# Low Inflow Protocols in the Catawba and Nantahala Area Basins

NALMS 19th Annual Southeastern Lakes Management Conference
May 5, 2010

Ed Bruce, P.E.
Senior Engineer, Duke Energy

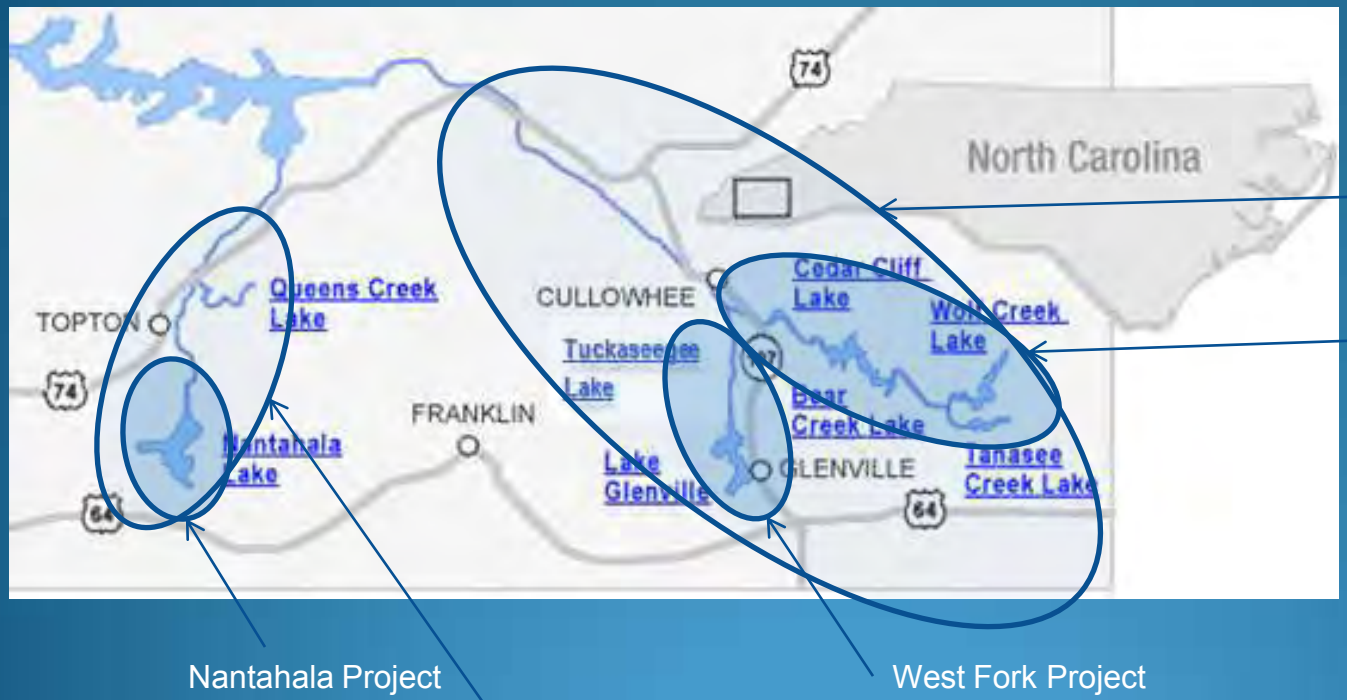
# Low Inflow Protocols in the Catawba and Nantahala Area Basins


Nantahala Area

Catawba-Wateree Basin

# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Nantahala Area




Tuckasegee River Basin

East Fork Project

Nantahala Project

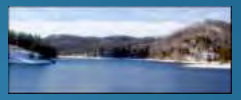
Nantahala River Basin

West Fork Project

# Low Inflow Protocols in the Catawba and Nantahala Area Basins

Nantahala Area Relicensing – Federal Energy Regulatory Commission (FERC):

- TCST SETTLEMENT AGREEMENT
  - East Fork Project No. 2698
  - West Fork Project No. 2686

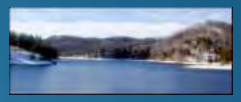


- NCST SETTLEMENT AGREEMENT
  - Nantahala Project No. 2692

# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Nantahala Area Relicensing

### Settlement Agreements Low Inflow Protocols:



Agreement between Licensee, resource agencies, local governments, NGOs and homeowners, and provides instructions to Licensee on how to manage natural resources during low inflow periods:

- Lake Levels
- Downstream Aquatic Flows
- Bypass Aquatic Flows
- Downstream and Bypass Recreation Flows

Duke Energy

# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Nantahala Area Relicensing

### Low Inflow Protocol (LIP) (Attachment B)

- During low inflow periods, the Licensee will make adjustments to generation amounts, minimum flow releases, Tainter gate releases for recreation and minimum reservoir elevations on a weekly basis so as to equitably allocate the impacts of reduced water availability.
- Threshold Minimum Flows – the minimum flow that may be necessary to sustain aquatic communities and provide minimum recreation flows
- Stages 1-5: If the Licensee cannot maintain the lake level above Normal Minimum Elevations, the Licensee will, on a weekly basis:
  - Reduce minimum weekly generation
  - Reduce downstream minimum flows (down to Threshold Minimum Flows)
  - Reduce bypass minimum flows (down to Threshold Minimum Flows)
  - Reduce reservoir minimum elevation
  - Reduce recreation flows if scheduled (down to Threshold Minimum Flows)
  - Notify resource agencies, NGO's and update web-site

# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Nantahala Area Relicensing

### Low Inflow Protocol (LIP) (Attachment B)

- Stages 6 and beyond - If the Licensee cannot maintain the lake level above Stage 5 Minimum Elevations, the Licensee will,
  - Reduce minimum weekly generation and hold constant at Stage 6 rate
  - Maintain downstream minimum flows at Threshold level
  - Maintain bypass minimum flows at Threshold level
  - Reduce recreation flows if scheduled to Threshold level
  - Minimum lake elevations no longer apply
  - Notify resource agencies, NGO's and update web-site
- Recovery from LIP is to follow Stage procedures in reverse order

# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Catawba-Wateree Basin


- 11 reservoirs, 13 hydro stations
- 5 thermal stations, 18 public water systems and multiple industries that rely on Project waters
- Licensed by the FERC

# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Catawba-Wateree Basin LIP Background

- **Development of LIP's For Nantahala Area Projects**
  - Focused on plant operations
  - Minimal water supply issues
  - Minimal public involvement
- **1998-2002 Drought of "Record" (or so we thought!)**
  - Minimal communication between Duke and water suppliers
  - Did not have good intake information
  - No mandatory water use restrictions
- **Catawba-Wateree Relicensing**
  - Requests for a Water Supply Study
  - Requests for a Drought Management Plan
  - Water withdrawal fee issue
- **State of North Carolina Initiatives**
  - State wanted to conduct a Water Supply Study similar to the Cape Fear Basin

Duke Energy

# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Catawba-Wateree Basin LIP Goals and Objectives

- Establish procedures for reductions in water use during periods of low inflow
- Ensure a basin-wide approach to drought management
- Maintain drinking water supplies as long as possible
- Maintain electrical supply as long as possible
- Prevent long-term or irreversible damage to aquatic communities
- Stay out of Low Inflow Protocol Stage 4 (Emergency)

# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Catawba-Wateree Basin LIP Organization and Infrastructure

Catawba-Wateree Drought Management Advisory Group (CW-DMAG)

- **Who** - Duke, Public Water Suppliers, Industries, Resource Agencies
- **What** - Take coordinated, basin-wide action to conserve water in response to drought
- **When** - Triggers are storage, streamflow, US Drought Monitor and groundwater
- **How** - Low Inflow Protocol (LIP) (5-stage procedure)

# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Catawba-Wateree Basin LIP Organization and Infrastructure

**Resource Agencies**

- NCDENR
- NCWRC
- SCDNR
- SCDHEC
- USGS

**Public Water Suppliers**

| | | |
|---|---|---|
| City of Marion | Lincoln County | City of Lincolnton |
| City of Morganton | Town of Mooresville | City of Newton |
| Town of Granite Falls | City of Gastonia | City of Rock Hill |
| City of Lenoir | City of Mount Holly | Catawba River WTP |
| Town of Valdese | City of Belmont | Chester Metropolitan District |
| City of Hickory | Bessemer City | City of Camden |
| Town of Longview | City of Cherryville | Lugoff-Elgin Water Authority |
| Charlotte-Mecklenburg Utilities | Town of Dallas | |

**Industries**

| | | |
|---|---|---|
| Siemens Westinghouse | SCANA | Clariant Corporation |
| Springs Industries | International Paper | Invista |
| Bowater | The Greens of Rock Hill | |

**Licensee (Duke Energy)**

# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Catawba-Wateree Basin LIP Triggers

CW-DMAG monitors 4 drought indicators

- Reservoir storage
- Tributary Inflow
- U.S. Drought Monitor
- Groundwater (Recovery only)

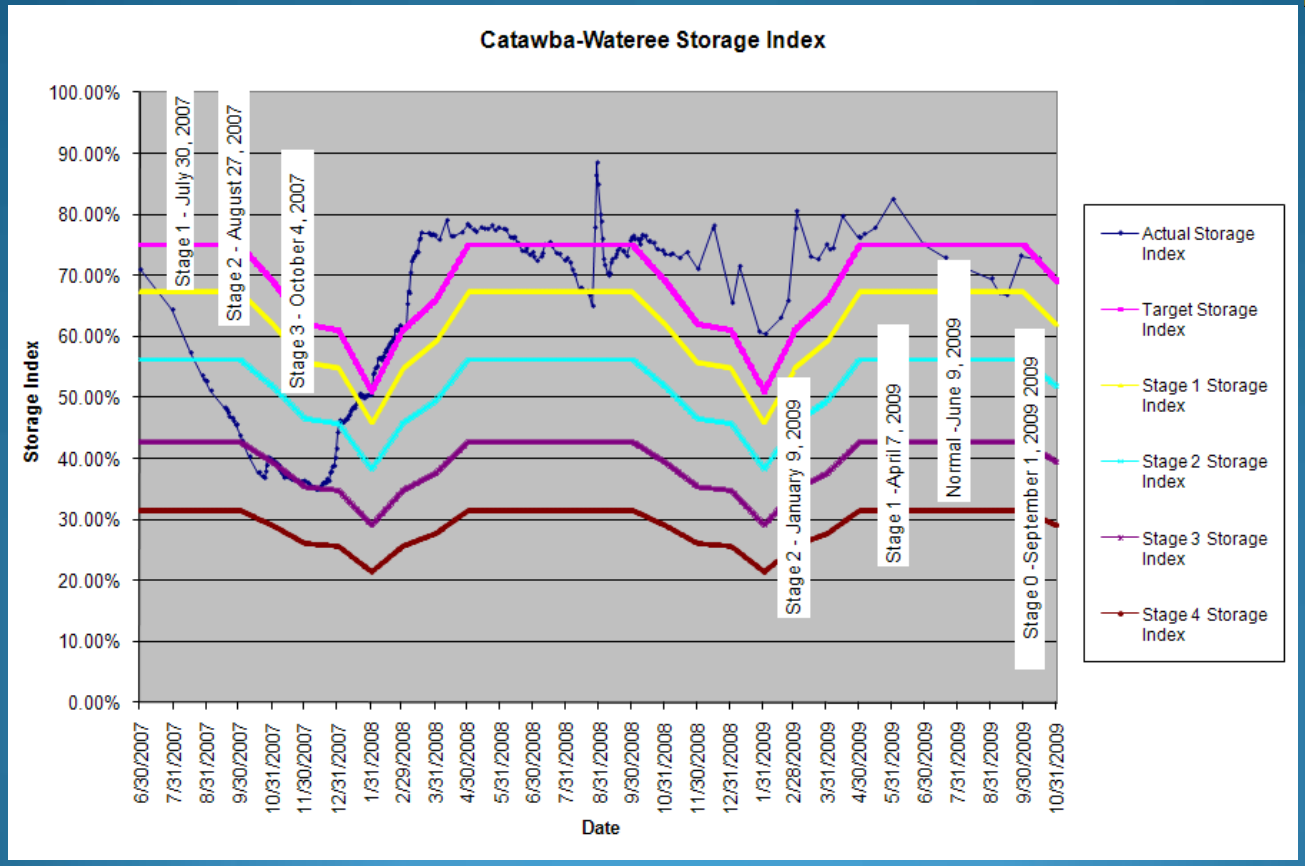
# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Catawba-Wateree Basin LIP Triggers

| Stage | Triggers | Action Summary |
|---|---|---|
| 0 | SI below TSI, but greater than 90% of TSI... or<br>US Drought Monitor ≥ 0; or<br>USGS Stream Gauges ≤ 85% of long term average<br>(must have two indicators) | Activate Catawba-Wateree Drought Management Advisory Group (CW-DMAG). |
| 1 | SI at or below 90% TSI, but greater than 75% of TSI...and<br>US Drought Monitor ≥ 1; or<br>USGS Stream Gauges ≤ 78% of long term average | *Licensee* - Reduce downstream and bypass flows by 60%, Recreation flows by 60%, and normal minimum elevations by one or more feet.<br>*Public Water Suppliers (PWS)* – Voluntary water use restrictions, 2 day/wk irrigation, reduce vehicle washing; water reduction goal of 3-5%.<br>*Other Large Water Intake (LWI) Owners* – Notify customers and request voluntary cutbacks. |
| 2 | SI at or below 75% TSI, but greater than 57% of TSI...and<br>US Drought Monitor ≥ 2; or<br>USGS Stream Gauges ≤ 65% of long term average | *Licensee* - Reduce downstream and bypass flows by 95%, eliminate recreation flows, and reduce normal minimum elevations by an additional one or more feet..<br>*PWS* – Mandatory water use restrictions, 2 day/wk irrigation, eliminate vehicle washing; water reduction goal of 5-10%.<br>*Other LWI Owners* – Notify customers and request voluntary cutbacks. |
| 3 | SI at or below 57% TSI, but greater than 42% of TSI...and<br>US Drought Monitor ≥ 3; or<br>USGS Stream Gauges ≤ 55% of long term average | *Licensee* - Reduce downstream and bypass flows to critical flows, and reduce normal minimum elevations by an additional one or more feet.<br>*PWS* – Mandatory water use restrictions, 1 day/wk irrigation, limit other outdoor water uses; water reduction goal of 10-20%.<br>*Other LWI Owners* – Notify customers and request voluntary cutbacks. |
| 4 | SI at or below 42% TSI...and<br>US Drought Monitor = 4; or<br>USGS Stream Gauges ≤ 40% of long term average | *Licensee* – Maintain downstream and bypass flows to critical flows, and reduce normal minimum elevations to critical elevations.<br>*PWS* – Restrict all outdoor water use, implement emergency restrictions; water reduction goal of 20-30%.<br>*Other LWI Owners* – Notify customers and request voluntary cutbacks. |

# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Catawba-Wateree Basin 2007-2008 Drought of Record



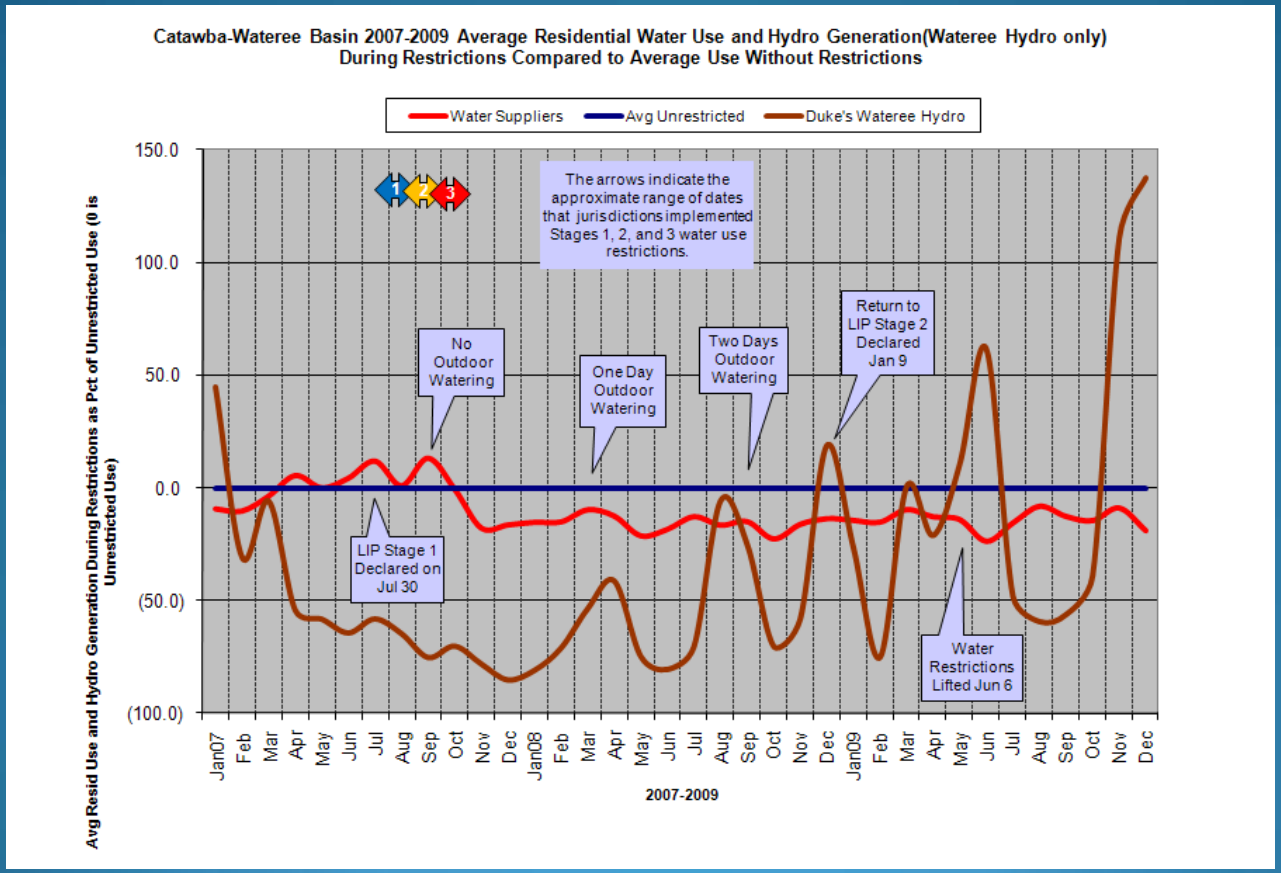
# Low Inflow Protocols in the Catawba and Nantahala Area Basins

Catawba-Wateree Basin 2007-2008 Drought of Record

- Stage 1 – July 30, 2007
- Stage 2 – August 27, 2007
- Stage 3 – October 4, 2007
  - Recommended no outdoor water use
- One day per week – April 1, 2008
- Temporary two days per week – September 24, 2008

# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Catawba-Wateree Basin 2007-2008 Drought of Record



# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Catawba-Wateree Basin LIP Potential Enhancements

- U.S. Drought Monitor  Trigger - basin worst to basin average
- Streamflow Trigger - 6 month rolling average to 4 month rolling average
- Groundwater Trigger – Advisory on recovery until groundwater network is completed

# Low Inflow Protocols in the Catawba and Nantahala Area Basins

## Questions?