Catawba-Wateree Hydroelectric Project
Low Inflow Protocol Update

Catawba-Wateree River Basin Advisory Commission
October 30, 2015
Catawba-Wateree Hydro Project – A Hard Working River

- First river in US comprehensively planned/developed for electricity production (lakes built 1904 – 1963)
  - 11 lakes; 79,895 surface acres; 1795 shoreline miles
  - 252 billion gallons of usable water storage
- Supports ~25% of Duke Energy’s generating capacity in the Carolinas
  - 843 MW clean, renewable, flexible hydropower
  - Cooling water for 7721 MW coal/nuclear
- Fully integrated into the river community
  - Drinking water for ~2 million people
  - Industrial water supply
  - 10+ million recreation visits/year
  - 25,000+ lake neighbors

* EL = Full Pond Elevation in feet Above Mean Sea Level

Rev: 9/25/2015
The Low Inflow Protocol (LIP) monitors three basin-specific drought triggers to determine drought status for the Catawba-Wateree River Basin:

- Remaining usable water storage in the eleven project reservoirs
- Four monitored tributary streamflows into the Catawba-Wateree Project
- The U.S. Drought Monitor (map) specific for the basin
# Catawba-Wateree Hydroelectric Project
## Low Inflow Protocol Drought Update
### Summary of LIP Actions

<table>
<thead>
<tr>
<th>Stage</th>
<th>Triggers</th>
<th>Action Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Storage Index (SI) below Target Storage Index (TSI), but greater than 90% of TSI; or US Drought Monitor $\geq 0$; or USGS Stream Gauges $\leq 85%$ of long term average (must have two)</td>
<td><strong>Licensee</strong> - Activate Catawba-Wateree Drought Management Advisory Group (CW-DMAG).</td>
</tr>
</tbody>
</table>
| 1     | SI at or below 90% TSI, but greater than 75% of TSI...and US Drought Monitor $\geq 1$; or USGS Stream Gauges $\leq 78\%$ of long term average | **Licensee** - Reduce downstream, bypass, recreation flows and Normal Minimum Elevations.  
**Public Water Suppliers (PWS)** – Voluntary water use restrictions, 2 day/wk irrigation, reduce vehicle washing; water reduction goal of 3-5%.  
**Other Large Water Intake (LWI) Owners** – Notify employees and customers and request voluntary cutbacks. |
| 2     | SI at or below 75% TSI, but greater than 57% of TSI...and US Drought Monitor $\geq 2$; or USGS Stream Gauges $\leq 65\%$ of long term average | **Licensee** – Further reduce flows and Normal Minimum Elevations.  
Eliminate recreation flows.  
**PWS** – Mandatory water use restrictions, 2 day/wk irrigation, eliminate vehicle washing; water reduction goal of 5-10%.  
**Other LWI Owners** – Notify employees and customers and request voluntary cutbacks. |
| 3     | SI at or below 57% TSI, but greater than 42% of TSI...and US Drought Monitor $\geq 3$; or USGS Stream Gauges $\leq 55\%$ of long term average | **Licensee** - Reduce downstream and bypass flows to critical flows, and further reduce Normal Minimum Elevations.  
**PWS** – Mandatory water use restrictions, 1 day/wk irrigation, limit other outdoor water uses; water reduction goal of 10-20%.  
**Other LWI Owners** – Notify employees and customers and request voluntary cutbacks. |
| 4     | SI at or below 42% TSI...and US Drought Monitor = 4; or USGS Stream Gauges $\leq 40\%$ of long term average | **Licensee** – Maintain downstream and bypass flows to critical flows, and reduce Normal Minimum Elevations to critical elevations.  
**PWS** – Restrict all outdoor water use, implement emergency restrictions; water reduction goal of 20-30%.  
**Other LWI Owners** – Notify employees and customers and request voluntary cutbacks. |
Catawba-Wateree LIP Trigger Status Summary for 10/01/15
and Changes Compared to 09/01/15

<table>
<thead>
<tr>
<th>Reservoir Storage as % of Target</th>
<th>% of 6-Month Long-Term Avg Streamflow</th>
<th>3-Month Avg of US Drought Monitor</th>
<th>Groundwater Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&gt;=100%</td>
<td>&gt;85%</td>
<td>&lt;0</td>
</tr>
<tr>
<td>LIP Stage 0</td>
<td>&gt;90%</td>
<td>&lt;=85%</td>
<td>&gt;=0</td>
</tr>
<tr>
<td>LIP Stage 1</td>
<td>&gt;75%</td>
<td>&lt;=78%</td>
<td>&gt;=1</td>
</tr>
<tr>
<td>LIP Stage 2</td>
<td>&gt;57%</td>
<td>&lt;=65%</td>
<td>&gt;=2</td>
</tr>
<tr>
<td>LIP Stage 3</td>
<td>&gt;42%</td>
<td>&lt;=55%</td>
<td>&gt;=3</td>
</tr>
<tr>
<td>LIP Stage 4</td>
<td>&lt;=42%</td>
<td>&lt;=40%</td>
<td>4</td>
</tr>
</tbody>
</table>

To recover to a less restrictive LIP Stage, all four triggers must support that Stage or lower. However at this time Groundwater Levels are being treated as advisory only.
6-Month Rolling Average Streamflow

- Blue line: 6-month rolling average streamflow
- Red line: Long-Term Average
- Dashed black line: Ratio 6-month Avg to LTA
- Light blue dotted line: Stage 0
- Light green dotted line: Stage 1
- Orange dotted line: Stage 3
- Red dotted line: Stage 4

Vertical axis: 6-month Avg Streamflow (cfs)
Horizontal axis: Date (3/1/2015 to 11/1/2015)
U. S. Drought Monitor
Catawba-Wateree Hydroelectric Project
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Summary:

• The Storage Trigger has recovered to Normal Conditions due to the October rainfall.

• The six-month average Streamflow Trigger is still in Stage 1 condition but should improve over the next two months with continued rainfall.

• The three-month average U.S. Drought Monitor for the Catawba-Wateree is improving and should return to normal by the end of November.
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Questions?