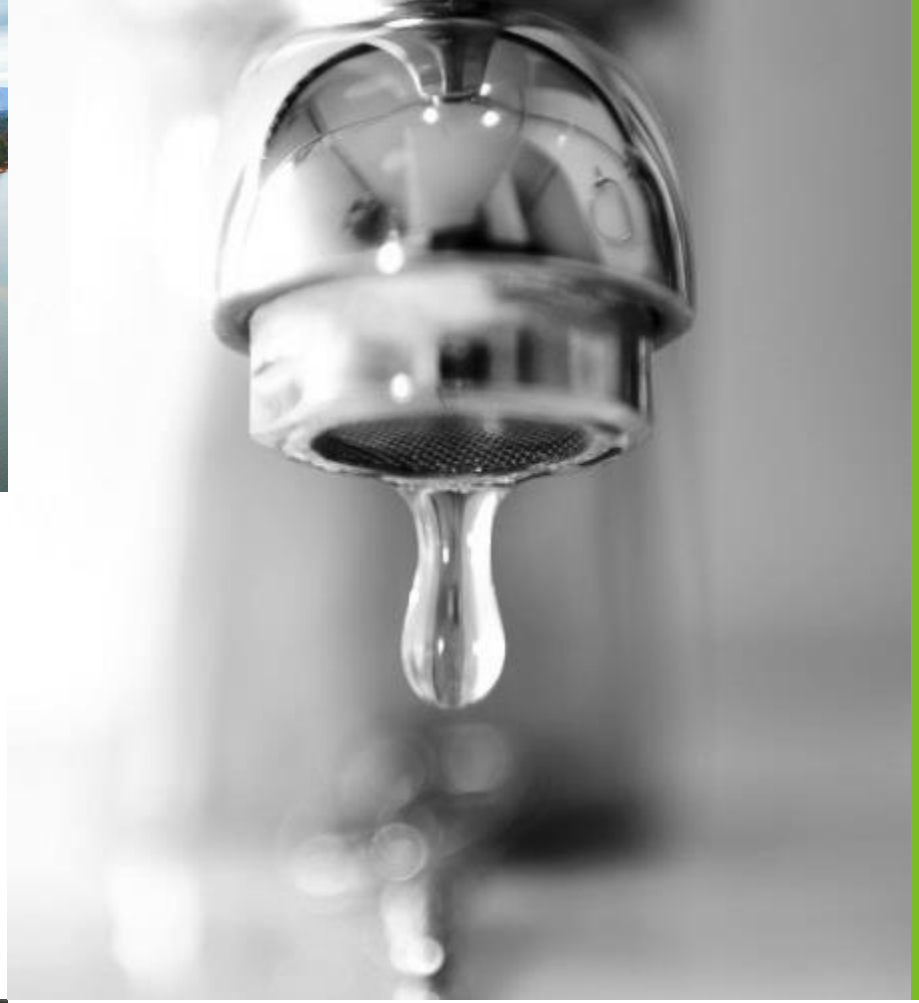


Catawba-Wateree Water Supply Master Plan

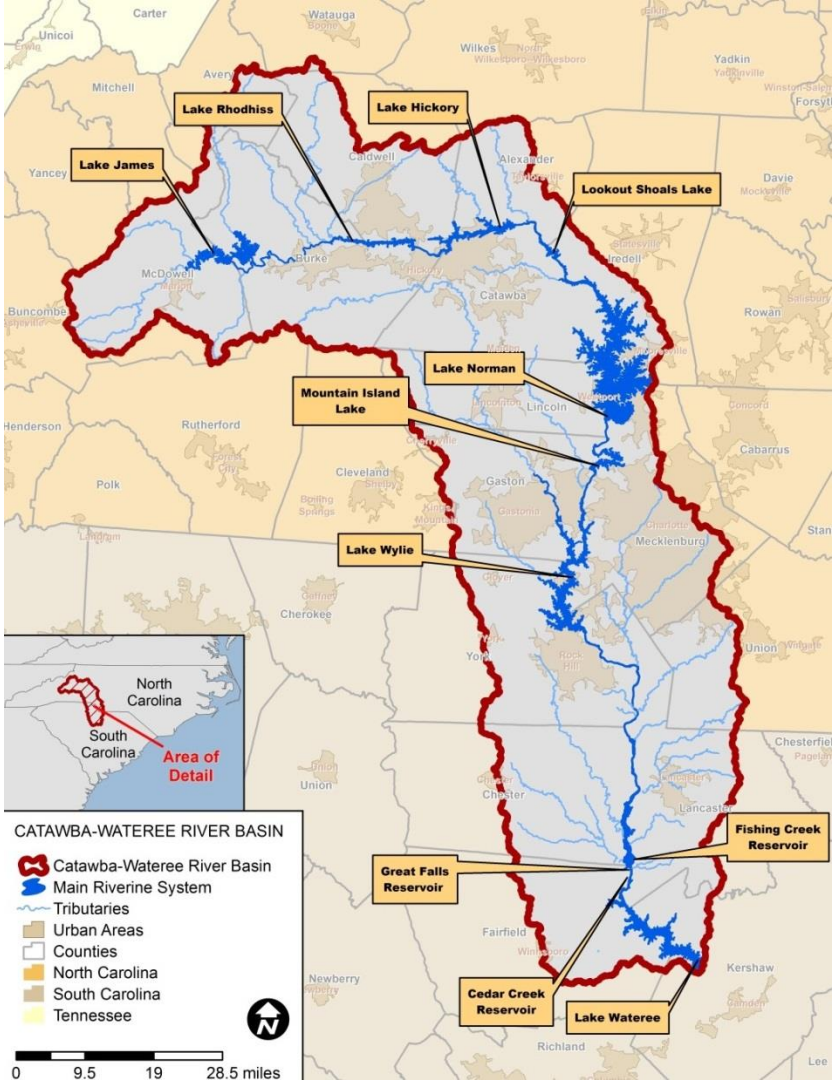
CATAWBA WATEREE
WATER MANAGEMENT GROUP

Background

- 2006 Water Supply Study found maximum capacity of Catawba River Basin for water supply could be reached mid-century
- Catawba-Wateree Water Management Group incorporated - December 2007
- Water Supply Master Plan commissioned in 2010
- Purpose of Master Plan is to find ways to extend the time before the capacity of the Basin is reached

The Catawba-Wateree River Basin

- 4,750 square miles
- Supports nearly two million people with water for drinking, power generation, industrial processes, crop and livestock production, recreation, irrigation, and more



Acknowledgements/Thanks

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- Duke Energy Foundation
- North Carolina Department of Environment and Natural Resources
- South Carolina Department of Natural Resources
- Catawba-Wateree Water Management Group

Elements of the Master Plan

- Supplemental funding
- Stakeholder input
- Water use projections
- Refinement of hydrologic model
- Climate change impacts
- Develop & evaluate options
- Action plan and schedule
- Publish report
- Implementation, on-going public input
- Periodic future updates

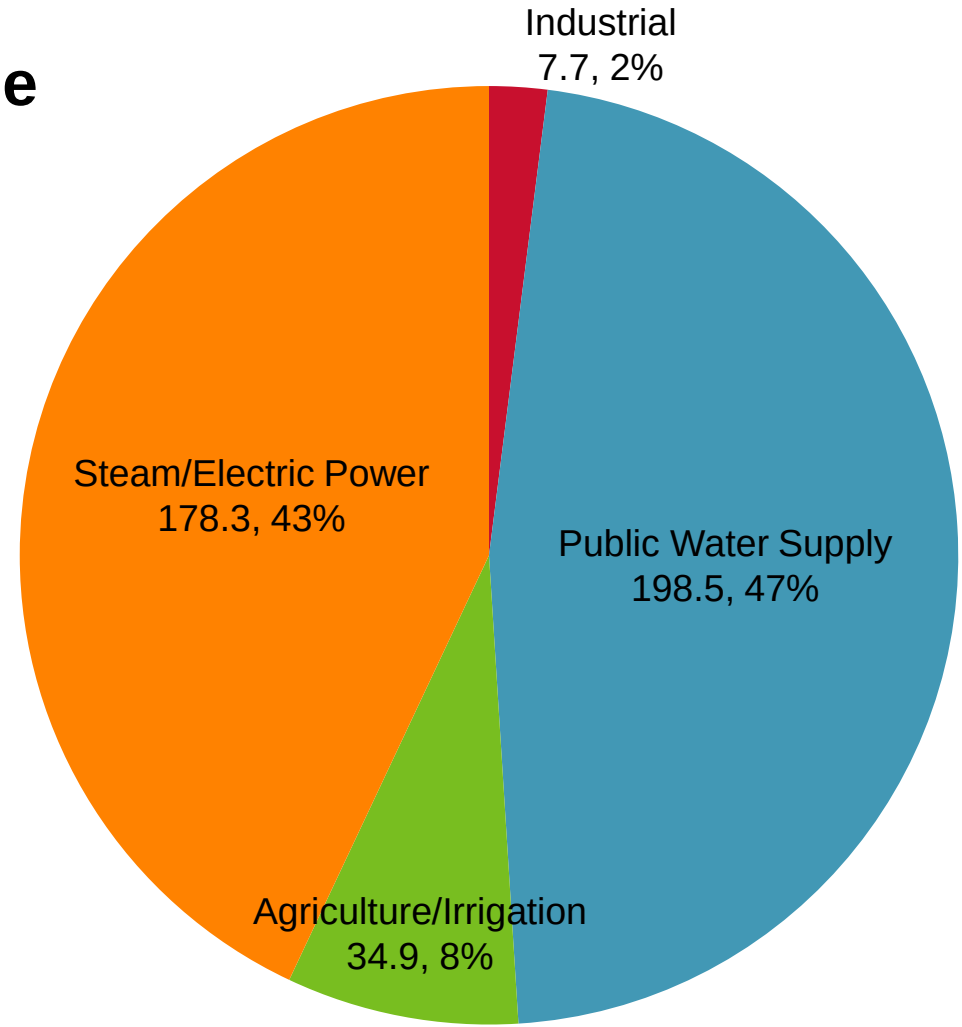
Stakeholder Advisory Team (SAT)

- Advisory level input by key organizations with an interest in future planning efforts for the Basin
- Intended to ensure a broad level of input from a diverse group of interested stakeholders

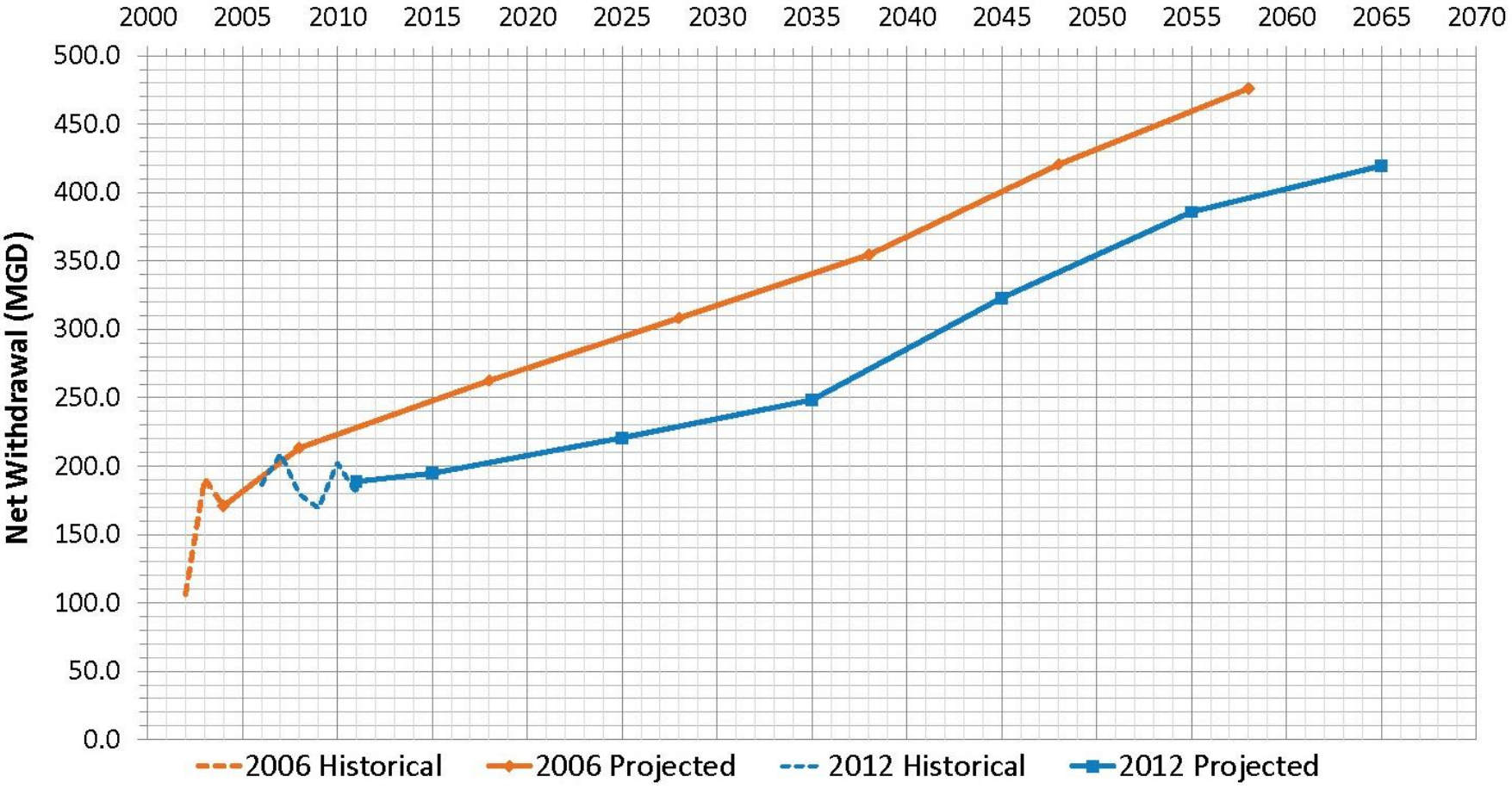
SAT Member Organizations		
Catawba Regional Council of Governments (COG)	Mt. Island Lake Marine Commission	The NC Conservation Fund
Centralina Regional COG	NC Division of Water Resources	Newton, NC
Western Piedmont Regional COG	NC Wildlife Resources Commission	Kershaw County, SC
Isothermal Regional COG	SC Dept. of Health & Env. Control	Resolute Forest Products
Central Midlands COG	SC Department of Natural Resources	International Paper
Lake Norman Marine Commission	Catawba Wateree Relicensing Coalition	Siemens Westinghouse
Lake Wylie Marine Commission		

How Water will be Used (2065)

- Million gallons per day (mgd) consumed and percent of total 419.4 mgd

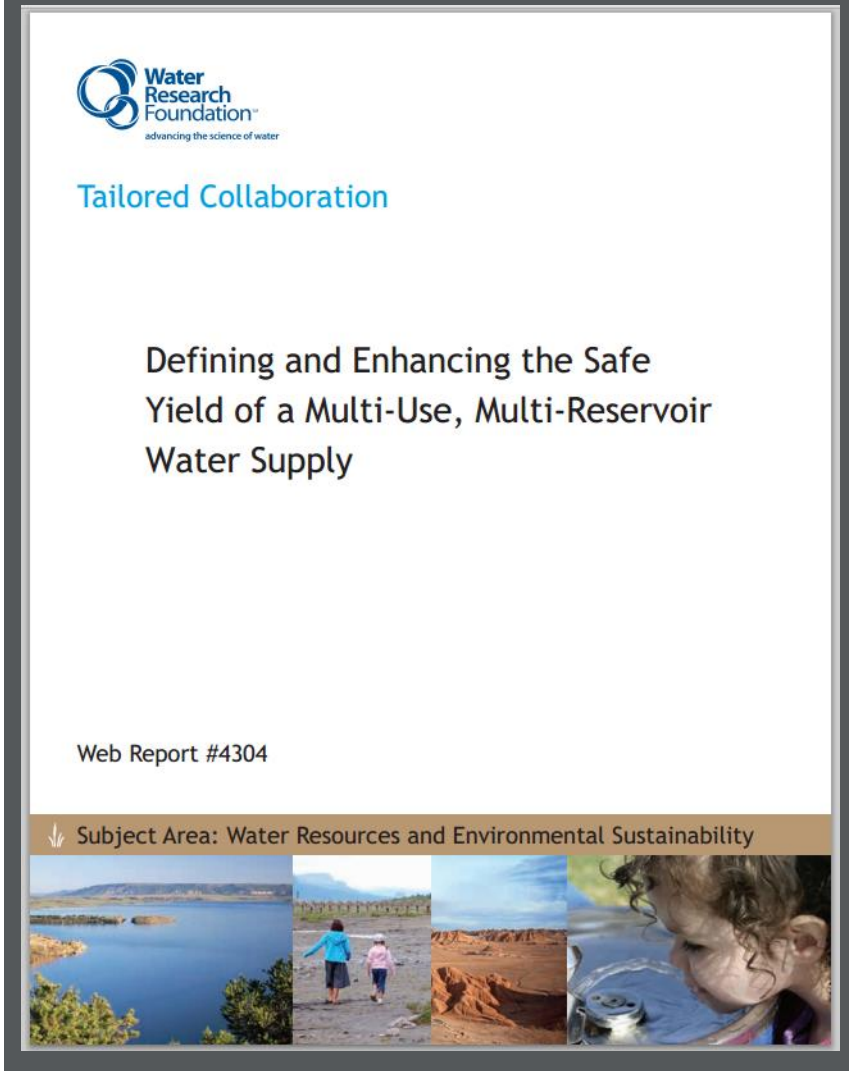


Water Use Projections



Pre-Master Plan Project Research

- Safe Yield Study
  - How to define and determine safe yield
  - Can safe yield be increased?
- Sedimentation Monitoring Study
- Water Use Efficiency Study
- Low Inflow Protocol Response Evaluation Study
- Full reports can be found at www.catawbawatereewmg.org



Population and Climate Change

Sensitivity Analysis

- Evaluated variation in population growth
- Evaluated climate change impacts
  - No impacts
  - Baseline (moderate) impacts – focused on temperature rise
  - High impact – temperature rise and reduced precipitation/inflow
- CWWMG – First in the region to incorporate climate change into water use planning

Individual and Integrated Future Planning Scenarios

Playing the "What If?" Game with a Robust Water Model

- Baseline
- Population growth
- Climate change
- Public water supplier water use changes (water use efficiency, reroute wastewater)
- Power consumptive water use changes (e.g. relocation of demand)
- New off-stream storage reservoirs
- Critical intake modifications
- Effluent flow recycling
- Modified reservoir operations
- Low Inflow Protocol (drought management plan) modifications

Results and Recommendations

- Improve safe yield of the Basin by over 200 mgd
- Extend water yield by 40 years

Table 1-5 Basinwide Yield Summary for Simulated Integrated Planning Scenarios

Scenario	Description	Safe yield (mgd)	Projection year to reach safe yield
MP-01	Planning Case A	660 - 719	2055 - 2065

Scenario	Integrated Planning Scenarios	Change in safe yield vs Planning Case[1] (mgd)	Yield enhancement vs Planning Case (years)
MP-01b	Planning Case B	0	0
MP-01M	Mitigated Planning Case A	139	30
MP-01Mb	**Mitigated Planning Case B (Recommended)**	**204**	**40**
MP-01Mc	Mitigated Planning Case C	269	50
MP-02	Best Case	~0	20
MP-02M	Mitigated Best Case	>74	50 +
MP-03	Worst Case	-169	-40
MP-03Ma	Mitigated Worst Case A	-78	-20
MP-03Mb	Mitigated Worst Case B	26	-10

Notes:

[1] Change in safe yield calculated as the difference between the safe yield range midpoint (average) for a given scenario and the safe yield range midpoint for the Planning Case (i.e., MP-01).

Key Recommendations

- Increase water use efficiency
- Lower critical water intakes/elevations
  - Power plant
  - Public water supply
- Raise target lake levels during summer months
- Enhance drought responsiveness through Low Inflow Protocol

Water Use Efficiency Recommendations

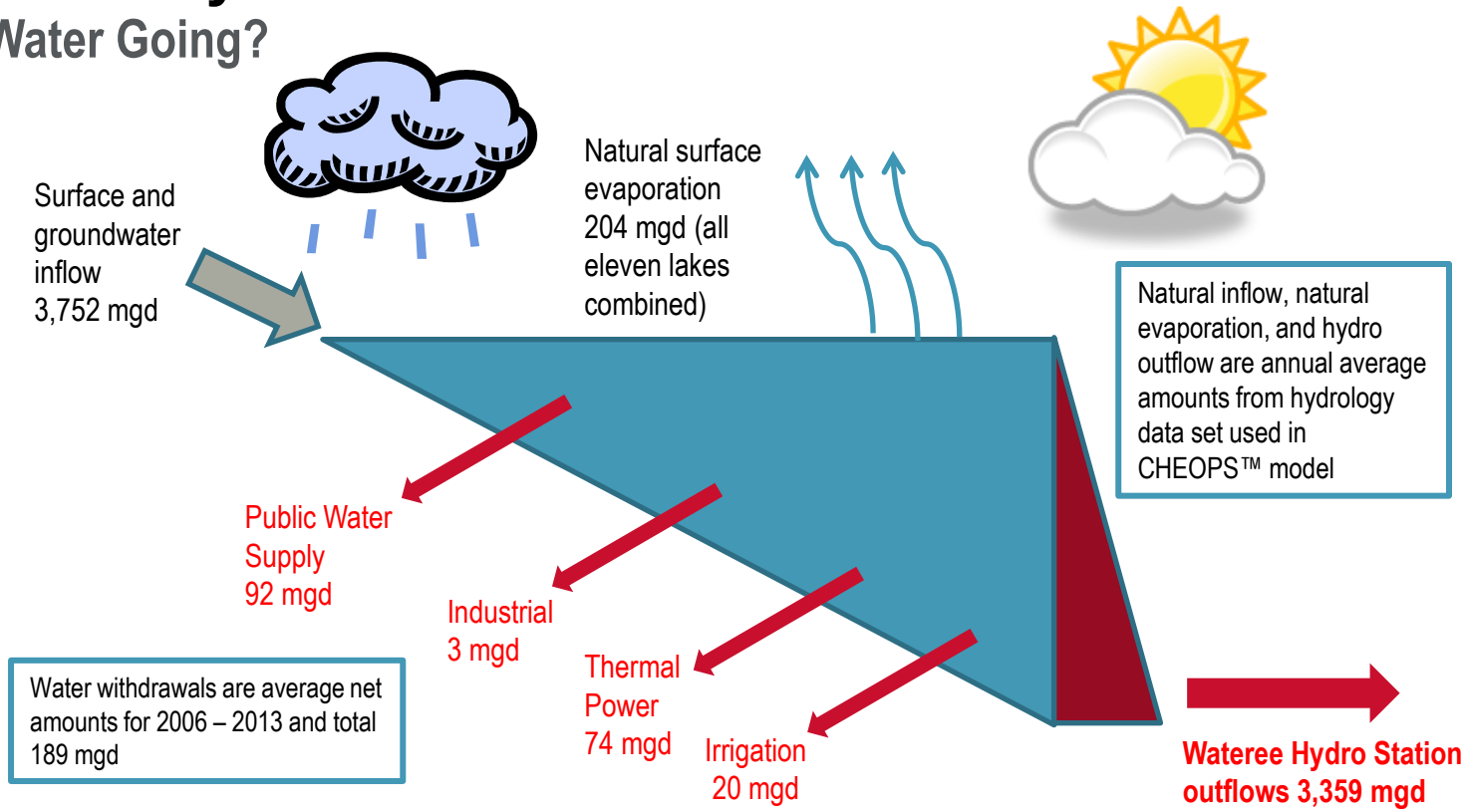
Table 1-7 Residential Per Capita Use Rates Aggregated by Subbasin (Historical and Strategies WC-01C and WC-01D)

	2006 WSS (2002 Data) Average Per Capita Use (gpd/person)	Current (2008-2011) Average Per Capita Use (gpd/person)	WC-01C Low-End Conservation: Average Per Capita Use (gpd/person)	WC-01D High End Conservation: Average Per Capita Use (gpd/person)
Sub-Basin	**Residential**			
Lake James	53	56	56	53
Lake Rhodhiss	59	80	72	64
Lake Hickory	79	68	65	58
Lookout Shoals Lake	58	54	54	51
Lake Norman	121	85	78	70
Mountain Island Lake	129	97	88	78
Lake Wylie	76	76	71	64
Fishing Creek Reservoir		68	65	58
Lake Wateree		74	69	62
BASIN-WIDE AVERAGE	**113**	**85**	**78**	**70**

- Example: average per capita use in the Charlotte-Mecklenburg system
  - Current ~100 gallons/day/person (residential)
  - Recommended 2065 ~80 gallons/day/person (residential)

CW Reservoir System Water Balance

Where's the Water Going?



* mgd = million gallons per day. To convert to cubic feet per second (cfs), multiply all numbers by 1.5475.

So What is Duke Energy's Role?

Manage the Water Resource

- Manage the region's raw water supply (big, ongoing investment)
- Implement Comprehensive Relicensing Agreement (CRA) and new license
- Continue making electric customers more energy-efficient. In 2009-2014, Duke Energy's energy conservation programs across the Carolinas
  - Reduced capacity needs by total of ≈ 1,200 MW (about a nuclear unit)
  - Reduced energy needs by total of ≈ 2,442,000 MWh (about a billion gallons of water equivalent)

So What is Duke Energy's Role?

Be a Good Partner

- Remain a dues-paying, active member of the Catawba-Wateree Water Management Group
- Help provide leadership and coordination

Implement the Water Supply Master Plan

- Pursue the identified initiatives
  - Water use for thermal plant replacements/additions
  - Quicker response in Low Inflow Protocol
  - Increase summer target elevations for selected reservoirs

Projected Results

- Implementation of the Catawba-Wateree Water Supply Master Plan extends the River's capacity to sustain growth through 2100

Questions?

Complete Water Supply Master Plan Report is available at www.catawbawatereewmg.org