

REQUEST TO PROCEED TO EMC FOR APPROVAL OF **ROANOKE** RIVER BASIN HYDROLOGIC MODEL

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SESSION LAW 2010-143

- AN ACT TO DIRECT THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES TO DEVELOP BASINWIDE HYDROLOGIC MODELS
- G.S. 143-355 is amended by adding a new subsection to read:
 - (o) Basinwide Hydrologic Models. - The Department shall develop a basinwide hydrologic model for each of the 17 major river basins in the State as provided in this subsection.

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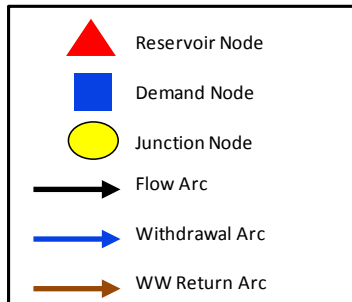
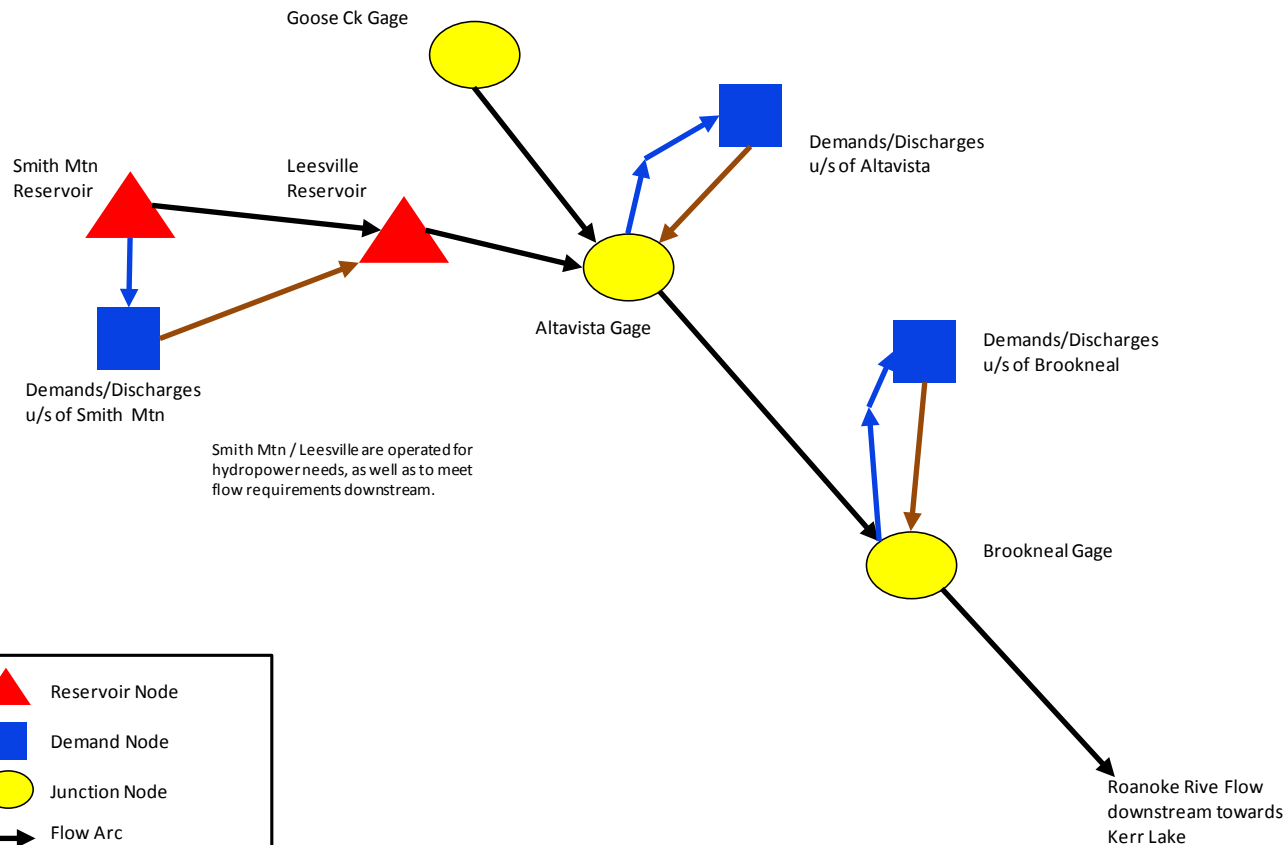
- (o)(3) Model. - Each basinwide hydrologic model shall:
- a. Include surface water resources, groundwater resources to the extent known by the Department, transfers into and out of the river basin, other withdrawals, ecological flow, instream flow requirements, projections of future withdrawals, an estimate of return flows within the river basin, inflow data, local water supply plans, and other scientific and technical information the Department deems relevant.

ROANOKE RIVER BASIN HYDROLOGIC MODEL

- Modeled surface water resources
 - 14 streams
 - 8 reservoirs



Flow Chart of Major Nodes in the Upper Roanoke Basin



ROANOKE RIVER BASIN HYDROLOGIC MODEL

- 4 modeled interbasin transfers
- Other withdrawals
 - 8 reservoir evaporation
 - Agricultural and golf course irrigation, 15 industrial withdrawals
- 8 instream flow requirements
- 2020 - 2060 withdrawal and return flow projections
 - 33 withdrawals
 - 46 return flows

ROANOKE RIVER BASIN HYDROLOGIC MODEL

- Inflow data
 - 11 USGS gages
- Local Water Supply Plans
 - For 44 systems
- Other scientific & technical information Dept. deems relevant
 - Drought plans for 5 systems

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- (o)(3) Model. - Each basinwide hydrologic model shall:
- b. Be designed to simulate the **flows** of each surface water resource within the basin that is identified as a source of water ... in response to different variables, conditions, and scenarios. The model shall specifically be designed to predict the places, times, frequencies, and intervals at which any of the following may occur:
 - 1. Yield may be inadequate to meet all needs.
 - 2. Yield may be inadequate to meet all essential water uses.
 - 3. Ecological flow may be adversely affected.

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- (o)(3) Model. - Each basinwide hydrologic model shall:
- b. Be designed to simulate the flows...
- Validation: evaluation of model performance, i.e., whether model possesses satisfactory range of accuracy consistent with its intended application
- Does model represent real system's flows to sufficient level of accuracy?

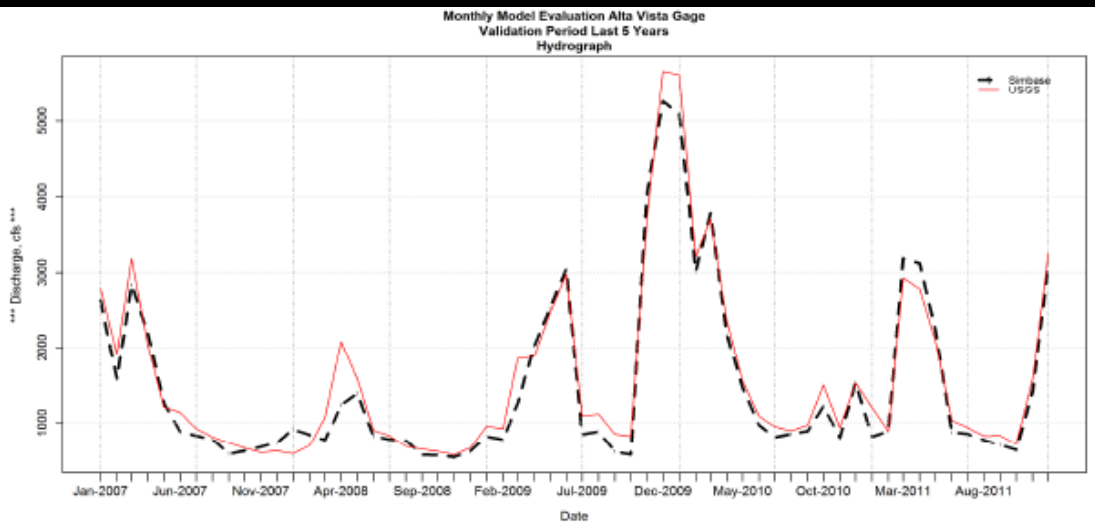
ROANOKE RIVER BASIN HYDROLOGIC MODEL

- Validation: statistical tests

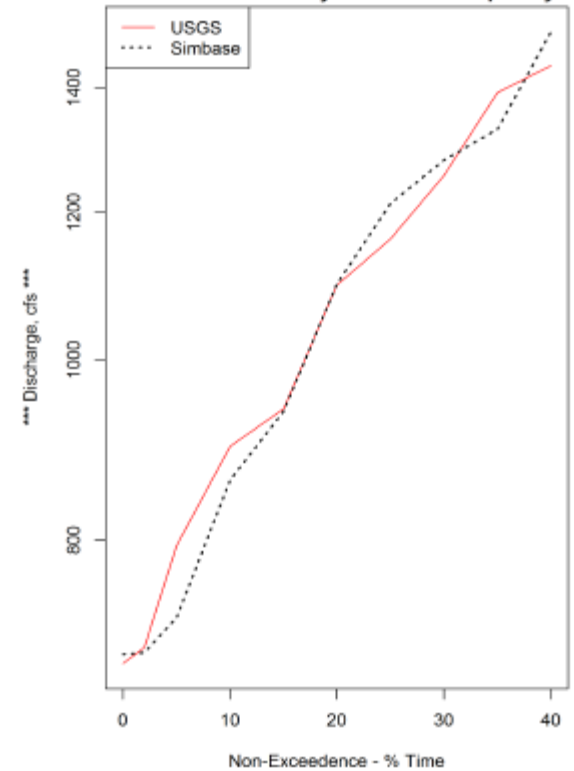
Goodness-Of-Fit Statistics Summary Table - Roanoke Basin Gage Flow						
Gages / GOF Results	Last 5 Years Data			Drought Period Comparison		
	Monthly			Data Source	Total, Days	% Difference $\leq \pm 25\%$
	NSE > 0.5	RSR ≤ 0.70	PBIAS $\leq \pm 25\%$			
220 Alta Vista Gage	0.9584	0.2024	-6.1	USGS	307	
	Satisfactory	Satisfactory	Satisfactory	Simbase	366	19

ROANOKE RIVER BASIN HYDROLOGIC MODEL

- Validation: graphical comparisons



Model Evaluation Paces Gage
Validation Period Last 5 Years
Validation Period - Monthly Low-Flow Frequency Curve



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- (o)(3) Model. - Each basinwide hydrologic model shall:
 - c. Be based solely on data that is of public record and open to public review and comment.
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- ✓ Flow records from U.S. Geological Survey
 - ✓ Withdrawals & discharges from local water supply plans, withdrawal registrations, and NPDES
 - ✓ Public meetings, public notice and comment

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- (o)(5) Interstate cooperation. - To the extent practicable, the Department shall work with neighboring states to develop basinwide hydrologic models for each river basin shared by North Carolina and another state.
- Commonwealth of Virginia supplied data and reviewed model
- North Carolina and Virginia agree to use this model for joint Roanoke River Basin water supply planning

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- (o)(6) Approval and modification of hydrologic models. -
- a. Upon completion of a hydrologic model, the Department shall:
 - 1. Submit the model to the Commission for approval.
 - 2. Publish in the North Carolina Register notice of its recommendation that the Commission approve the model and of a 60-day period for providing comment on the model.
 - 3. Provide electronic notice to persons who have requested electronic notice of the notice published in the North Carolina Register.
- b. Upon receipt of a hydrologic model, the Commission shall:
 - 1. Receive comment on the model for the 60-day period noticed in the North Carolina Register.
 - 2. [Act on the model](#) following the 60-day comment period.

ROANOKE RIVER BASIN HYDROLOGIC MODEL

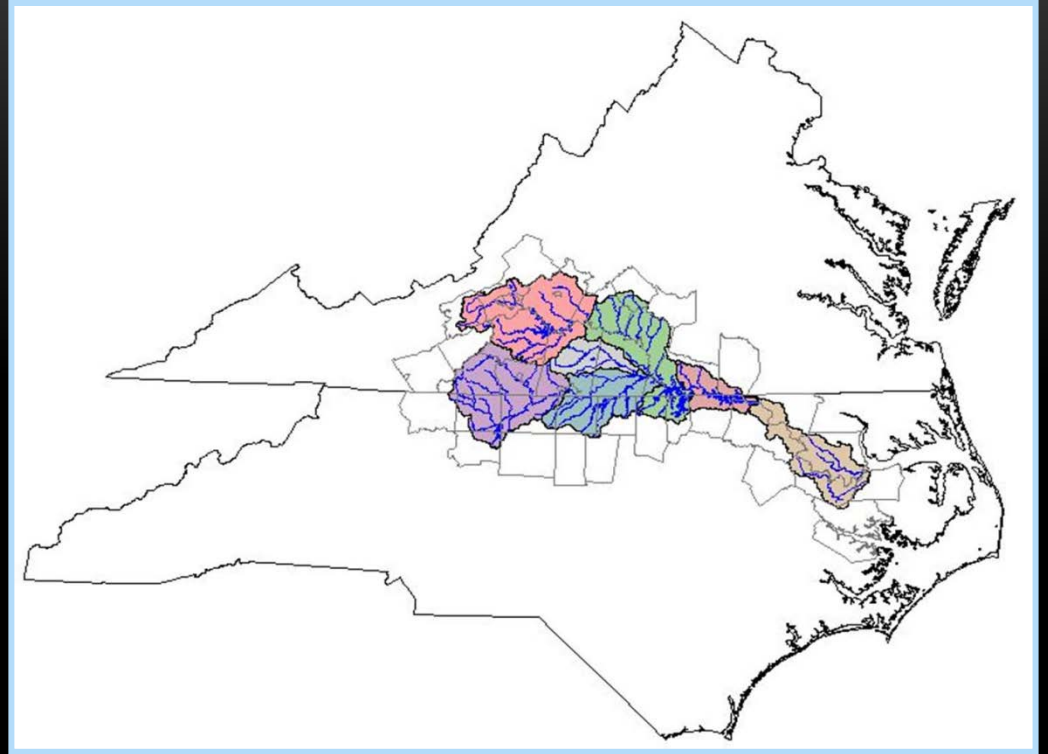
- ✓ NC Register publication February 3, 2014
- ✓ Comments accepted through April 4, 2014
- 2 comments received
 - Duke Energy: provided their water demand projections through 2060
 - Individual: information about historical & topographical study of Roanoke watershed prepared by Virginia Canals & Navigations Society

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- (o)(6) d. A hydrologic model is not a rule, and Article 2A of Chapter 150B of the General Statutes does not apply to the development of a hydrologic model.
 - ✓ Roanoke model is not a rule
- (o)(8) Nothing in this subsection shall be construed to vary any existing, or impose any additional regulatory requirements, related to water quality or water resources.
 - ✓ Roanoke model is for planning purposes only

RECOMMENDATION

- The Division recommends that the Water Allocation Committee approve proceeding to the EMC for approval of the Roanoke River basin hydrologic model.



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QUESTIONS ?