North Carolina Department of Environmental Quality

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

January 7, 2016

MEMORANDUM

TO: ENVIRONMENTAL REVIEW COMMISSION
The Honorable Trudy Wade, Co-Chair
The Honorable Jimmy Dixon, Co-Chairman
The Honorable Chuck McGrady, Co-Chairman

FROM: Matthew Dockham, Director of Legislative Affairs

SUBJECT: Basinwide Hydrologic Models Annual Report

DATE: January 7, 2016

Pursuant to G.S. 143-355(o).9 and updated in S.L. 2010-143 section 2(o)(9), the Department shall report to the Environmental Review Commission on the development of basinwide hydrologic models no later than November 1, of each year. The attached report satisfies this reporting requirement.

If you have any questions or need additional information, please contact me by phone at (919) 707-8618 or via e-mail at matthew.dockham@ncdenr.gov.

cc: Tom Reeder, Assistant Secretary for Environment, NCDEQ
Jay Zimmerman, Director of Water Resources, NCDEQ

North Carolina Department of Environmental Quality
Division of Water Resources

STATUS REPORT TO THE GENERAL ASSEMBLY

DEVELOPMENT OF BASINWIDE HYDROLOGIC MODELS
OCT. 1, 2014 THROUGH SEPT. 30, 2015

Executive Summary

The North Carolina General Assembly directed the N.C. Department of Environmental Quality (DEQ) to develop basinwide hydrologic models, as recommended by the Environmental Review Commission. Session Law 2010-143 requires that the department report to the Environmental Review Commission on the development of basinwide hydrologic models no later than Nov. 1 of each year.

The priority for model development by the department is based on three factors:

1. The degree to which a river basin or a portion of a river basin is experiencing, or will be likely to experience, water supply shortages;
2. Whether the ecological integrity of surface waters in the river basin is threatened, or will likely become threatened; and
3. A river basin for which an existing hydrologic model has not been developed by the department or others.

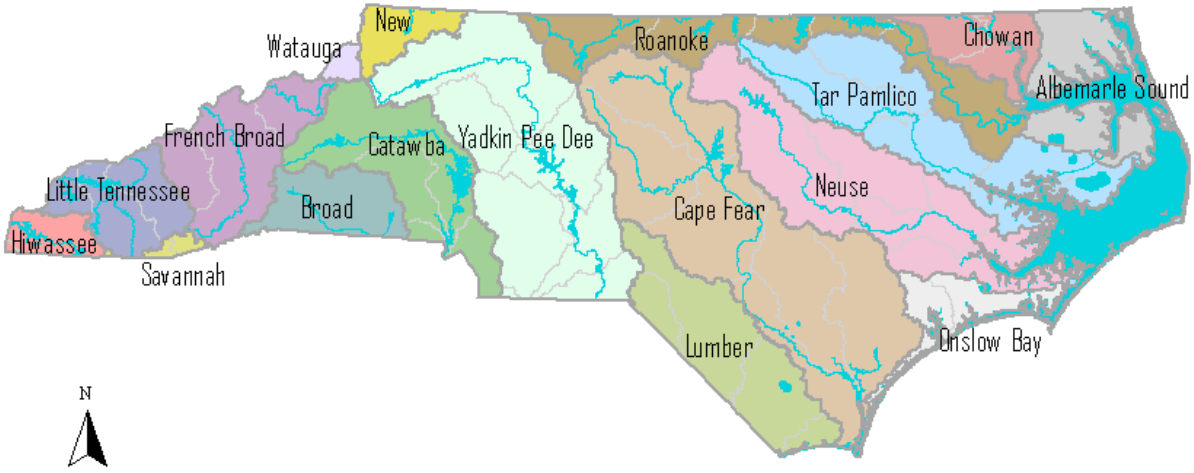
All models under development include the incorporation of the water shortage response plans for water systems. Stakeholder meetings are held in each river basin at specific stages of the model development process. The purpose of these meetings is to provide information to water systems and other stakeholders about the collection of model input data and how the model is constructed. Stakeholders have the opportunity to review all of the information in the model related to their water system for accuracy. The N.C. Division of Water Resources (DWR) also provides model demonstrations. A meeting is held in each basin upon model completion to provide training for interested parties in using the completed river basin hydrologic model.

Model Development Schedule

In accordance with the priorities established in Session Law 2010-143, the department has updated the following table for river basin model development. The table lists the name of the river basin along with the year when the hydrologic model for that basin is proposed to be completed (or has already been completed). The map below shows the river basins for which basinwide hydrologic models will be developed.

Calendar Year	River Basin Hydrologic Models
Completed models	
2011	**Broad and Tar models completed**
2012	**Broad receives EMC approval; Cape Fear and Neuse combined model begun**
2013	**Catawba, Roanoke, Cape Fear and Neuse combined models completed**
2014	**Tar-Pamlico model completed**
Schedule for remaining basins	
2016	**Lumber and Yadkin Pee Dee**
2017	**French Broad, Hiwassee, Little Tennessee and Watauga**
2018	**Albemarle Sound, Chowan, New, Onslow Bay, and Savannah**

North Carolina River Basins



South Carolina is developing hydrologic models for all of the South Carolina river basins. DWR will consult with South Carolina to determine if it is in our best interest to adjust modeling schedules in order to cooperate jointly on the remaining shared river basins, which include the Lumber, Yadkin Pee Dee and Savannah River basins.

Ecological Flows Science Advisory Board

Session Law 2010-143 also mandated that the department create a Science Advisory Board to assist the department in characterizing the natural ecology of the different river basins and to develop procedures for determining the flows necessary to maintain ecological integrity in surface waters. The Ecological Flows Science Advisory Board (EFSAB) was convened

according to the guidelines in the legislation, and its first meeting was held in November 2010. The Science Advisory Board met monthly, or bi-monthly. All meetings were open to the public and participation was also available through webinars. The board issued a final report in November 2013. The report and more information on ecological flows, Ecological Flows Science Advisory Board, meeting summaries, and presentations are available on the division's website at: http://www.ncwater.org/?page=366.

The EFSAB recommended that DEQ use a two-part strategy to establish ecological flows:

- Between 80 and 90 percent of ambient modeled flow should remain in the stream, in combination with a critical low-flow component that identifies when additional actions may be needed to protect ecological integrity; and
- A 10 percent reduction in biological condition initiates further review by DEQ.

The EFSAB also recommended that DEQ use adaptive management in the implementation of the strategy in recognition of the value and insight of lessons learned in modeling, new scientific literature, and the accumulation of additional data to fill in gaps associated with the biology and hydrology of specific North Carolina headwater streams, non-wadeable rivers, and coastal waters.

DWR contracted with the Instream Flow Council (IFC) to peer review the EFSAB's document in response to comments received during a courtesy public review through the Department of Administration's Environmental Review Clearinghouse. The IFC found the document to be on sound scientific footing, based on the scientific literature, and that the recommendations were appropriate for use in a statewide framework. Although the IFC did not identify any fundamental flaws with the EFSAB's document, they did recognize the biological and hydrological data gaps, the lack of specificity in establishing a percent flow-by value, and the use of altered rather than unaltered flow records as the baseline to identify reaches of concern. The IFC recommended that the report be updated at least once every five years to track the status of the recommendations and account for new information that would better inform the planning process.

Environmental Management Commission Model Approval

On September 11, 2014, the division requested EMC approval of the Tar-Pamlico, Roanoke, and combined Cape Fear/Neuse River Basin models. Minutes from this meeting (http://portal.ncdenr.org/c/document_library/get_file?uuid=2c6a8c00-2fdc-497f-89c8-f06ca9110493&groupId=61581) describe the resulting decision. In summary, the decision authorized and directed the Department of Environmental Quality to work with the General Assembly to specifically resolve the inconsistent and incompatible uses of the term "ecological flow" in General Statute §143-355(0)(3). The decision also stated that until the statutory language issue is resolved, the EMC would not be approving hydrologic river basin models. However, the EMC authorized the department to continue to use the Tar River Basin, the Roanoke River Basin and the Cape Fear-Neuse River Basin hydrologic models in planning decisions and, as required, in order to comply with statutes and rules, to make decisions on permit applications, or other matters concerning water allocations. The division is prepared to work with the General Assembly on statute changes during the next legislative session.