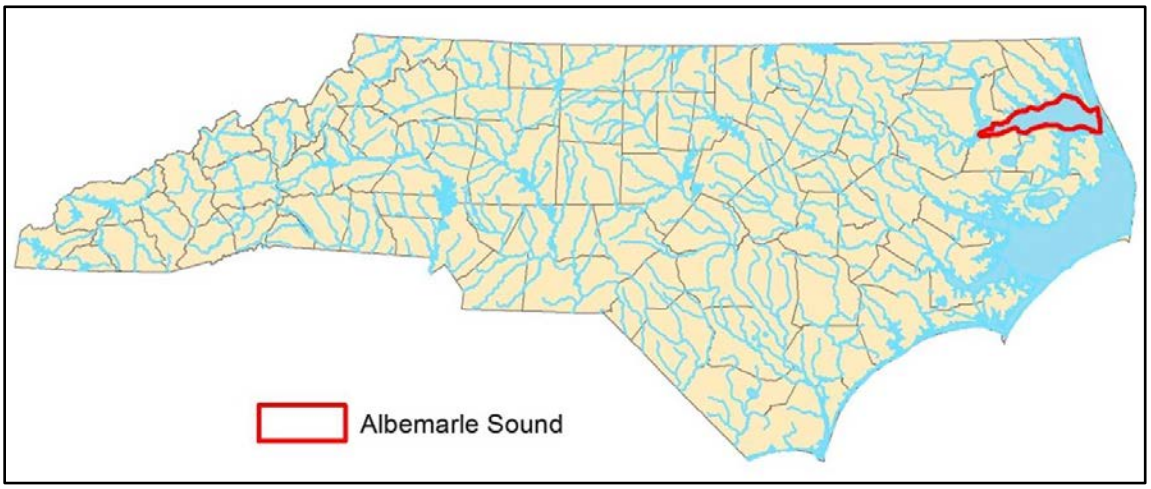

Figure 2. General location of the Albemarle Sound

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 a monitoring project underway in the Albemarle Sound and is 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. These data are currently being quality assured and will be reviewed as part of this process.

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

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Tasks and Timelines:

Table 3. Task list for the Albemarle Sound.

Task No.	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.	July 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.	September 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).	September 2014
4	Albemarle Sound workgroup recommends focus area of study for the Albemarle Sound criteria development.	November 2014
5	Albemarle Sound workgroup meets quarterly (or more often as necessary) to develop its Preliminary Phase I report. Meeting No. 1 February 2015 Meeting No. 2 May 2015 Meeting No. 3 August 2015	August 2015
6	Preliminary Phase I report completion. Report will include: • 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.	November 2015

Task No.	Task	Anticipated Completion Date.
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.	December 2015
8	Present preliminary workgroup phase I report to the SAC and APNEP's STAC for review and comment.	December 2015
9	Provide a formal status update to the EPA.	December 2015
10	The Albemarle Sound workgroup adopts its final phase I report.	March 2016
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 2018
12	The Albemarle Sound workgroup incorporates new monitoring, research and modeling information into a final phase II report. 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. *Upon completion of the phase II report, the Albemarle Sound workgroup will have evaluated all causal and response variables in Table 1 for use as nutrient criteria.*	April 2019
13	DWR proposes recommended criteria for adoption and proposed approaches in developing nutrient criteria for estuaries statewide.	May 2019
14	Adoption of nutrient criteria for the Albemarle Sound per NC Administrative Procedure Act.	December 2020

4. 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."

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.		December 2014
2	Present results of the data review to the SAC.		January 2015
3	The SAC identifies additional data needs.		March 2015
4	Additional monitoring to support modeling (June, 2015 – May, 2017).		May 2017
5	Nutrient response model development and report.		December 2018
6	Discuss with the EPA the results of the nutrient response model development and report.		December 2018
7	Establish stakeholder group. Quarterly meetings are planned, to begin January 2019. 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	January 2019	
	b. Present tentative NNC to SAC	December 2019	
	c. Present refined NNC to SAC	March 2020	
	d. Present proposed NNC to WQ Committee	May 2020	
	e. Present proposed NNC to EMC	July 2020	July 2020
8	Adoption of nutrient criteria for the central portion of the Cape Fear River Basin per NC Administrative Procedure Act.		December 2021

5. 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.	June 2018
2	Based upon the water quality data review estuaries will be summarized by watershed characteristics with SAC input.	December 2018
3	Present findings to the SAC.	January 2019
4	Prioritize specific estuaries for nutrient criteria and confirm approaches proposed in the Albemarle Sound nutrient criteria development process with SAC involvement.	December 2019
5	Review progress to date and make revisions to the NCDP if necessary.	January 2020
6	Develop nutrient criteria with SAC involvement using the confirmed approaches: a. Begin consultation with the SAC — January 2020 b. Present tentative NNC to SAC — March 2021 c. Present refined NNC to SAC — July 2021 d. Present proposed NNC to WQ Committee — September 2021 e. Present proposed NNC to EMC — November 2021	December 2021
7	Adopt nutrient criteria per NC Administrative Procedure Act	June 2023

6. 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 2019
2	Based upon the water quality data review, reservoirs and lakes will be summarized by size, morphological and other characteristics with SAC input.	December 2019
3	Present findings to the SAC.	January 2020
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 2020
5	Review progress to date and make revisions to the NCDP if necessary.	January 2021
6	Develop nutrient criteria with the SAC's involvement using confirmed approaches: a. Begin consultation with the SAC — January 2021 b. Present tentative NNC to SAC — February 2022 c. Present refined NNC to SAC — April 2022 d. Present proposed NNC to WQ Committee — September 2022 e. Present proposed NNC to EMC — November 2022	December 2022
7	Adoption of nutrient criteria per NC Administrative Procedure Act	June 2024

[1] NNC = Numeric Nutrient Criteria

7. 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 2020
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 2020
3	Present findings to the SAC.	January 2021
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 2021
5	Review progress to date and make revisions to the NCDP if necessary.	January 2022
6	Develop nutrient criteria with the SAC involvement using the confirmed approaches: a. Begin consultation with the SAC — January 2022 b. Present tentative NNC to SAC — March 2023 c. Present refined NNC to SAC — May 2023 d. Present proposed NNC to WQ Committee — September 2023 e. Present proposed NNC to EMC — November 2023	December 2023
7	Adoption of nutrient criteria per NC Administrative Procedure Act	June 2025

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