



NARUC Water/Energy Interdependency Issues Panel
Drought in the Southeast

Mr. Steven Jester
Duke Energy Carolinas

February 17, 2008

Presentation Structure

- **Part I** Drought Conditions and Weather Outlook
- **Part II** Dependency on Water
- **Part III** Drought Impacts
- **Part IV** Electric Industry Response to the Drought and Outlook for Summer of 2008
- **Part V** Helpful Lessons

Presentation Structure

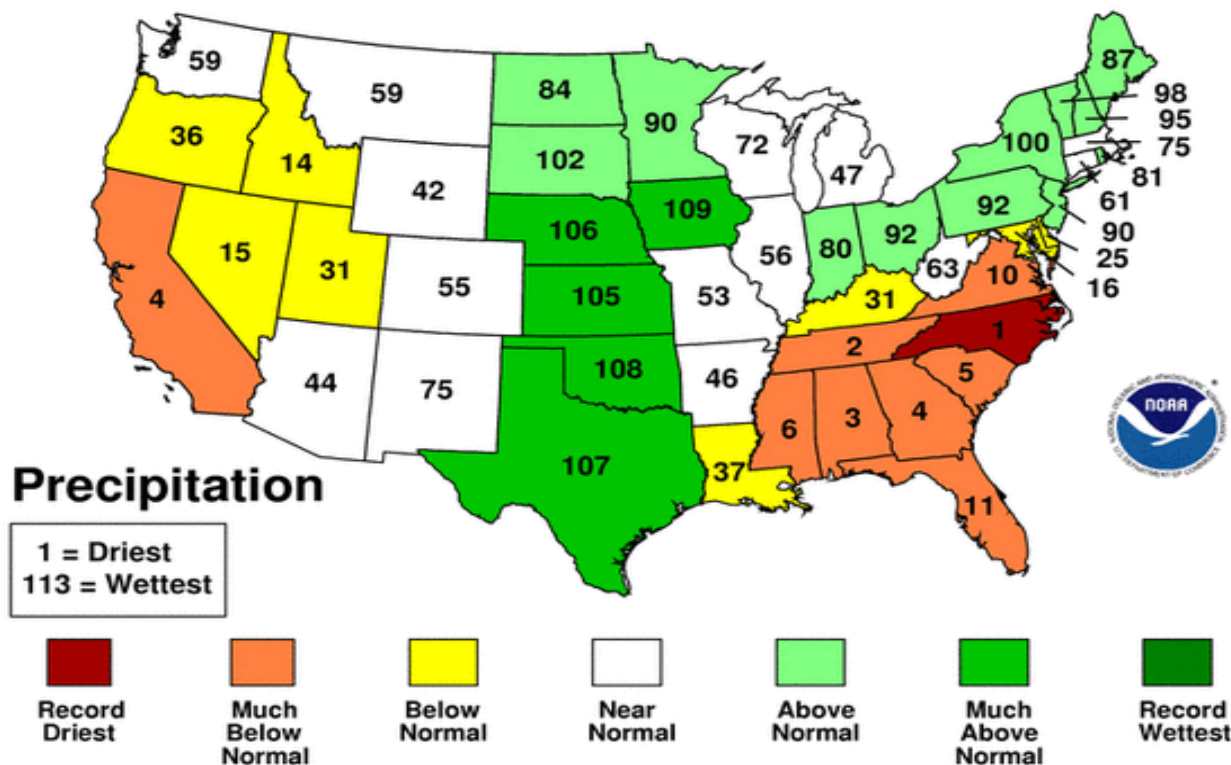
- **Part I** Drought Conditions and Weather Outlook
- **Part II** Dependency on Water
- **Part III** Drought Impacts
- **Part IV** Electric Industry Response to the Drought and Outlook for Summer of 2008
- **Part V** Helpful Lessons

2007 Conditions Quickly Became Severe

- Previously, the southeast experienced the “Drought of Record” which lasted 4 years (ending in the autumn of 2002)
- The current drought, for much of the southeast, started to make its presence known in the spring
- The current drought is different in two respects:
 - This drought developed over a much shorter period of time
 - The intensity is far more severe
- Topped off by [Record Heat](#)

January-December 2007 Statewide Ranks

National Climatic Data Center/NESDIS/NOAA



For the Southeast, 2007 was the second driest year in 113 years

Southeast - Seasonal Weather Assessment (Feb.-April)

- Warmer than average temperatures
- Below long term average rainfall for much of the southeast
 - Many areas have received some rain since mid December
 - Below average rainfall is welcome in contrast to the near arid conditions experienced in 2007
- The northern most part of the Southeastern drought region should see some improvement
- The odds for drought relief diminish farther south, resulting in persisting drought from south-central Alabama eastward and northward through the Carolinas into southeastern Virginia.
- Even where improvement is anticipated, many reservoirs and wells will remain low due to lingering impacts from the extreme rainfall deficits incurred last year.

Presentation Structure

- **Part I** Drought Conditions and Weather Outlook
- **Part II** Dependency on Water
- **Part III** Drought Impacts
- **Part IV** Electric Industry Response to the Drought and Outlook for Summer of 2008
- **Part V** Helpful Lessons

Society is Dependent upon Water

- Drinking Purposes
- Industrial Uses
- Agricultural Uses
- Residential Uses
- Recreational Uses
- Shipping and Travel (in some areas)

Power Generation is Dependent upon Water

- There is an obvious connection between water and conventional hydroelectric and pumped storage hydroelectric generation (both fueled by water)
- Plants use water to condense the steam cycle and to cool the power producing equipment.
- Plants use water in wet scrubbers to control sulfur emissions.
- Plants use water to inject into the combustion process to control the formation of oxides of nitrogen.
- Plants use highly purified water in the steam cycle (or loop).
- *Steam generation plants need considerable volumes of water but much of the water is returned to the source river or reservoir*

Presentation Structure

- **Part I** Drought Conditions and Weather Outlook
- **Part II** Dependency on Water
- **Part III** Drought Impacts
- **Part IV** Electric Industry Response to the Drought and Outlook for Summer of 2008
- **Part V** Helpful Lessons

- Stream flows are very low
 - In coastal areas this can increase the threat of salt water intrusion
- Reservoirs with far less than ideal water storage
- Municipal and Industrial water intakes threatened
- Highly water dependant businesses impacted – Particularly agriculture, landscaping industry, industrial processes, etc.
- Recreational impacts
- Households curtailing water consumption out of necessity

- Conventional hydro generation – Many utilities, including Duke, have experienced drought related impacts.
 - In the Southeast, conventional hydro does not represent a large portion of the overall electric generation capability but it is an important piece
 - At Duke, Conventional hydro represents 5% of our total generating capability in the Carolinas and accounted for 1.5% of actual generation during 2006.
- Some electric utilities, including Duke, did experience thermal de-rates at some steam generation plants last summer.
 - At Duke we were able to manage these de-rates such that there were no impacts during peak demand periods.
- Increased use of peaking type generation, e.g. combustion turbines
- Duke and other electric utilities have been able to meet their customer's (native load) demand for electricity.

Presentation Structure

- **Part I** Drought Conditions and Weather Outlook
- **Part II** Dependency on Water
- **Part III** Drought Impacts
- **Part IV** Electric Industry Response to the Drought and Outlook for Summer of 2008
- **Part V** Helpful Lessons

Southeast Utilities are:

- Monitoring river flows and lake elevations
- Maintaining water storage in key reservoirs
- Implementing modifications to generation (intended to mitigate drought-related risks, e.g. mitigating thermal discharge limits)
- Implementing modifications to unlock (get-at) additional water stored in the reservoirs
- Incorporating drought-related risks in power supply planning
- Continuing to execute appropriate stage of drought contingency plans at affected plants
- Monitoring drought impacts in coordination with their utility neighbors
- Collaborating on and reviewing potential drought impacts on the bulk transmission system

Looking Forward – Utilities are continuing to:

- Plan, monitor, and adjust
- Promote water conservation
- Ask customers to use less electricity
- Monitor Generation Availability/Demand and Evaluate Options
 - Continued reduced use of conventional hydro generation
 - Thermal de-rate issues (perhaps most often at fossil plants)
 - Increased usage of Combustion Turbines
 - Use of demand-side load reduction programs
 - Appropriate consideration of off-system purchases

Presentation Structure

- **Part I** Drought Conditions and Weather Outlook
- **Part II** Dependency on Water
- **Part III** Drought Impacts
- **Part IV** Electric Industry Response to the Drought and Outlook for Summer of 2008
- **Part V** Helpful Lessons

A drought is not like a storm event. There is no dramatic beginning or ending of events but a series of changing circumstances.

- Regions should know their river systems
 - We should know how much water is available for use and what are long-term flow and use projections
 - We should have stream-flow, lake level and groundwater monitors in place
 - We should know all critical water intake elevations (not just your own), etc.
- Utilities need a good understanding on how the groundwater fluctuations, seasonal natural evaporation rates, etc., impact streams and reservoir levels
- We should view river basins (including the large streams and reservoirs) as a water supply system and establish the philosophy that all users share the resource as well as the management responsibility
- Establish alliances among hydropower reservoir owners and public water system operators, as they both serve the same households
 - Everyone expects 100% reliability of both their electric supply and their water supply

- Establish a water shortage response plan with objective triggers
 - **Catawba-Wateree Low Inflow Protocol** - Developed with stakeholders during a recent relicensing project defines the actions that the 5000 square mile basin will take during periods of low stream flows and dropping reservoir levels to extend the available water resources and allow time for normal rainfall to return
- Minimize options for consumers to be confused about water use restrictions (**i.e., utilities should work with public water systems to establish consistency in water use restrictions between jurisdictions and communicate together**)
- Drought scenario planning is critical and that planning should be fluid
- Pursue capital projects that would help mitigate thermal impacts, allow access to additional water stored in reservoirs, etc.
- Collaboration with other electric utilities is critical

EFFECTIVE DROUGHT COMMUNICATIONS are ESSENTIAL

- Keep regulators and elected officials informed
- Keep our employees informed
- Regularly interface with others who rely upon the shared water supply, e.g. public water systems, business, industry, etc.
- Communicate with federal and state agencies; they are in a better position to help if they are informed
- Stay engaged with the media in an effort to keep the facts in front of the public
- Use e-mail and the Internet to distribute updates – (example = the [Duke Drought Webpage](#))

In Conclusion

- We should use the drought situation as a springboard for long-term improvements
 - Refine water resource plans
 - Build long-term consumer education and water conservation programs
 - Get water intakes (ours and others) modified to operate at lower depths
 - A crisis tends to rally folks around a cause – those relationships need to remain intact after the drought passes



The screenshot shows the Duke Energy website's 'Carolinias Drought Information' page. The navigation menu includes Residential Customers, Business Customers, Public Safety, Environment & Sustainability, Community, Careers, Investors, News, and About Us. The page content features a 'Lakes & Recreation' sidebar with links like 'Check Lake Levels' and 'Scheduled Flow Releases'. The main content area has the heading 'Carolinias Drought Information' and a paragraph stating: 'Persistent drought conditions continue in both Carolinas. The Catawba-Wataree River basin is a vital resource in the region, providing water for drinking, sanitation, recreation, power generation, business uses and aquatic habitat. As the drought continues, energy and water conservation become even more important.' Below the text is a photograph of a bird on a rocky shore. To the right, a 'RELATED LINKS' section lists various resources such as 'Energy Conservation Tips - NC Customers' and 'Water Conservation Tips'.