



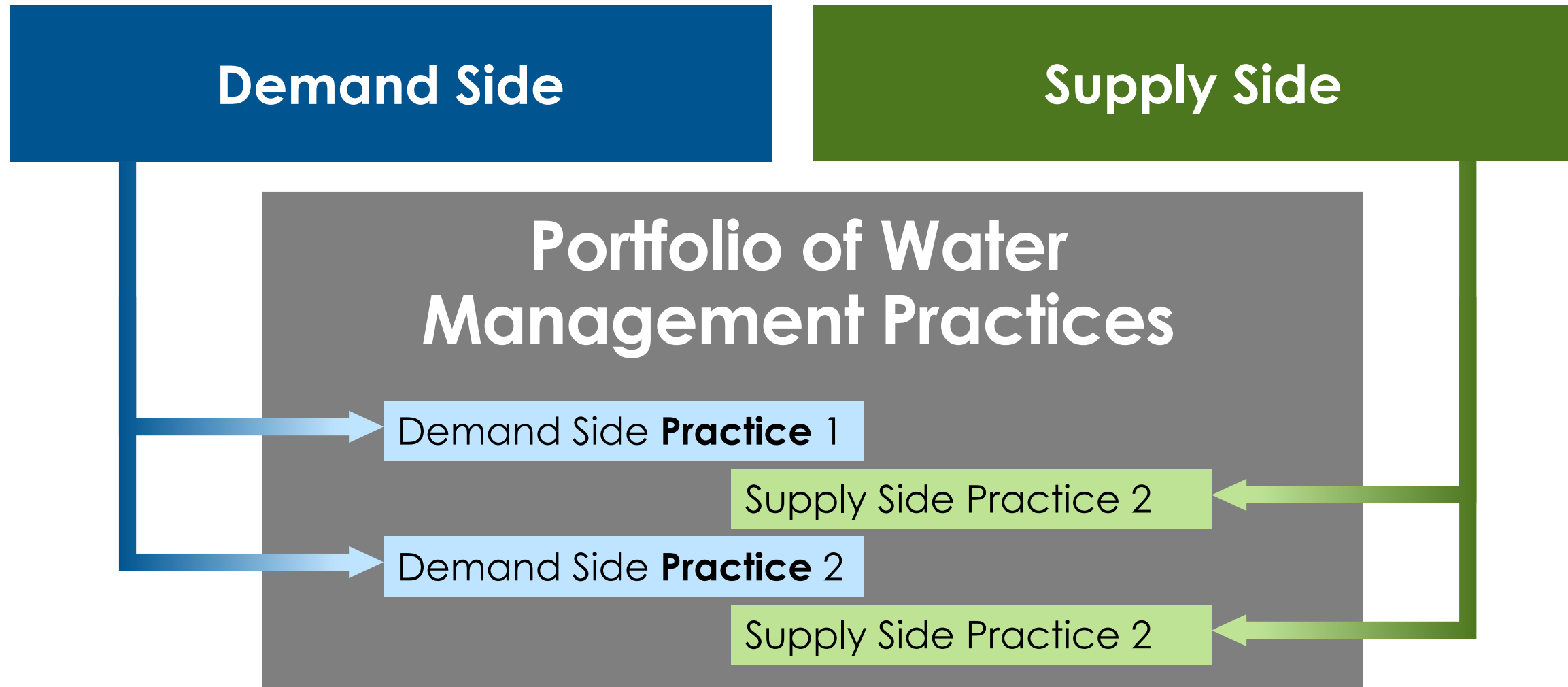
Introduction to Water Management Strategies

John Boyer

Planning Framework Definitions

- **Surface Water Management Strategy** – a water management strategy proposed to eliminate a Surface Water Shortage, reduce a Surface Water Shortage, or generally increase Surface Water.
- A River Basin Plan is a collection of **water management strategies** supported by a summary of data and analyses designed to ensure the surface water and groundwater resources of a river basin will be available for all uses for years to come, even under drought conditions.

Water Management Strategies



Water Management Strategies

Demand Side Strategies

Example Practices

Municipal conservation

Water loss control programs
Low flow fixtures, toilets and appliances
Pricing structures (ex. increasing block rates)
Public education

Ag/Irrigation conservation

Water audits and center pivot sprinkler retrofits
Dammer dikers
Cover cropping, conservation tillage, mulch
Soil Moisture sensors/smart irrigation
Crop selection
Irrigation scheduling
Drip/Trickle irrigation (for select crops)

Water Management Strategies

Demand Side Strategies

Example Practices

Industrial conservation

Water reuse and recycling
Water efficient processes
Water loss control
Low flow fixtures, toilets and appliances

Thermoelectric
conservation

Reclaimed water
Switch to combined-cycle natural gas
Energy saving appliances (which reduces thermoelectric generation needs)

Water Management Strategies

Supply Side Strategies

Example Practices

New or Increased Storage

New impoundments, ponds, reservoirs, tanks
Dredging (pond deepening)
Reservoir expansion (raising dam height)
Aquifer storage and recovery

Water Reclamation

Water reuse systems (non-potable)
Direct potable reuse
Stormwater capture and treatment

Conjunctive Use

Using groundwater to augment surface water during low flow periods

Water Management Strategies

Supply Side Strategies

Conveyance

Example Practices

Regional water systems
Utility interconnections
Interbasin transfers

Criteria to Evaluate Water Management Strategies

- **Effectiveness**
 - Analyze Performance Measures (via modeling)
 - Cost/benefit incl. capital and annual costs (\$/MGD)
- **Reliability (especially during drought)**
- **Permitting/regulatory including potential interbasin impacts**
- **Environmental impacts**
- **Socioeconomic impacts**
- **Water quality impacts and considerations**

Water Conservation Strategies

Town of Cary, NC (pop. 175,000)



- **Since 1999, the Town has implemented:**
 - Three-tiered water rate structure
 - Landscape and irrigation codes
 - Toilet flapper rebates
 - Residential water audits
 - Points program for new construction with water efficient measures
 - Monthly water budgets for large irrigators
 - Public education
 - Reclaimed water program
- Conservation strategies reduced per capita water demand from **114 gpcd in 2001** to **81 gpcd in 2016 (29% reduction in per capita demand)**

Water Conservation Strategies

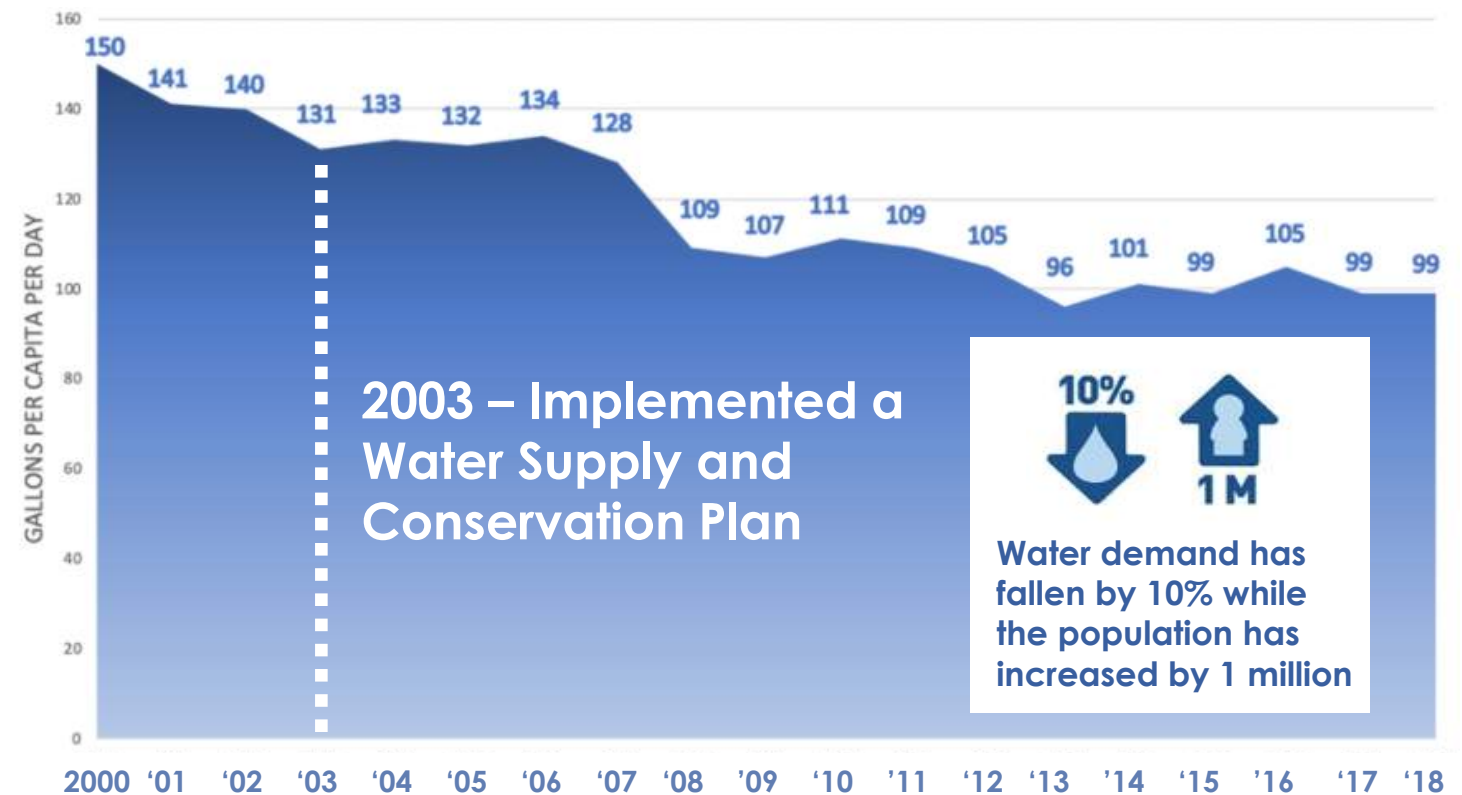
Metro North Georgia Water Planning District

Example Water Conservation & Efficiency measures implemented:

- Conservation pricing structures
- Toilet rebate program
- Landscape irrigation program
- Leak detection and water loss control programs
- Car wash recycling ordinances
- Public education

Conservation strategies reduced per capita water demand from 131 gpcd in 2003 to 99 gpcd in 2018 (**24% reduction in per capita demand**)

Annual Per Capita Water Use



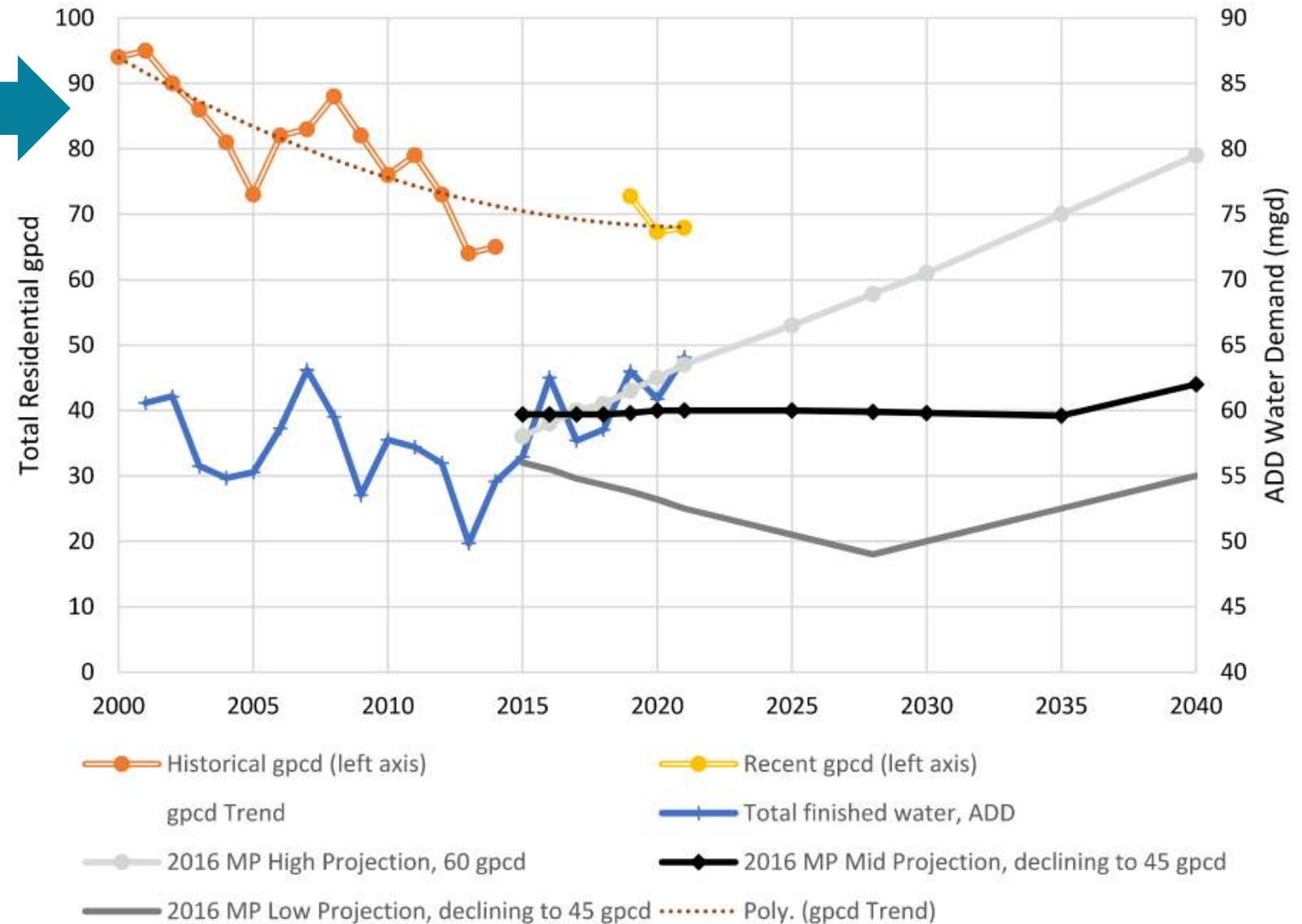
Sources: Metropolitan North Georgia Water Resource Management Plan, June 2017 and <https://northgeorgiawater.org/current-water-stats/water-withdrawals-per-capita-remain-steady/>

Greenville Water – Declining per Capita Demand

2001: 95 gpcd
2021: 68 gpcd



28% decrease in residential per capita demand



Source: Greenville Water Facility Master Plan 2022 Update, Brown & Caldwell

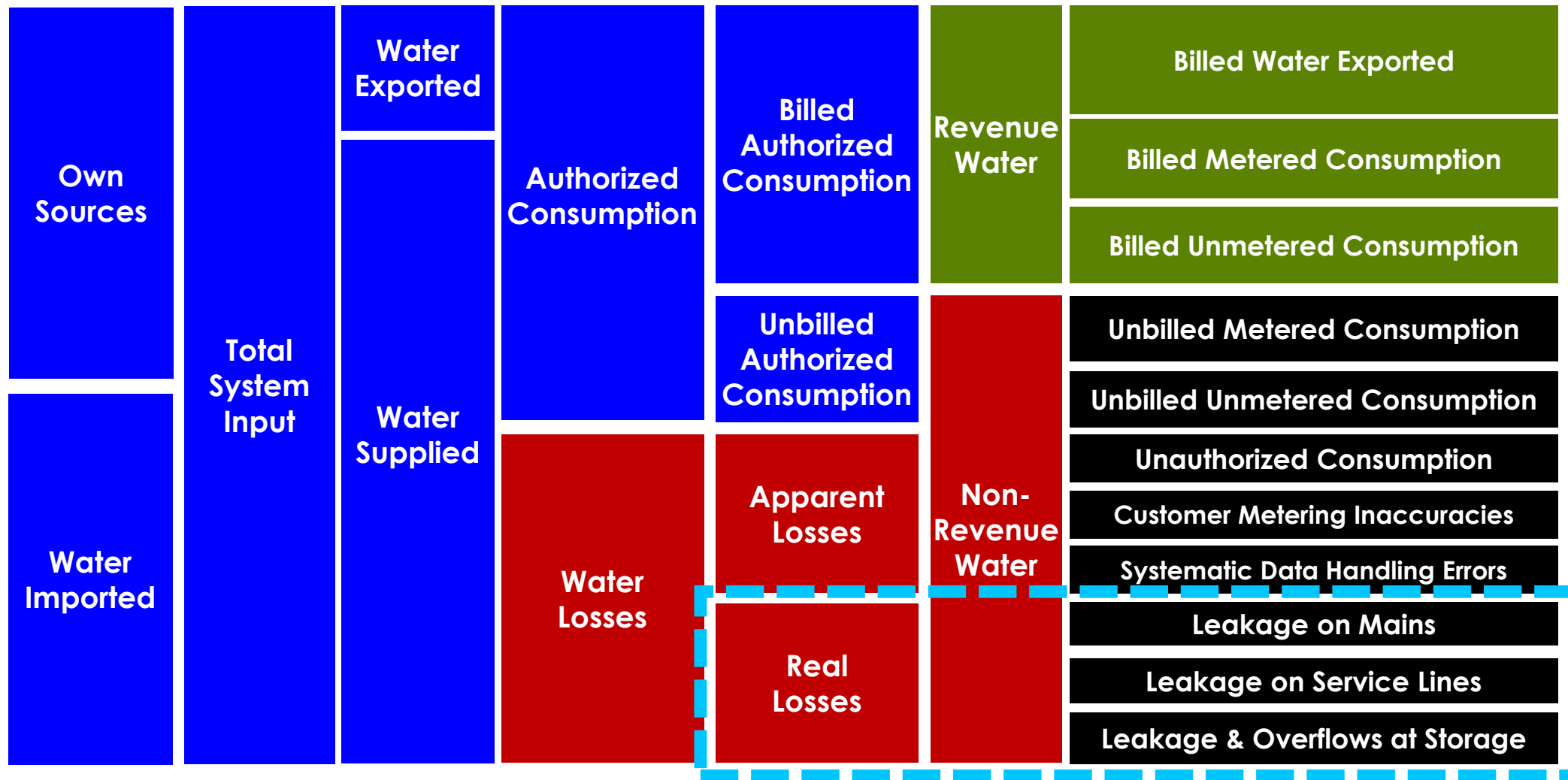
Water Efficiency and Water Loss Programs

Georgia Water Stewardship Act of 2010

- The Act set water loss control requirements that include:
 - Completion of an Annual Water Loss Audit using AWWA M36 Methodology
 - Development and implementation of a Water Loss Control Program
 - Development of individual goals to set measures of water supply efficiency
 - Demonstration of progress toward improving water supply efficiency
- Requirements apply to public water systems serving populations over 3,300 (about 250 utilities)



Water Efficiency and Water Loss Programs



Source: AWWA M36 Methodology from *Demonstrating Progress Toward Improving Water Supply Efficiency* (presentation slides), GA EPD, T. Cash, B. Frechette, J. Smith, and W. Zeng, May 2019

Water Efficiency and Water Loss Programs

Real Losses

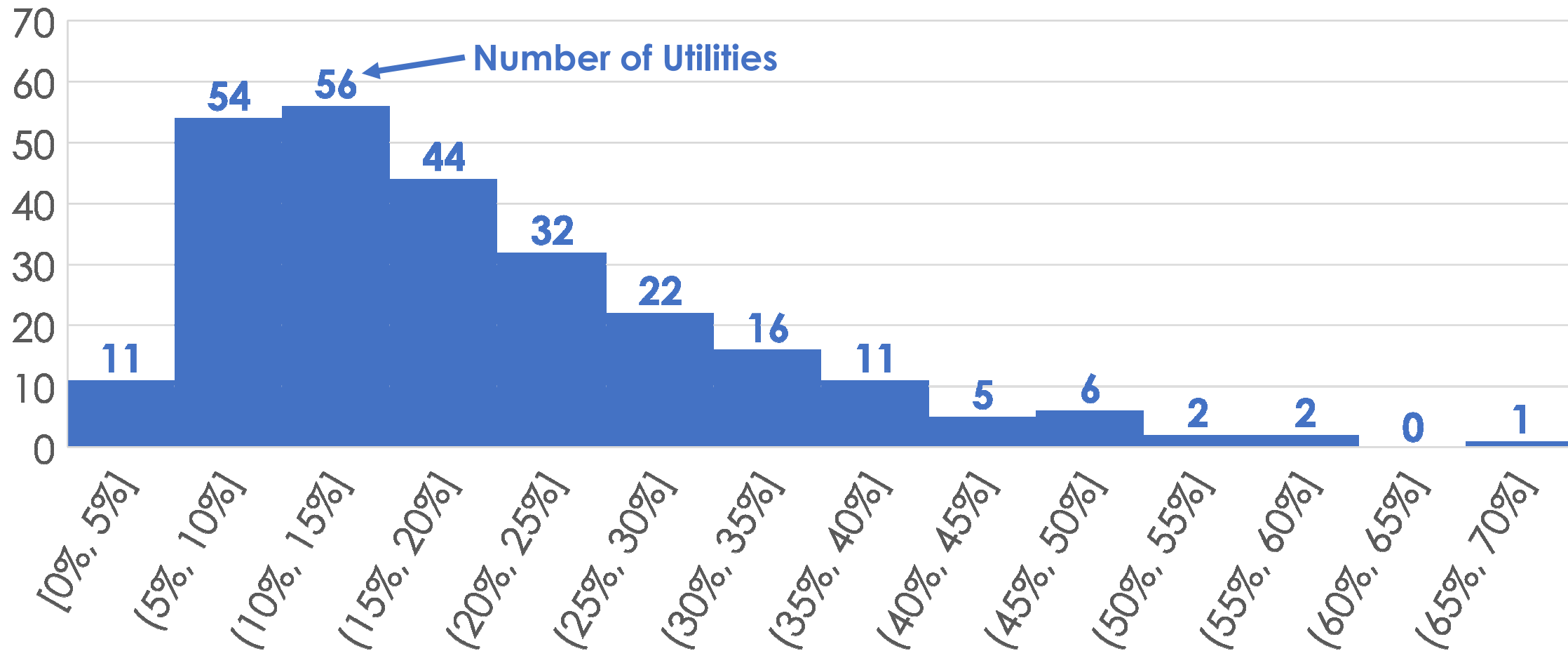
- Also called *Physical Losses* – Water that enters the distribution system, but never reaches a user
- **Examples Include:**
 - Leakage on transmission and distribution mains
 - Storage tank overflows
 - Service Line leakage up to customer meter
- **Reducing real losses extends the water resource**

Source: *Demonstrating Progress Toward Improving Water Supply Efficiency (presentation slides)*, GA EPD, T. Cash, B. Frechette, J. Smith, and W. Zeng, May 2019

Water Efficiency and Water Loss Programs



Histogram of Real Losses as a Percent of Total Water Supplied 10 Year Average for 263 Georgia Utilities

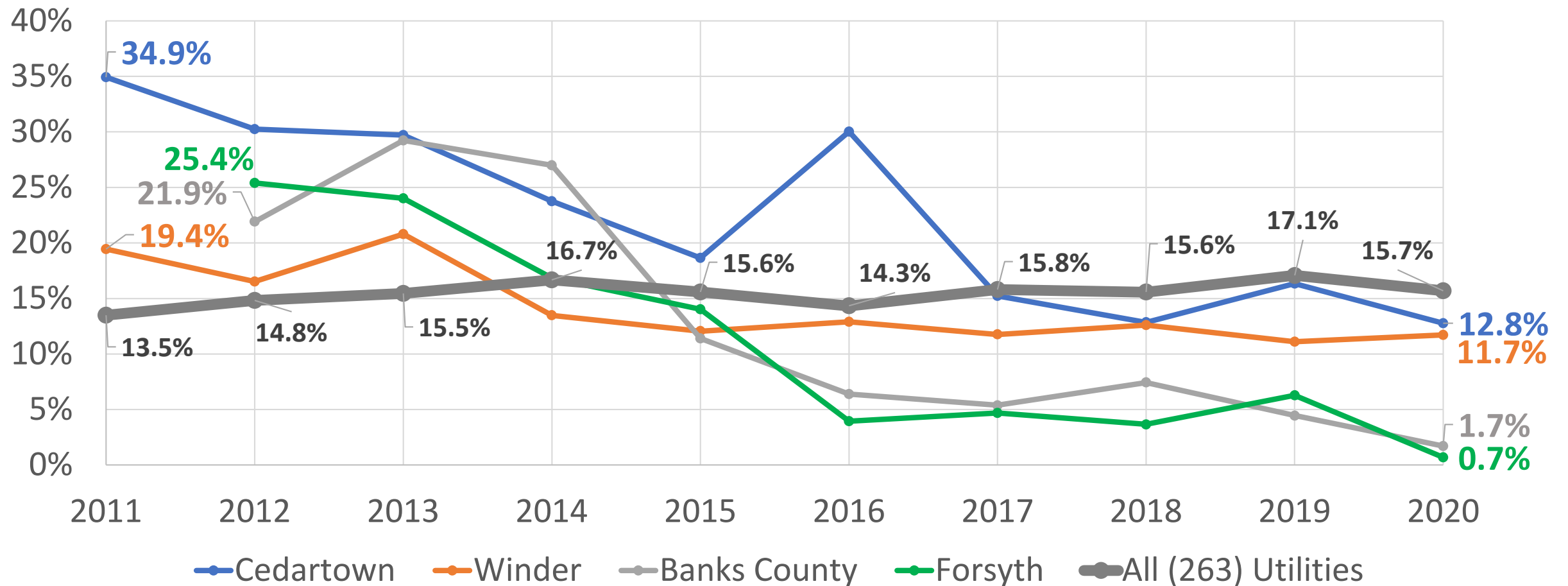


Source: GA EPD Validated Water Audits, 2011 through 2020 (<https://epd.georgia.gov/watershed-protection-branch/water-efficiency-and-water-loss-audits>)

Water Efficiency and Water Loss Programs



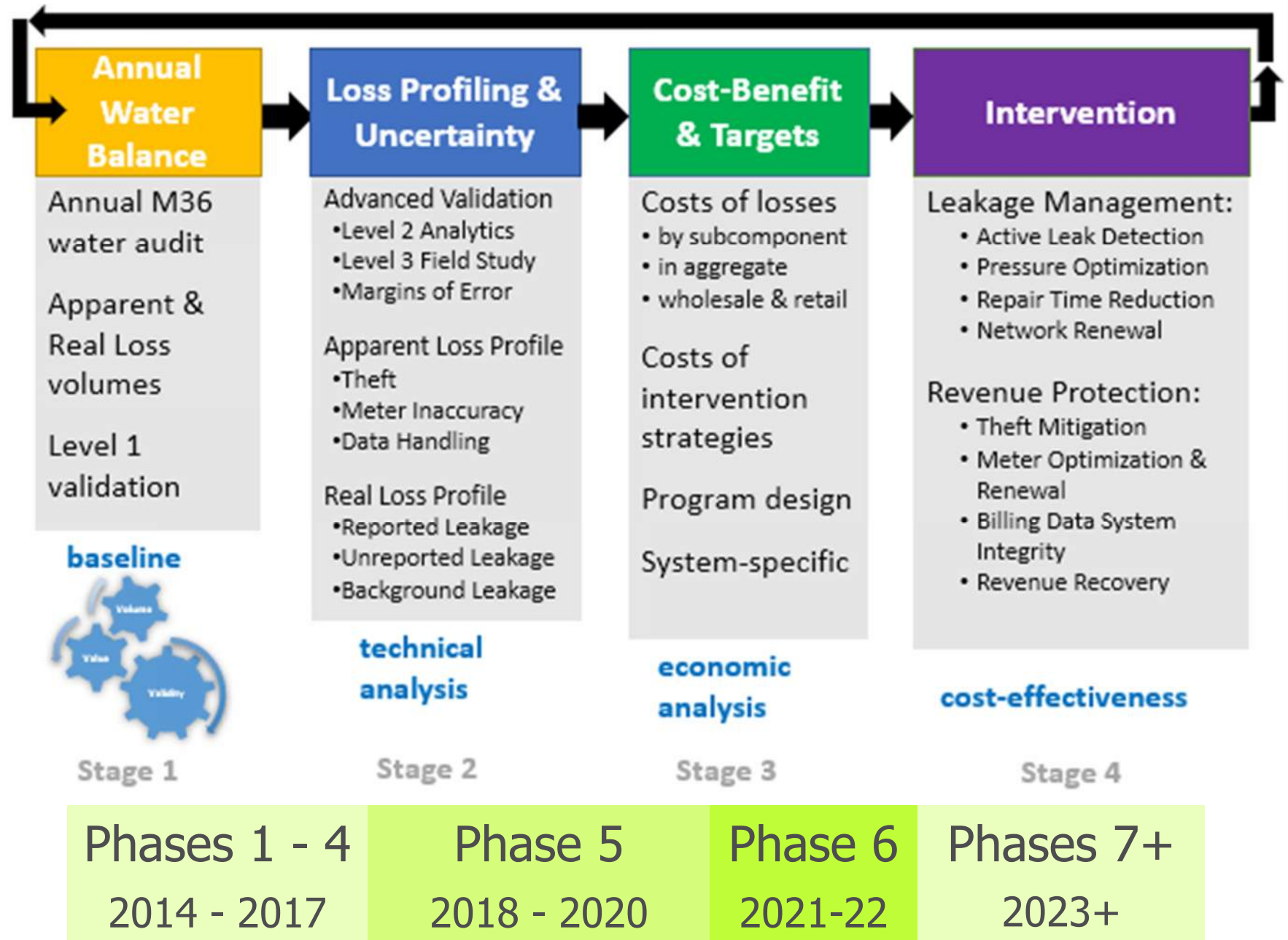
Annual Real Losses as a Percent of Total Water Supplied
High Performers and Average for All Utilities



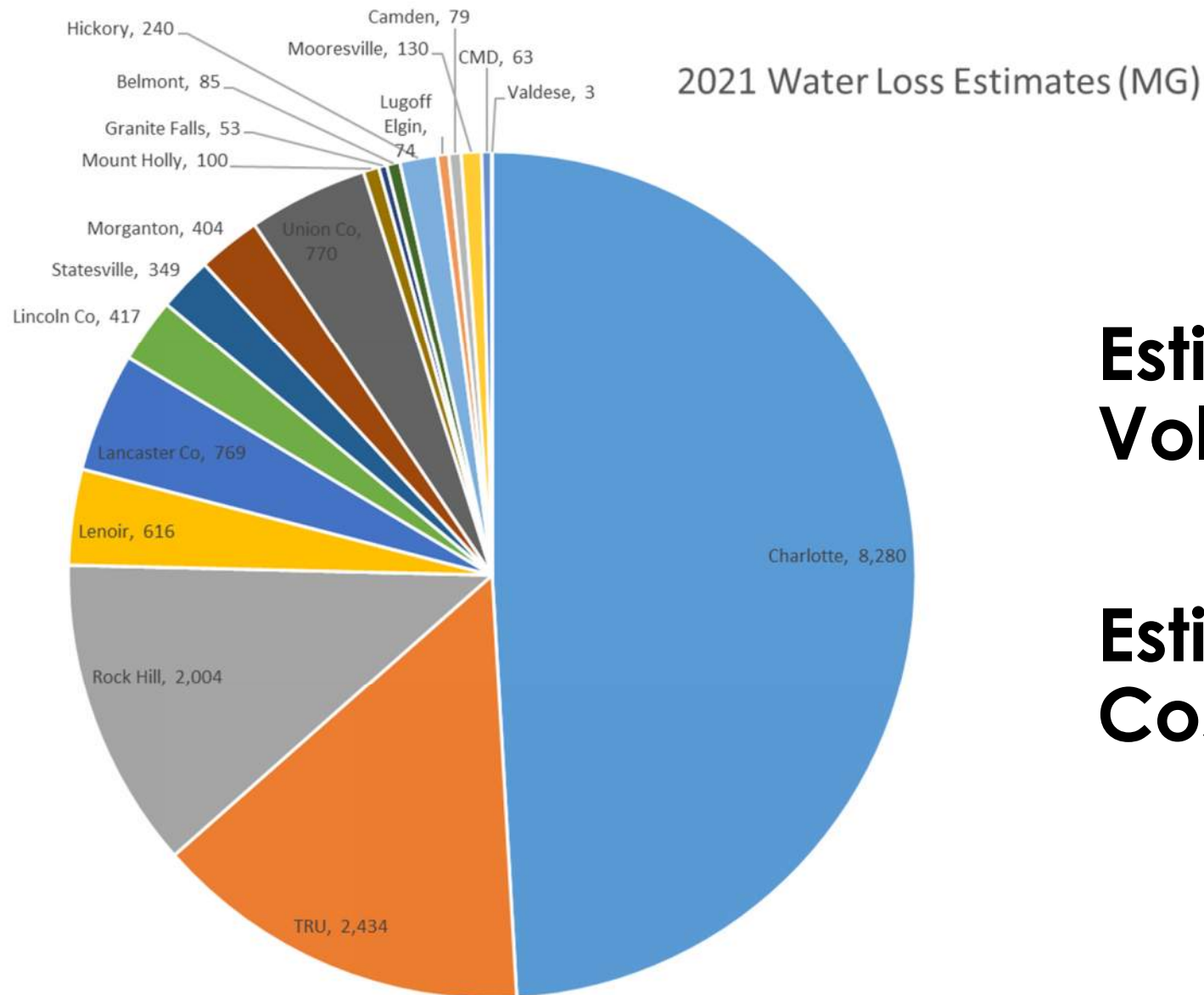
Source: GA EPD Validated Water Audits, 2011 through 2020 (<https://epd.georgia.gov/watershed-protection-branch/water-efficiency-and-water-loss-audits>)

Catawba-Wateree Water Management Group (CWWMG)

Multi-phased Approach to Water Loss



CWWMG Water Loss Program PHASE 6



Estimated Water Loss Volume (2021): 17 BG

Estimated Water Loss Cost (2021): \$23M