EMC Update November 2017
Drought Response and Catawba-Wateree Water Management Group Update

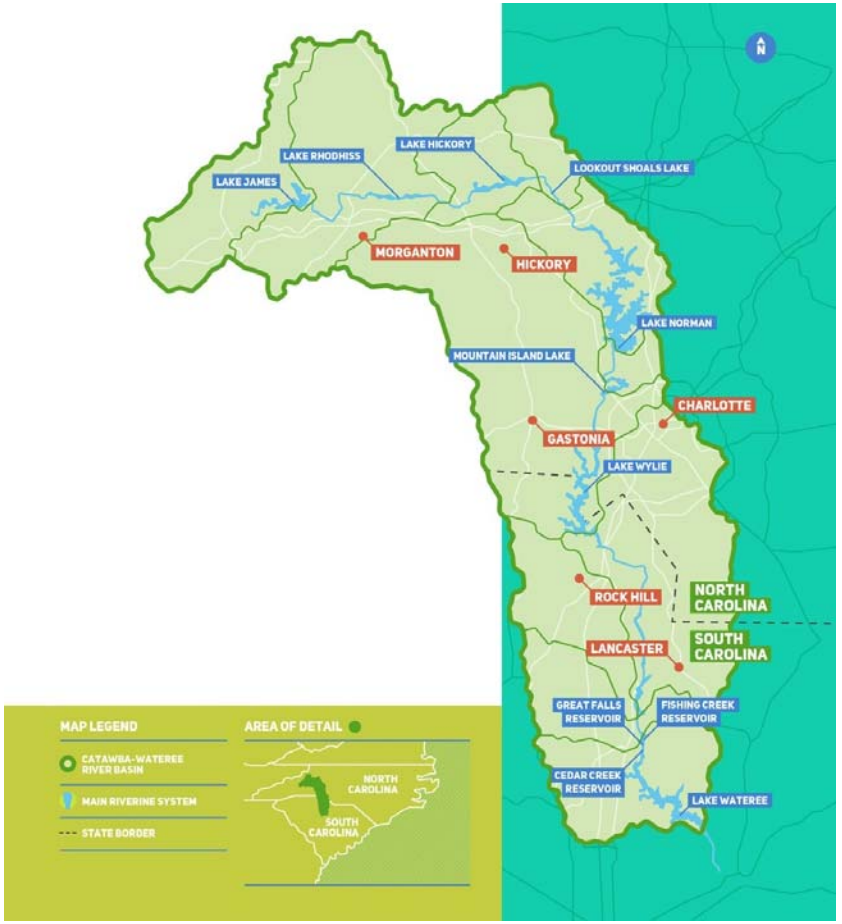
CATAWBA WATEREE
WATER MANAGEMENT GROUP

Agenda

- Introduction to Low Inflow Protocol (LIP) for Catawba-Wateree Basin
- How the LIP works
- LIP Results Evaluated
- Update on Catawba-Wateree Water Management Group

Catawba-Wateree River Basin

- Approximately 2 million people
- 4,750 Square miles
- 220 River miles
- 11 Interconnected reservoirs
- 13 Hydropower stations
- Nuclear & coal power stations
- 18 Public water suppliers that directly use or rely on the basin reservoirs



Low Inflow Protocol (LIP) Introduction

- **Principle –** All parties will share responsibility to establish priorities and to conserve the limited water supply

- **Goal –** Delay full depletion of the available water storage during drought

- **Strategy** - Identify onset and changes of drought conditions and act to make the 11 lakes meet regional needs through the drought

Low Inflow Protocol (LIP) Introduction

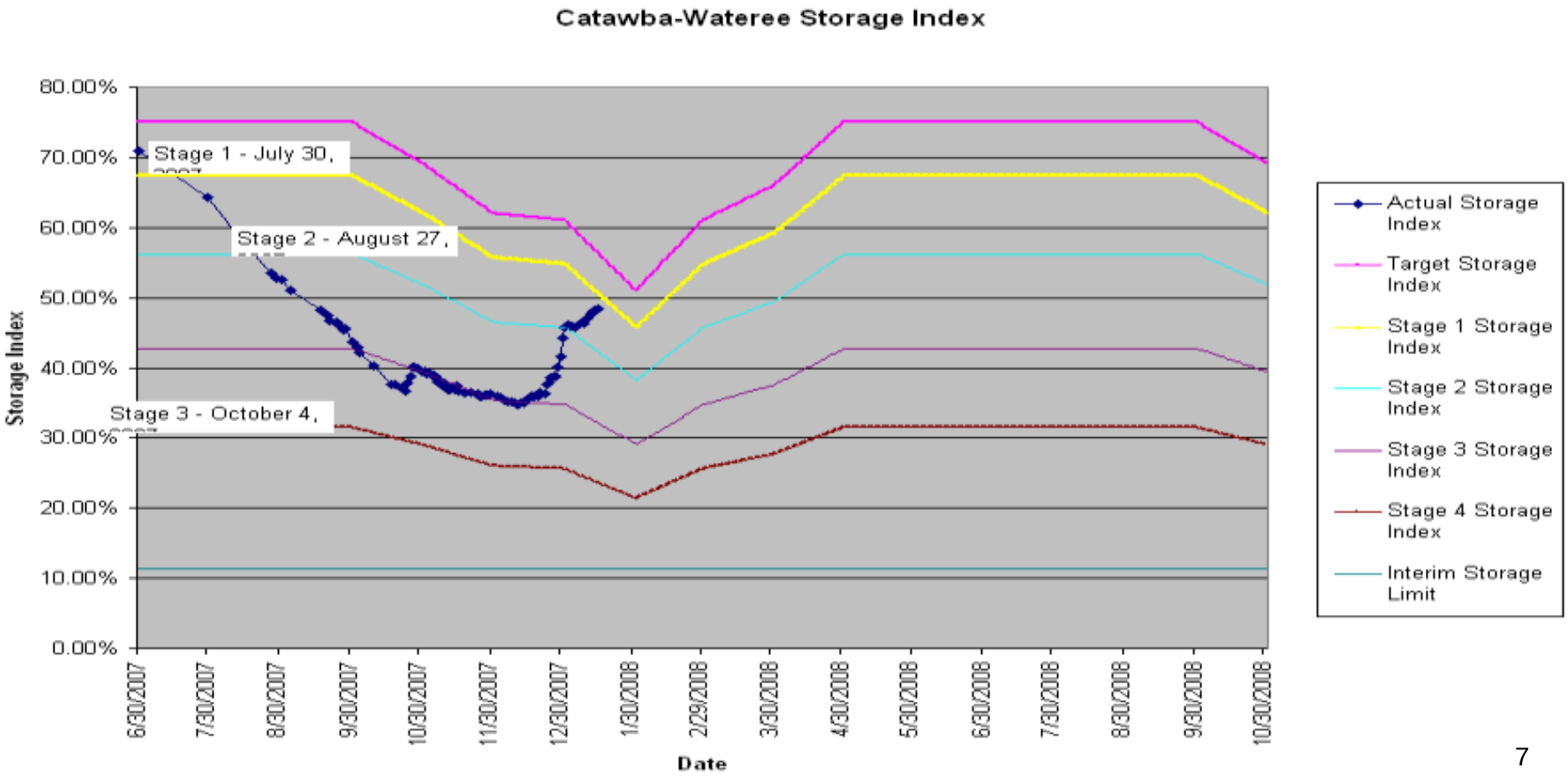
- **Governance** – LIP is managed by Duke Energy in conjunction with a Catawba-Wateree Drought Management Advisory Group (CW-DMAG)

- **Regulation** – LIP is enforceable through FERC License held by Duke Energy

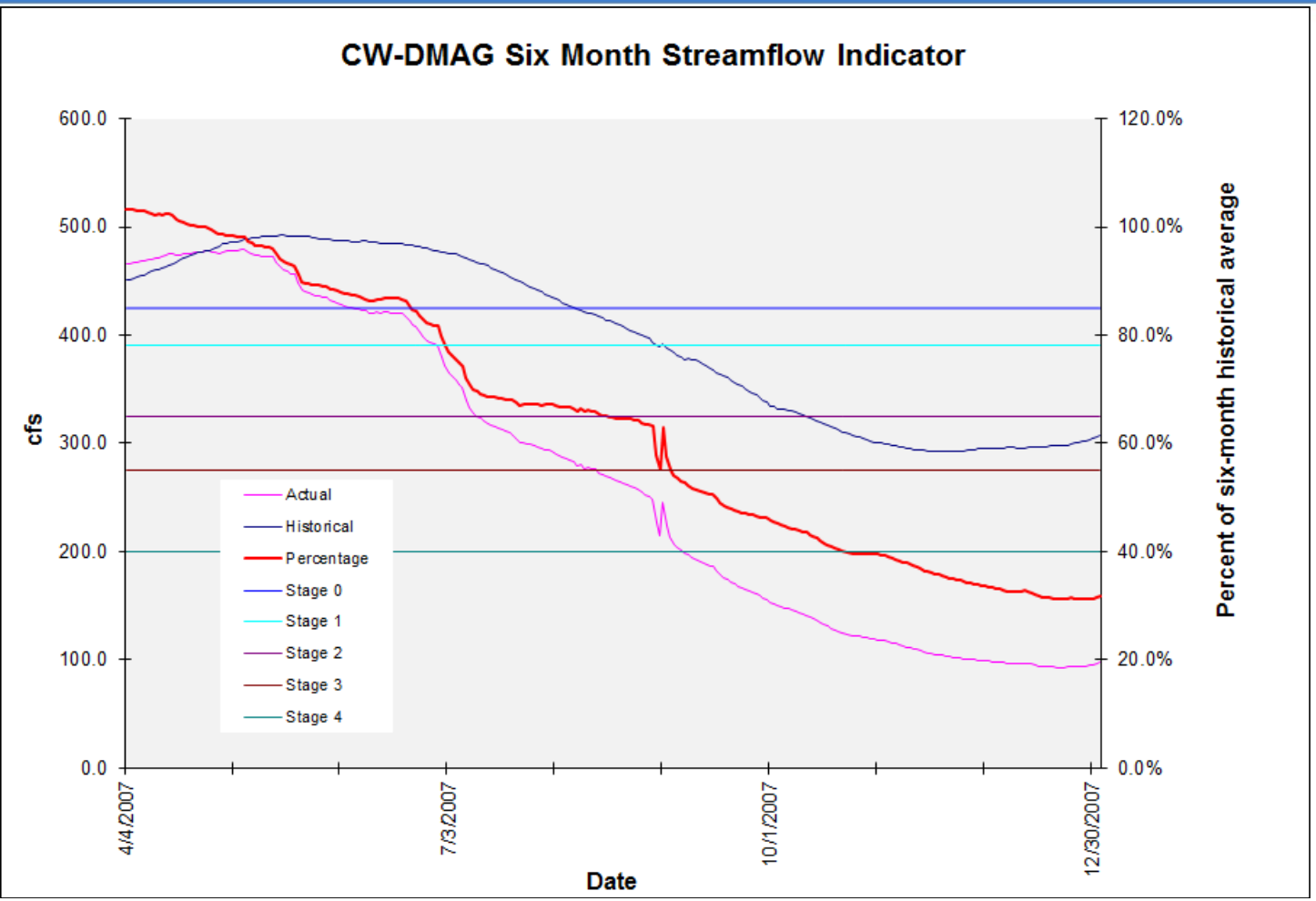
Drought Indicators

- How much total remaining usable water is in the reservoirs
- How much water is flowing into the reservoirs
- Reports from U.S. Drought Monitor, a government index that indicates areas experiencing drought and the severity, specific to the Catawba-Wateree River Basin
- Indicators are evaluated and reported at least monthly

Remaining Usable Water Storage

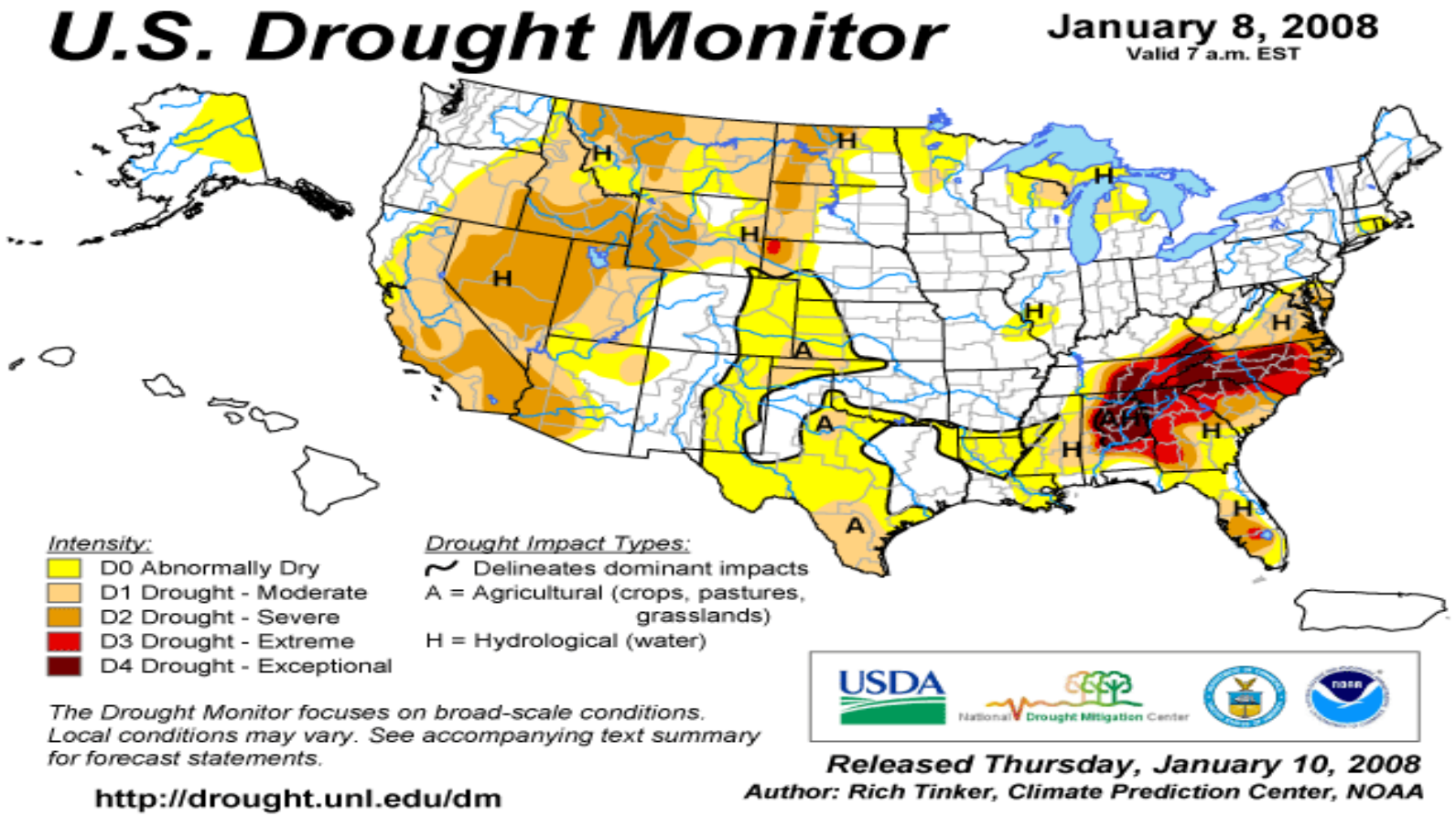


Stream Flows into the Reservoirs



- Four tributary USGS Streamflow Gages
- Monitored for six-month averages
- Compared to the historical flows for the same six-month period

U.S. Drought Monitor



Drought Indicators – Current Conditions

Storage: **Stage 1 Condition**
Storage Index (SI): 68%
Target Storage Index (TSI): 76.8%
Ratio: 88.5%

Streamflow: **Normal Condition**
(Six month average versus historical six month average)
Six-month ratio: 104%

U.S. Drought Monitor: **Normal Condition**
(Three month average of worst weighted condition)

Three-Month Numeric Average: -0.67

Current Overall – Stage 0 (in Recovery)

Catawba-Wateree LIP Trigger Status Summary for 10/02/17 and Changes Compared to 09/01/17

	Reservoir Storage as % of Target	% of 6-Month Long-Term Avg Streamflow	3-Month Avg of US Drought Monitor	Groundwater Levels
Normal	>=100%	>85% (104.0%)	<0 (-0.67)	
LIP Stage 0 (Oct 2, 2017)	>90% (88.5%)	<=85%	>=0	
LIP Stage 1	>75%	<=78%	>=1	Glen Alpine, Langtree
LIP Stage 2	>57%	<=65%	>=2	
LIP Stage 3	>42%	<=55%	>=3	
LIP Stage 4	<=42%	<=40%	4	

To recover to a less restrictive LIP Stage, all four triggers must support that Stage or lower.

CW-DMAG Membership

- NC Department of Environmental Quality
- NC Wildlife Resources Commission
- SC Department of Natural Resources
- SC Department of Health and Environmental Control
- US Geological Survey
- US Fish and Wildlife Service
- National Marine Fisheries Service
- Owners of large water intakes within the basin (31 entities)
- Duke Energy (Designated as CW-DMAG Coordinator)

Development of LIP Actions

- Based on highly developed hydrologic model of Catawba-Wateree River Basin
- 80 + years of hydrologic data used for analysis
- Considers “failure” at any reservoir a system failure
- Uses projected growth and water consumption data
- Considers water supply, power production, other large water users
- Iterative modeling process determined steps needed to meet goals
- Modeled drought of record against 50 year growth projections
- Sets targets and gives users flexibility as to how targets are met

Actions Required – Stage 0

- Duke Energy
  - Activate CW-DMAG
  - Reduce recreational flow releases at Lake Wylie Dam

- Water Suppliers
  - Participate in CW-DMAG conference calls
  - Prepare to implement further drought response measures

Actions Required – Stage 1

- Duke Energy
  - Reduce minimum flow requirements
  - Reduce normal minimum allowed lake levels (does not necessarily mean the lake level will go to that level)
  - Enhance communications
  - Bi-weekly updates to water intake owners
- Water Suppliers and large irrigators
  - Notify customers and employees
  - Request customers voluntarily reduce water use by 3% - 5%
- Owners of other Large Water Intakes
  - Notify customers and employees
  - Request voluntary water and energy conservation

Actions Required – Stage 2

- Duke Energy
  - Eliminate recreational flow releases
  - Further reduce minimum flow requirements
  - Further reduce minimum lake levels
  - Update communications
  - Notify FERC, USFWS, USBIA, NMFS, and Catawba Indian Nation
- Water Suppliers and large irrigators
  - Update customers and employees
  - Require customers restrict water use with reduction goal of 5% - 10%
  - Enforce mandatory water use restrictions
  - Provide updates to DMAG on actual water use trends
- Owners of other Large Water Intakes
  - Update customers and employees
  - Request voluntary water and energy conservation
  - Provide updates to CW-DMAG on actual water use trends

Actions Required – Stage 3

- Duke Energy
  - Further reduce minimum flow requirements to critical flow level
  - Further reduce minimum allowed lake levels
  - Update communications
  - Notify FERC, USFWS, USBIA, NMFS, and Catawba Indian Nation
  - Provide bi-weekly updates to owners of large water intakes
- Water Suppliers and large irrigators
  - Update customers and employees
  - Require customers further restrict water use with reduction goal of 10% - 20%
  - Enforce mandatory water use restrictions through penalty assessment
  - Encourage industrial/manufacturing process changes to reduce water consumption
  - Provide updates to CW-DMAG on actual water use trends
- Owners of other Large Water Intakes
  - Update customers and employees
  - Request increased voluntary water and energy conservation
  - Encourage industrial/manufacturing process changes to reduce water consumption
  - Provide updates to CW-DMAG on actual water use trends

Actions Required – Stage 4

- Duke Energy
  - Provide critical flows as long as possible
  - Further reduce minimum lake levels to critical reservoir elevations
  - Update communications and schedule meeting of CW-DMAG specific to Stage 4 LIP condition
  - Notify FERC, USFWS, USBIA, NMFS, and Catawba Indian Nation
  - Provide bi-weekly updates to owners of large water intakes
- Water Suppliers and large irrigators
  - Update customers and employees of move to emergency water use restrictions
  - Restrict all outdoor water use
  - Implement emergency water use restrictions with reduction goal of 20% - 30%
  - Enforce mandatory water use restrictions through penalty assessment
  - Meet with industrial/manufacturing customers to develop contingency plans
  - Prepare to implement emergency plans to respond to water outages
  - Provide updates to CW-DMAG on actual water use trends
- Owners of other Large Water Intakes
  - Update customers and employees
  - Request increased voluntary water and energy conservation
  - Encourage industrial/manufacturing process changes to reduce water consumption
  - Provide updates to CW-DMAG on actual water use trends

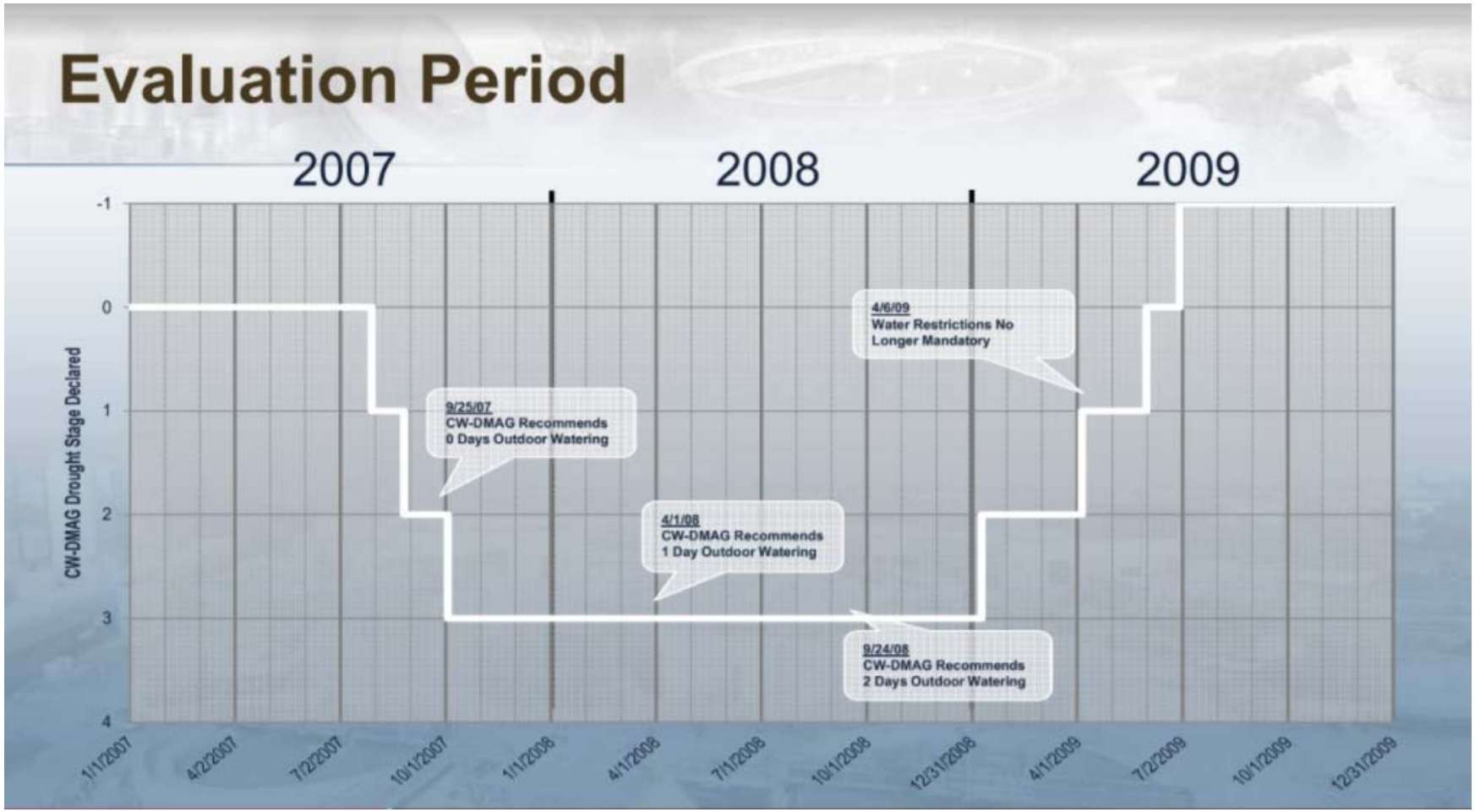
Recovery from LIP

- All three indicators must meet or exceed threshold levels
- Groundwater level trigger points must be attained
- CW-DMAG communications remain active until “normal” stage reached
- Intent is to avoid short term movement into and out of stages

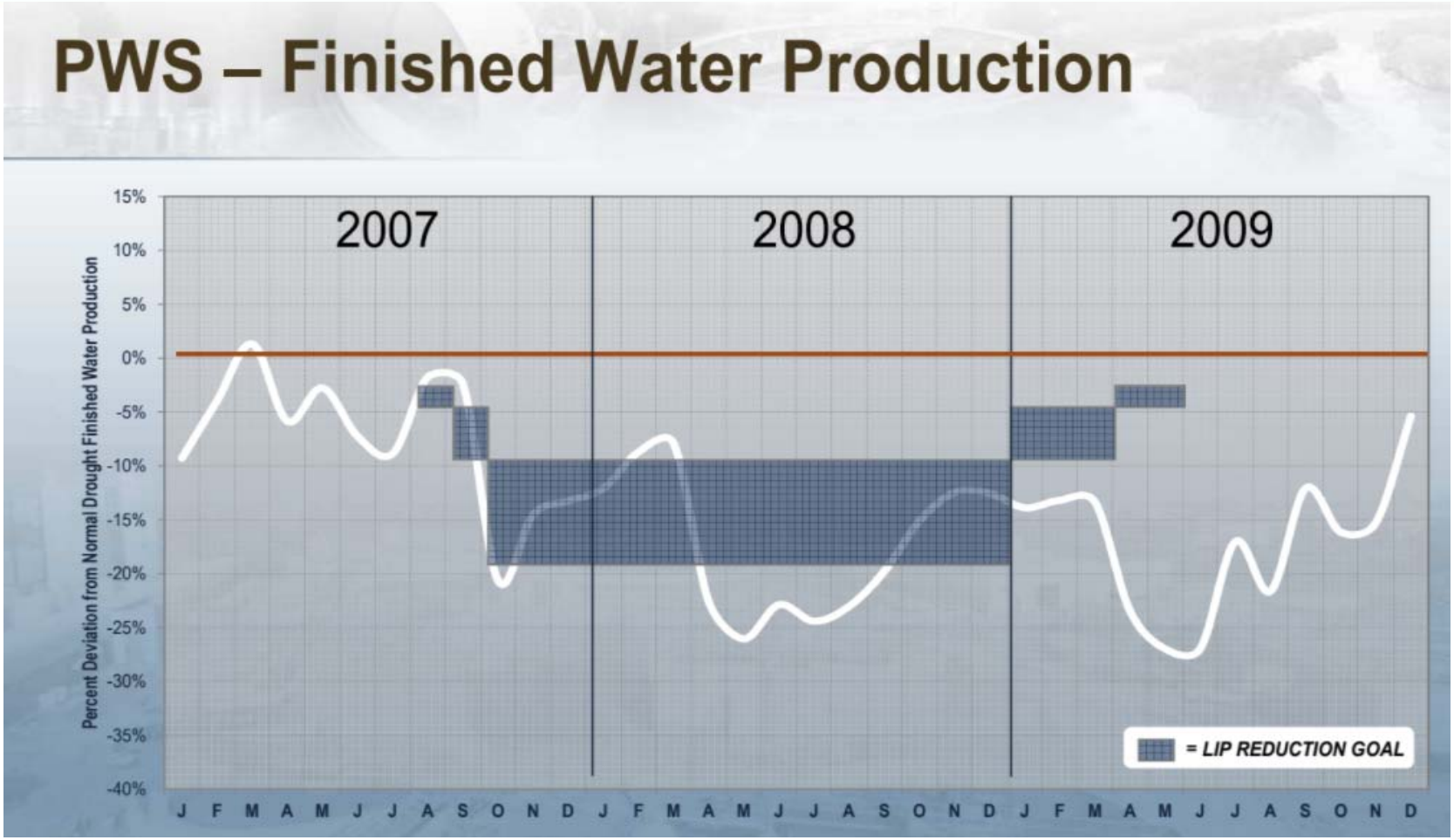
Evaluation of LIP Results

- Iterative reviews of LIP
  - 2011 – Review effectiveness during 2006 – 2009 drought
  - 2013 – Refine baseline for comparative water use
  - 2016 – Review drought indicators, threshold levels and some response actions

Review of 2006 – 2009 Drought



Review of 2006 – 2009 Drought



2011 LIP Review Conclusions
2006-09 Drought

- LIP reduction goals largely met or exceeded
- Reduced outdoor watering (e.g., lawn sprinkling) the likely largest contributor to savings
- Water user response was quick entering Drought; slow leaving the Drought
- Flood control even during droughts can require higher than planned LIP releases often.
- As intended, independent industrial water use not a significant contributor to reductions.
- LIP response by CW-DMAG members improved over course of Drought

Catawba-Wateree Water Management Group is a non-profit corporation working to extend and enhance the capacity of the Catawba and Wateree Rivers to meet human needs while maintaining the ecological health of the waterway

www.catawbawatereewmg.org

Membership

Our Members

Catawba River Water Treatment Plant (Union County, NC; Lancaster County Water & Sewer District, SC)

Chester Metropolitan District, SC

City of Belmont, NC

City of Camden, SC

City of Charlotte, NC

City of Gastonia, NC, Two Rivers Utilities

City of Hickory, NC

City of Lenoir, NC

City of Morganton, NC

City of Mount Holly, NC

City of Rock Hill, SC

City of Statesville, NC

Duke Energy Carolinas, LLC

Lincoln County, NC

Lugoff-Elgin Water Authority, SC

Town of Granite Falls, NC

Town of Long View, NC

Town of Mooresville, NC

Town of Valdese, NC

Our Work

We are committed to work based on:

- **Sound science**
- **Affordable engineering**
- **Existing technology**
- **Maintaining quality of life and economic viability for the region**

We deliver on this Mission through an Annual Strategic Focus

Leverage strategies of the WSMP to effectively protect, preserve and increase awareness of our water supply, and encourage practices that support extending our supply into the next century.

Identify and execute a series of research and technical projects that directly serve CWWMG members and address regional issues requiring leadership and vision.

Promote CWWMG's brand, visibility and reputation by providing the highest quality research, data and support, and communicating often with a wide range of community partners.

Reducing Threats to Safe and Sufficient Water Supply – Water Supply Master Planning

- It's a ***process*** – not an event!
- Undertaken voluntarily – no regulatory mandate
- Voluntary implementation
- Multiple phases/components
  - Safe Yield Research Project – Establish credibility of modeling & assumptions
  - Water Quantity – Extend safe yield capacity beyond year 2100
  - Water Quality – Understand future of source as drinking water supply
  - Economics – Document value of the water supply, role in the economy
- Update at regular intervals

Other CWWMG Projects

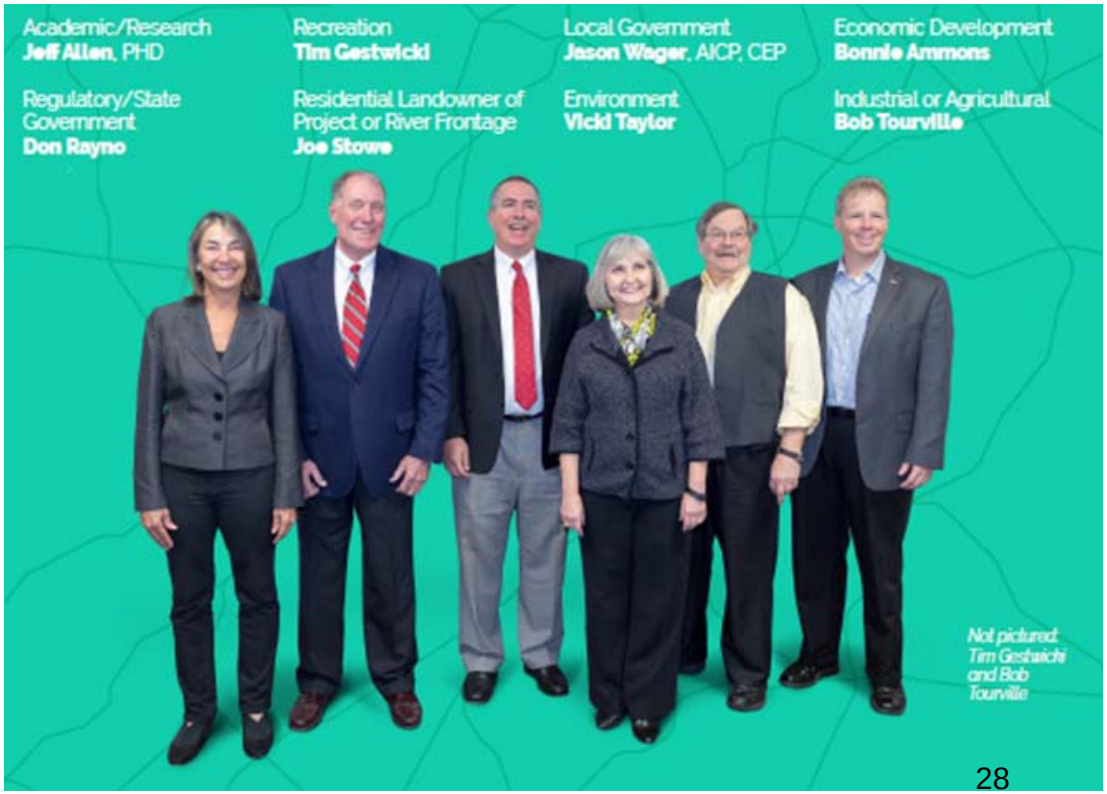
- Sediment Monitoring
- Water Use Efficiency Plan
- Intake Contingency Plan
- LIP Response Evaluation
- USGS Groundwater Well Project
- Rhodhiss Tailrace Nutrient Study
- Safe Yield Research Project
- Land Conservation and Water Quantity
- Regional Water Audit / Water Loss Management
- Annual Reports
- Water for All Summit Event

Broader Perspectives

- Advisory Committee
  - Individual feedback
  - External perspectives
  - Support CWWMG's mission
  - Strictly advisory in nature

- 5-Year Self-Assessment

CWWMG Advisory Committee



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Questions?