

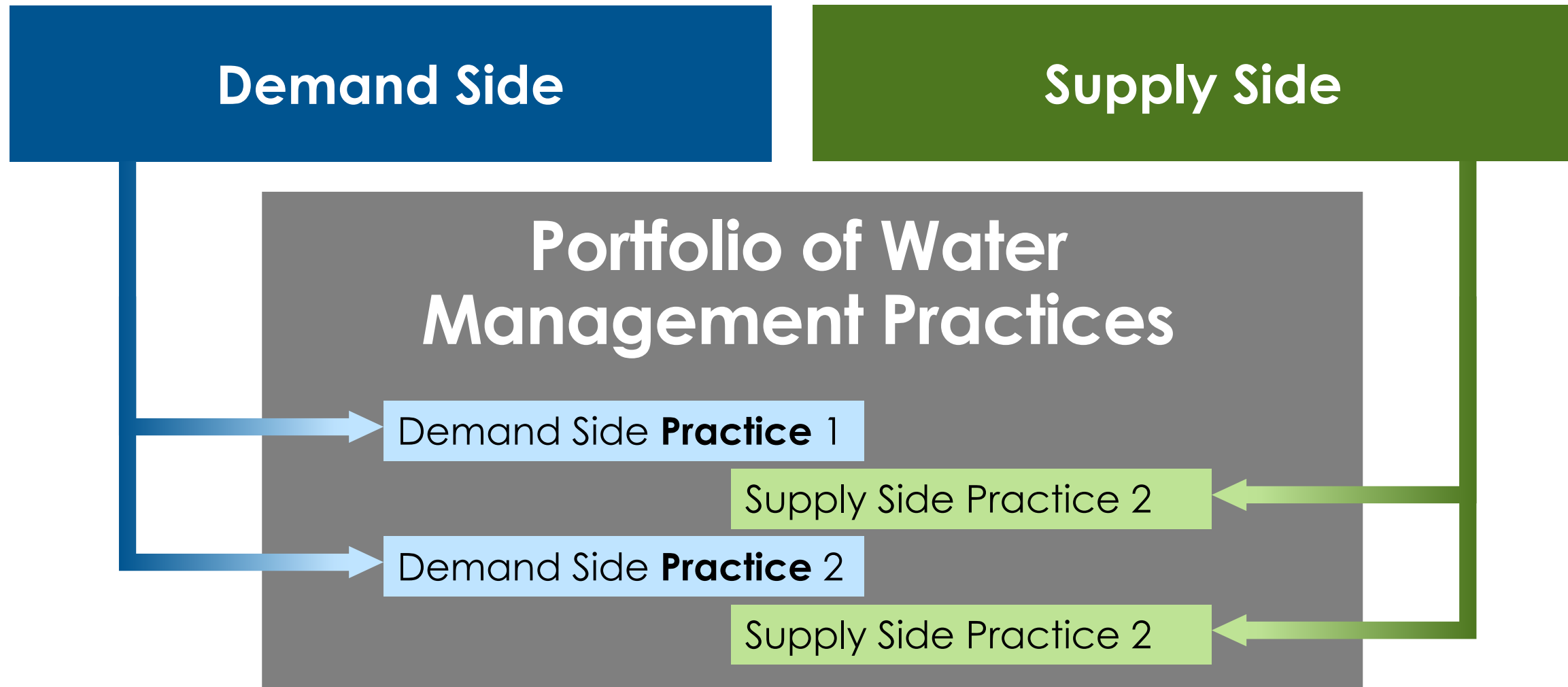
# Introduction to Water Management Strategies



# 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

Municipal conservation

## Example Practices

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**
- **Constructability**



# 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

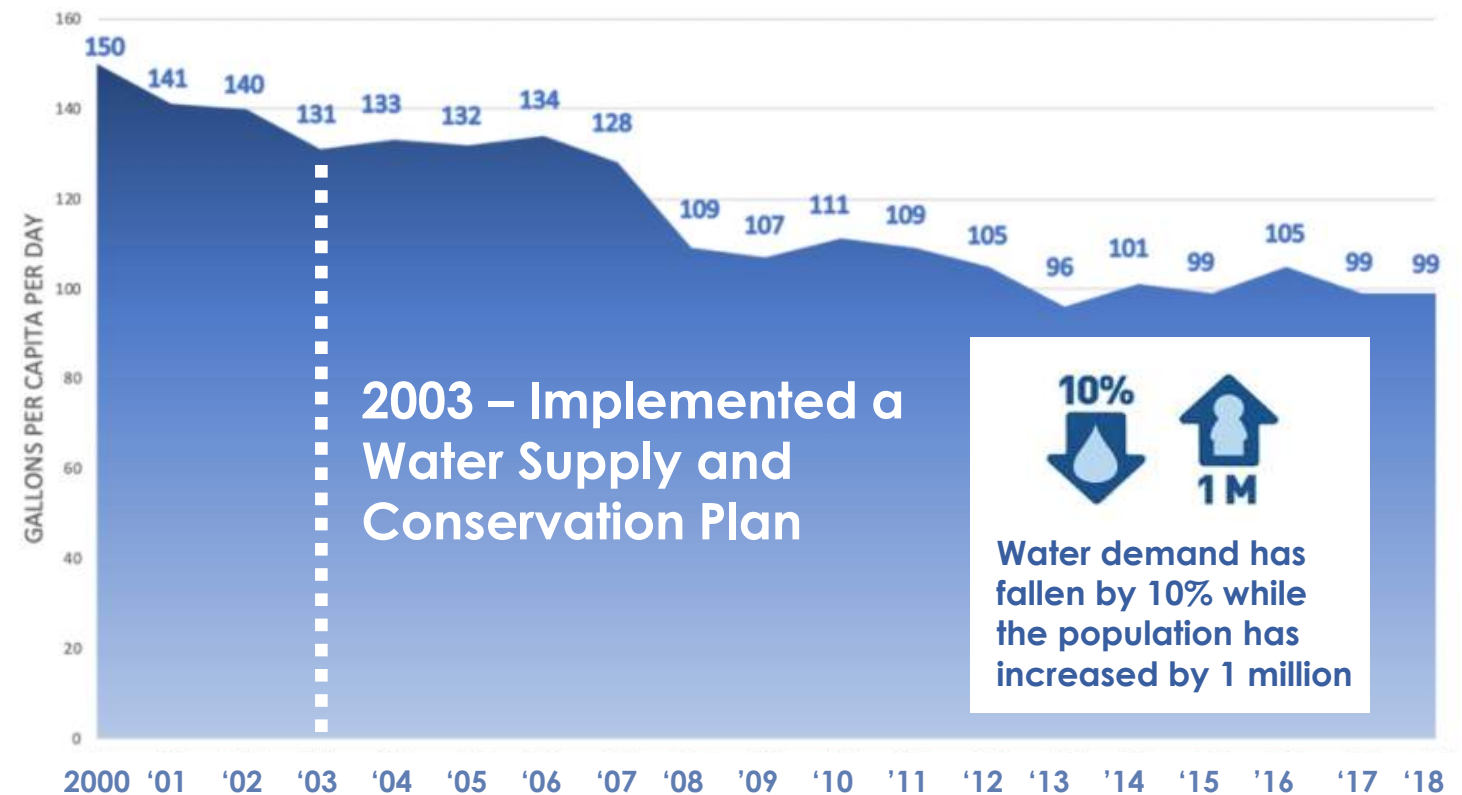
## Metro North Georgia Water Planning District

### 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/>

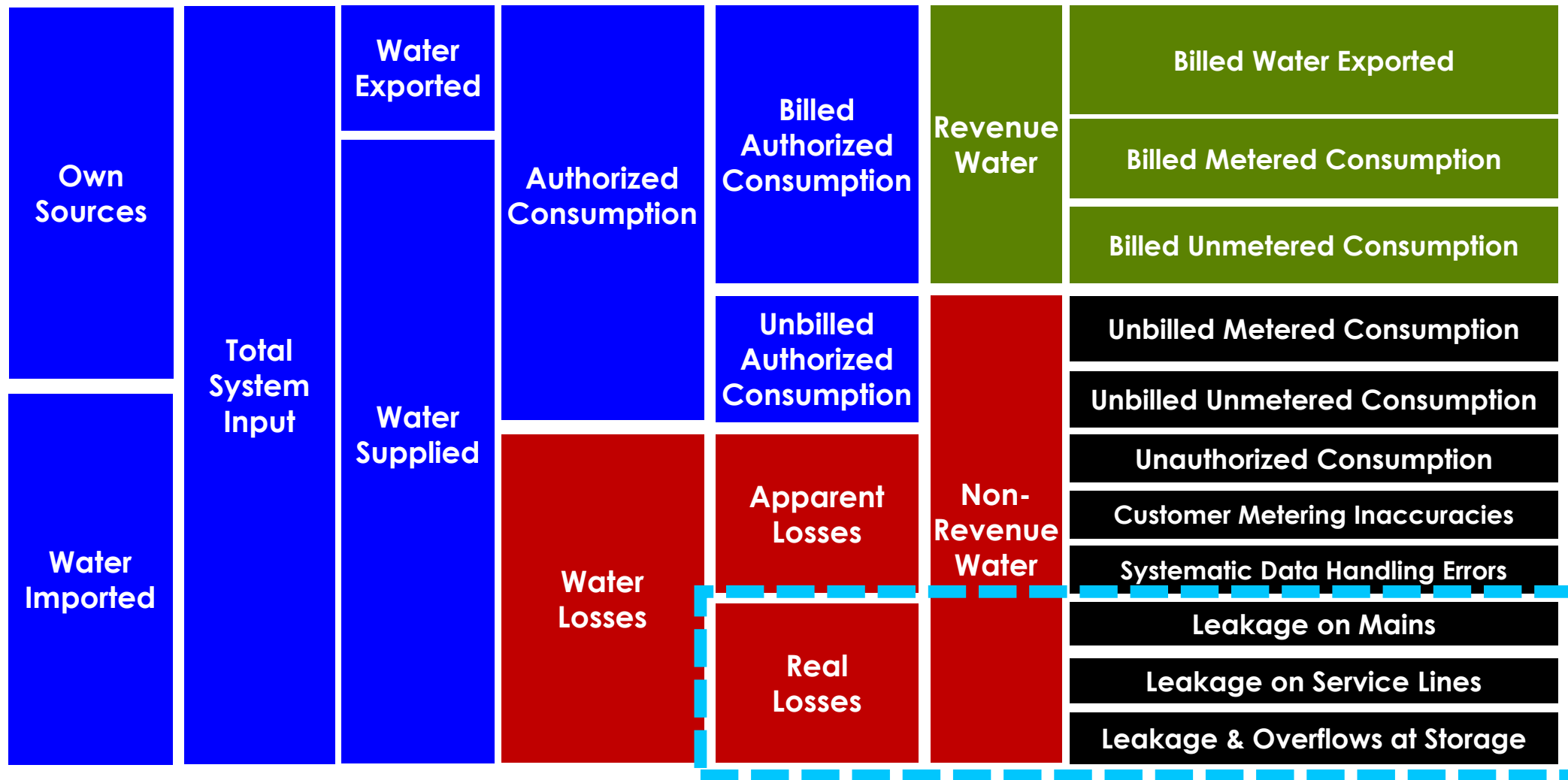
# Water Efficiency and Water Loss Programs

## 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

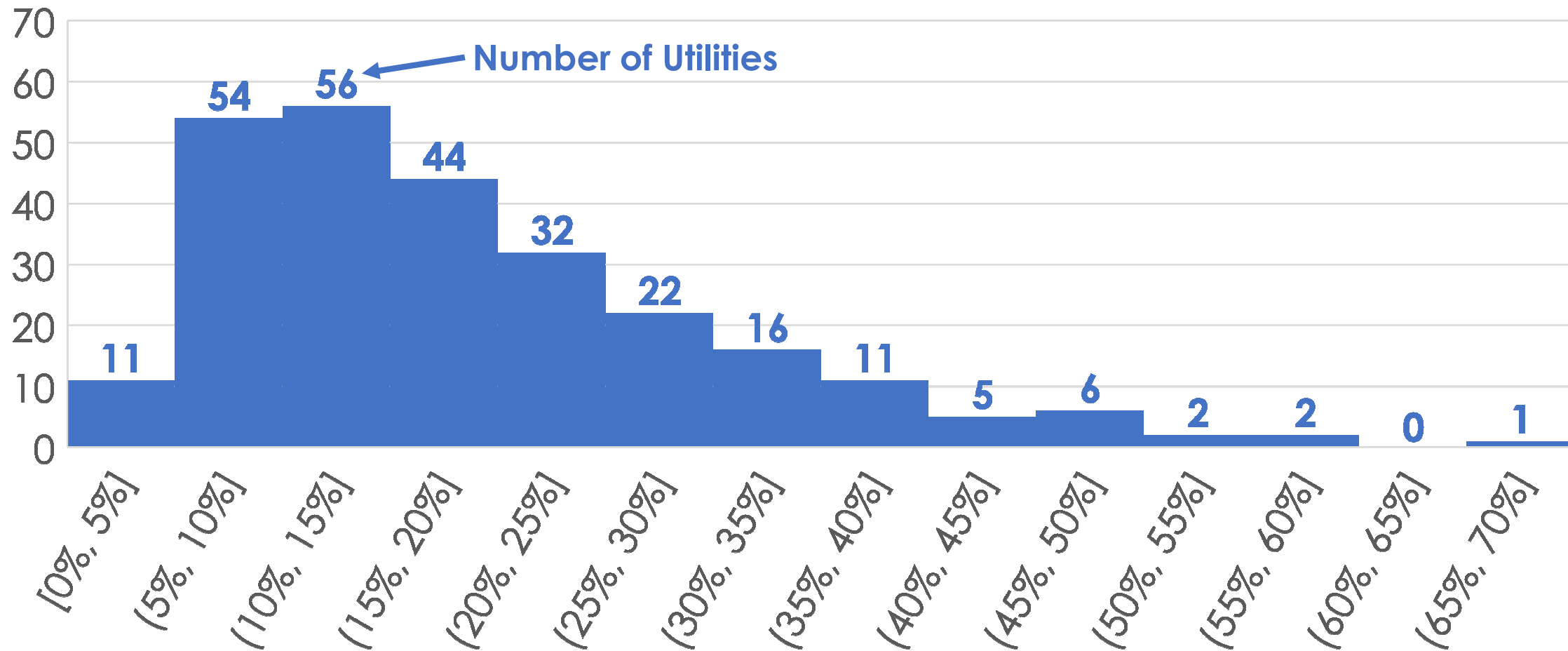
- Also called *Physical Losses* – Water that enters the distribution system, but never reaches a user
- **Examples Include:**
  - Leakage on transmission and distribution mains
  - Storage tank overflows
  - Service Line leakage up to customer meter
- **Reducing real losses extends the water resource**

**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

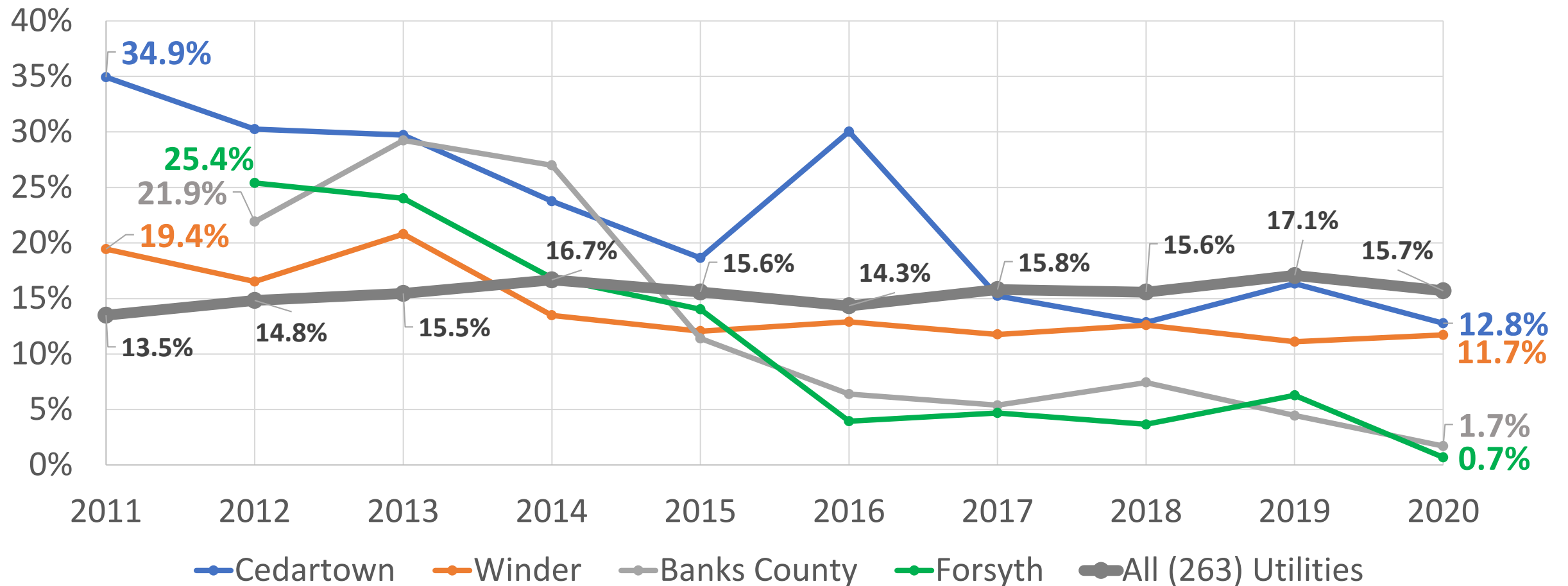


Source: GA EPD Validated Water Audits, 2011 through 2020 (<https://epd.georgia.gov/watershed-protection-branch/water-efficiency-and-water-loss-audits>)

# Water Efficiency and Water Loss Programs

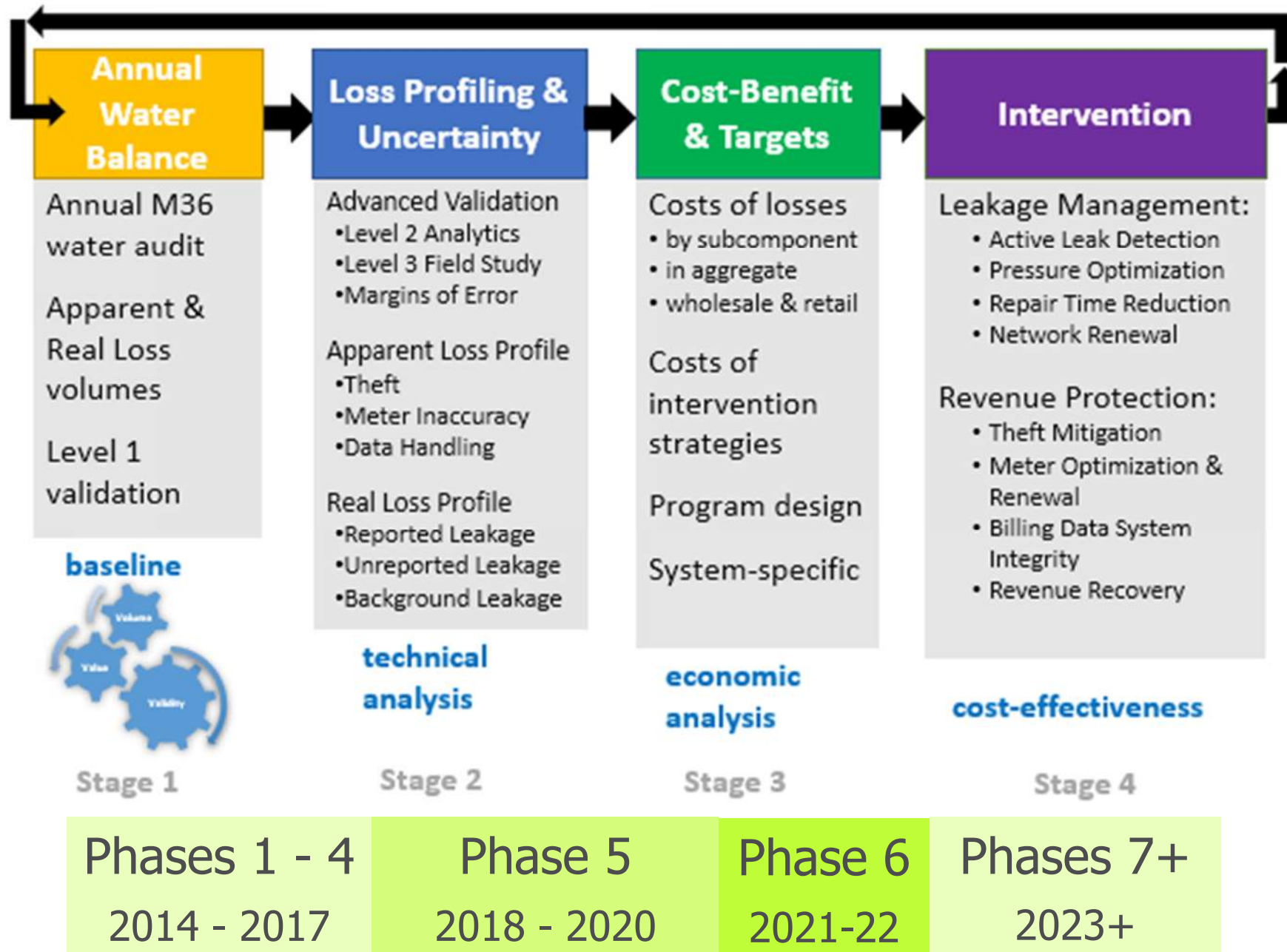


Annual Real Losses as a Percent of Total Water Supplied  
High Performers and Average for All Utilities



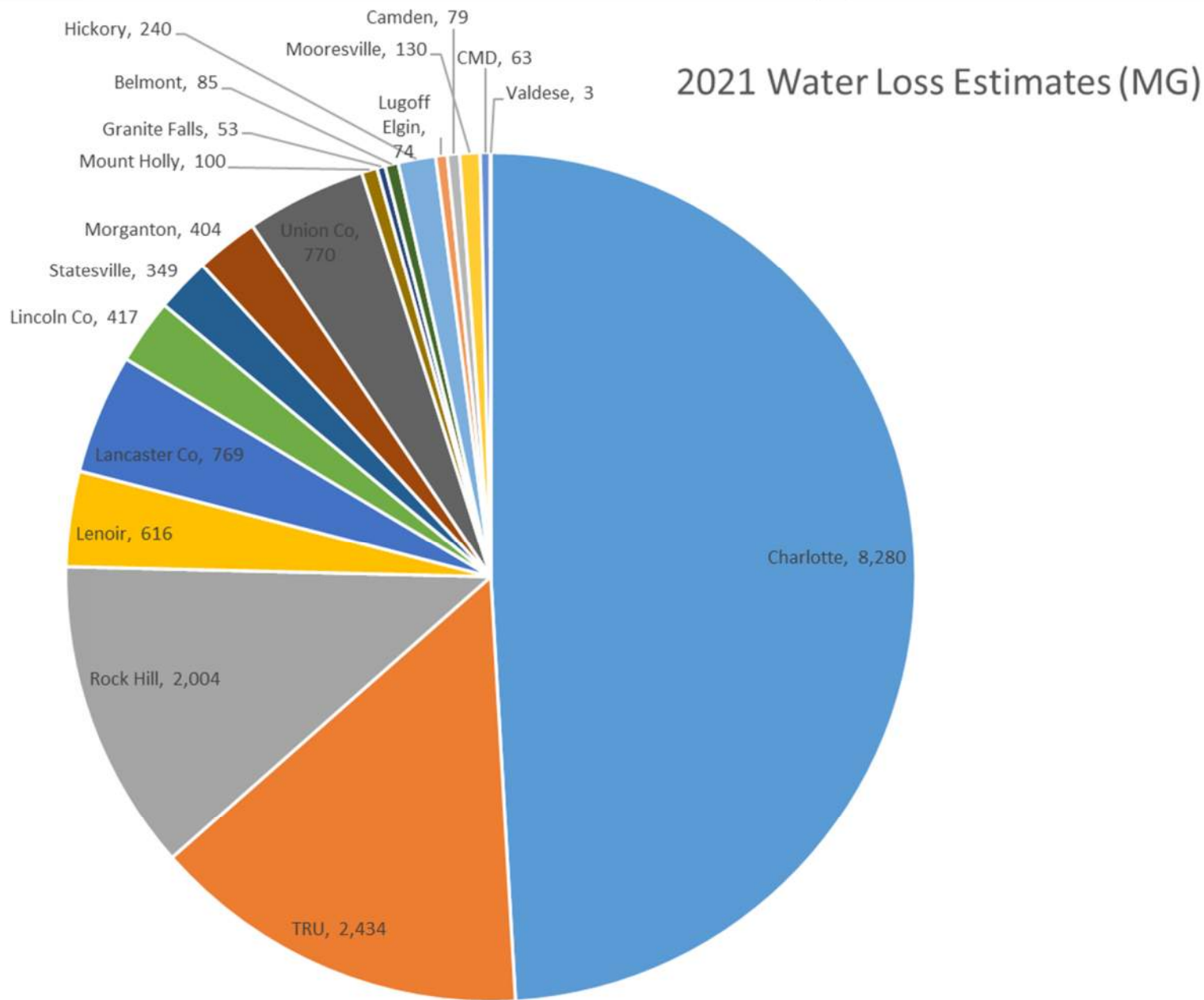
Source: GA EPD Validated Water Audits, 2011 through 2020 (<https://epd.georgia.gov/watershed-protection-branch/water-efficiency-and-water-loss-audits>)

# Multi-phased Approach





# CWWMG Water Loss Program PHASE 6



**Estimated  
Water Loss  
Volume (2021):  
17 BG**

**Estimated  
Water Loss  
Costs (2021):  
\$23M**

# Existing Water Management Strategies in the Edisto Basin

## City of Aiken

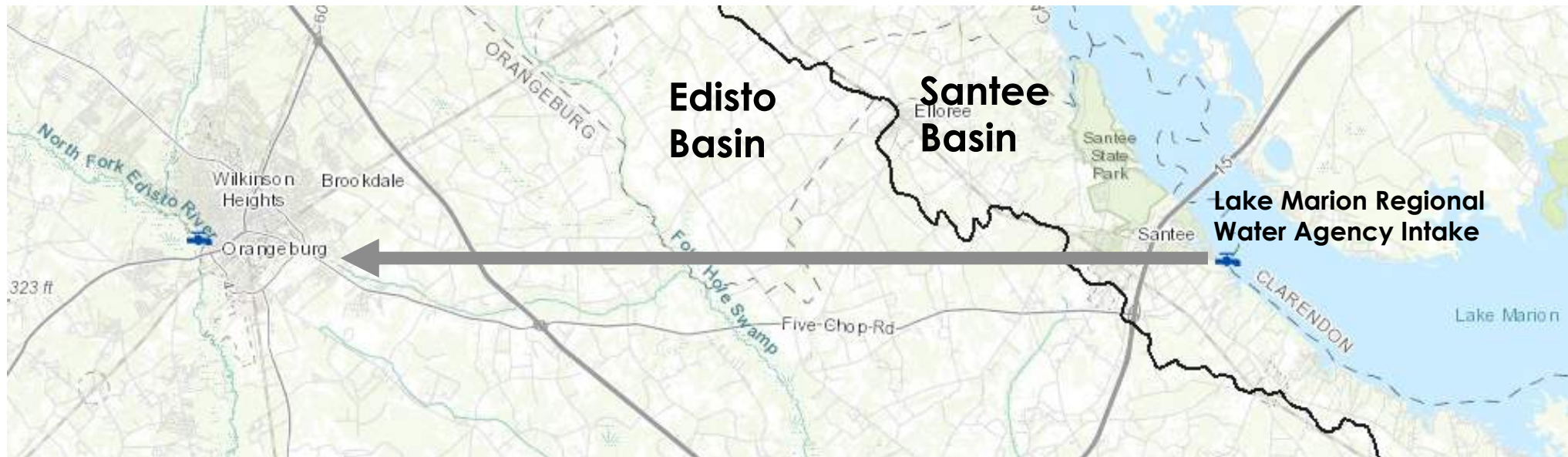
- **Masons Branch Reservoir**
  - 1,254 acre-feet (340 mgal) storage
  - Releases only during extreme drought to augment flow in Shaw Creek, above the City's intake
  - Provides approximately 30-day supply during average use



# Existing Water Management Strategies in the Edisto Basin

## City of Orangeburg

- Two Aquifer Storage and Recover (ASR) wells
- Interconnection with Lake Marion Regional Water System





# Existing Water Management Strategies in the Edisto Basin

## Walther Farms

- **Supply side** - Installed groundwater well to provide up to 20% of peak demand (conjunctive use)
- **Demand side** - Water audit/sprinkler head retrofits, eliminate end spray guns, cover cropping, dammer dikers



# Existing Water Management Strategies in the Edisto Basin

## Dominion Energy Cope Station

- Moving from 100% groundwater to a combination of surface and groundwater by 2028
- Eventually will withdrawal ~90% from surface water and ~10% from groundwater when river conditions allow
- During low flow conditions, all water use at the station will be groundwater



# Edisto Basin Proposed Low Flow Management Strategy

The strategy serves to augment statewide and municipal drought management plans by triggering tiered withdrawal curtailment by the largest water users in the basin when Edisto River flow reaches certain low levels.

Incremental Percent Below 20% of Median Flow	Edisto River Flow Range (cfs) at Givhans Ferry		Reduction Goal for Surface Water Withdrawals
	Lower	Upper	
0-20%	266	332	20%
20-40%	199	266	40%
40-60%	133	199	60%
60-80%	66	133	80%
80-100%	0	66	100%

