



**Charleston  
Water System**

# **Reservoir and Source Water Management**

by Jason Thompson

# Introduction to Charleston Water System

- Drinking and Wastewater Services
  - *We don't do stormwater*
- Independent municipal agency
- Commissioners of Public Works  
(dba Charleston Water System)
- Oversight by Board of Commissioners  
(3 Elected, 2 Ex-Officio)
- 6 Officers, 430 employees





# Where we serve: WATER



## Retail

- Charleston
- North Charleston
- Hanahan
- Ladson
- James Island
- Daniel Island
- Cainhoy
- Thomas Island
- West Ashley
- Hollywood
- Ravenel
- Meggett

## Wholesale

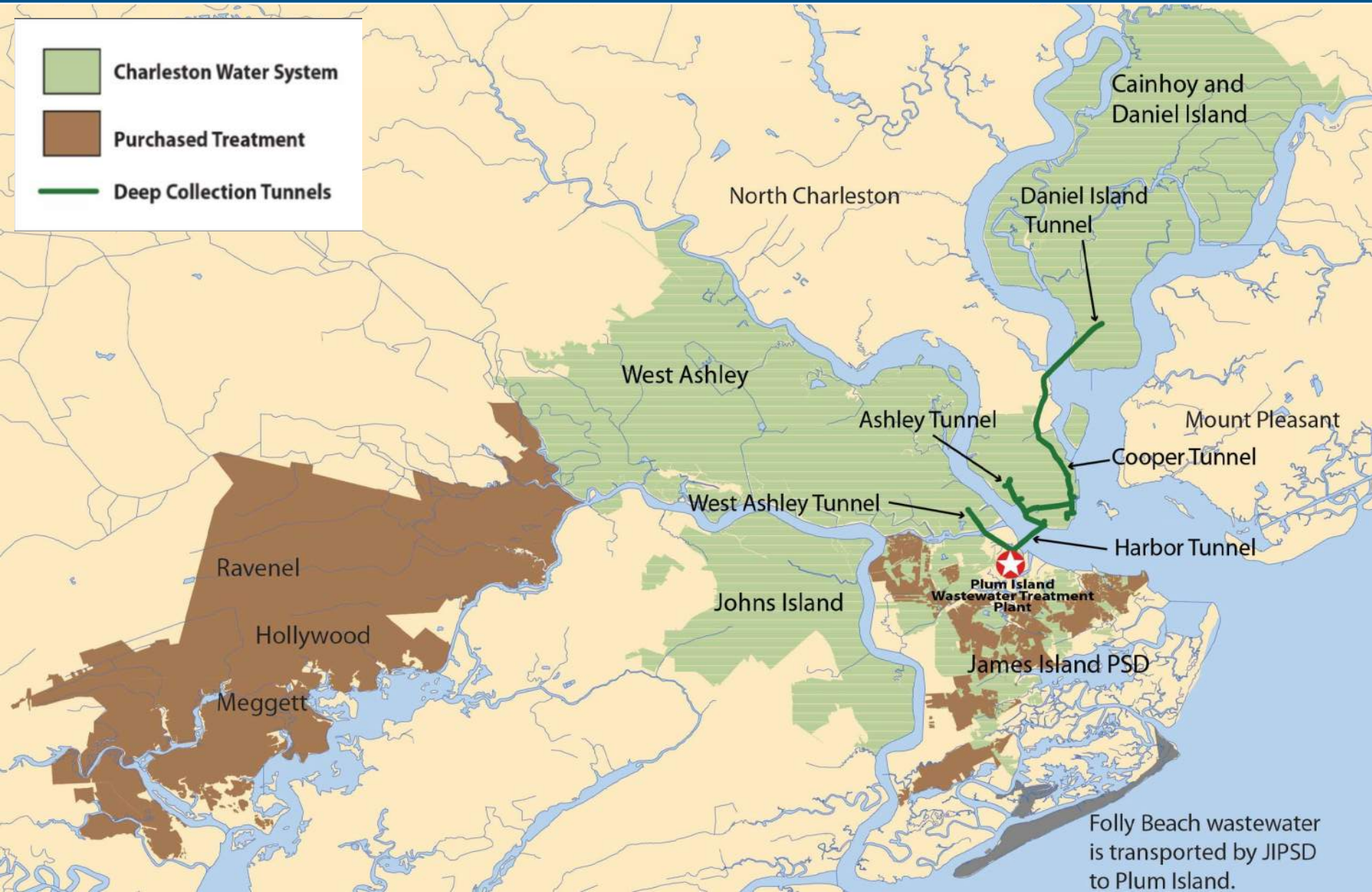
- St. Johns Water Company
- Mt. Pleasant Waterworks
- Berkeley County
- Dorchester County Public Works
- Town of Folly Beach
- Town of Sullivan's Island
- Isle of Palms Water and Sewer Commission
- Joint Base Charleston
- Town of Lincolnville

*\* 20-25% of HWTP's potable production goes to wholesale*

**WATER SERVICE AREA**



# Where we serve: SEWER



## Retail to parts of:

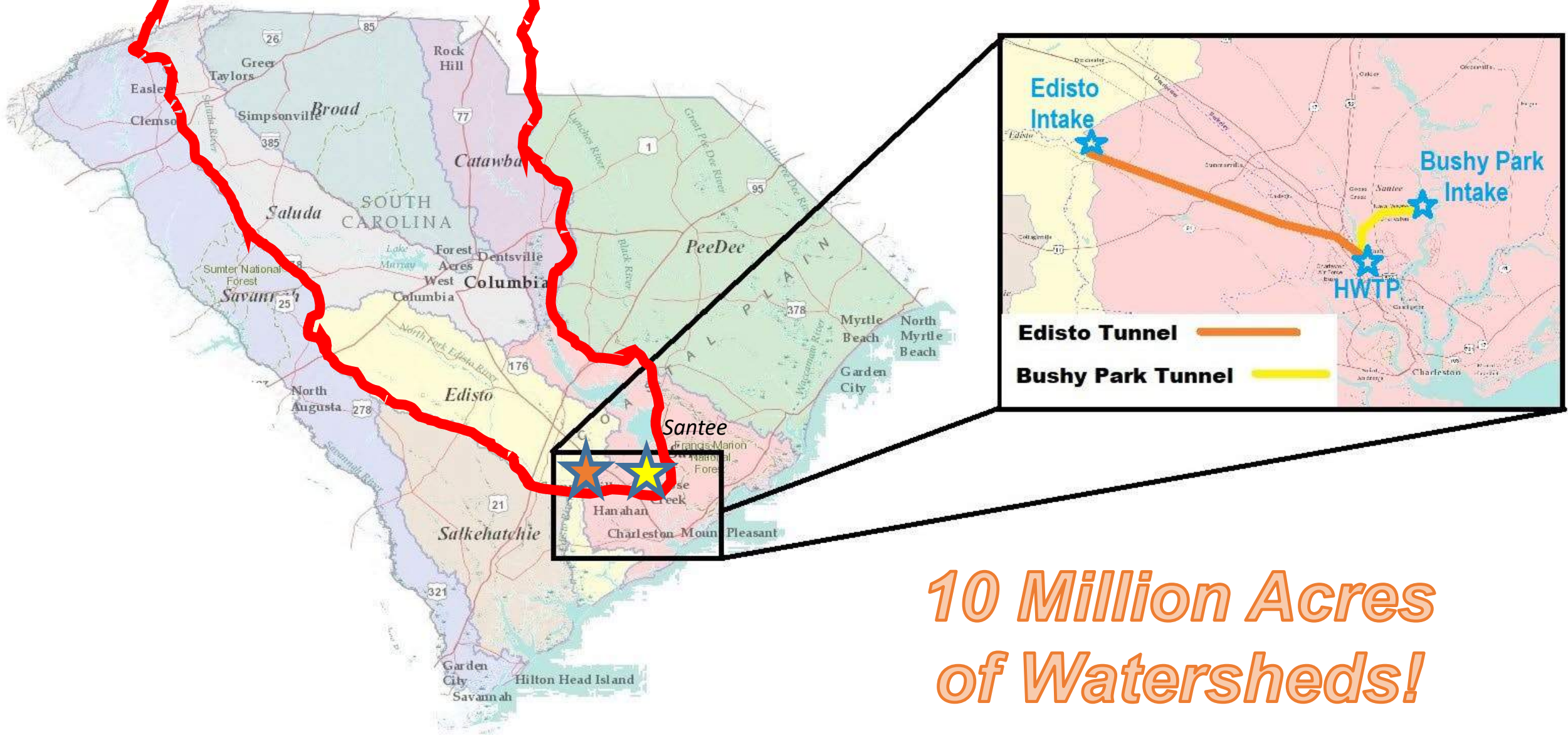
- Charleston
- West Ashley
- Johns Island
- Daniel Island
- Cainhoy
- James Island

## Wholesale

- Folly Beach
- Hollywood
- Meggett
- Ravenel
- James Island Public Service District

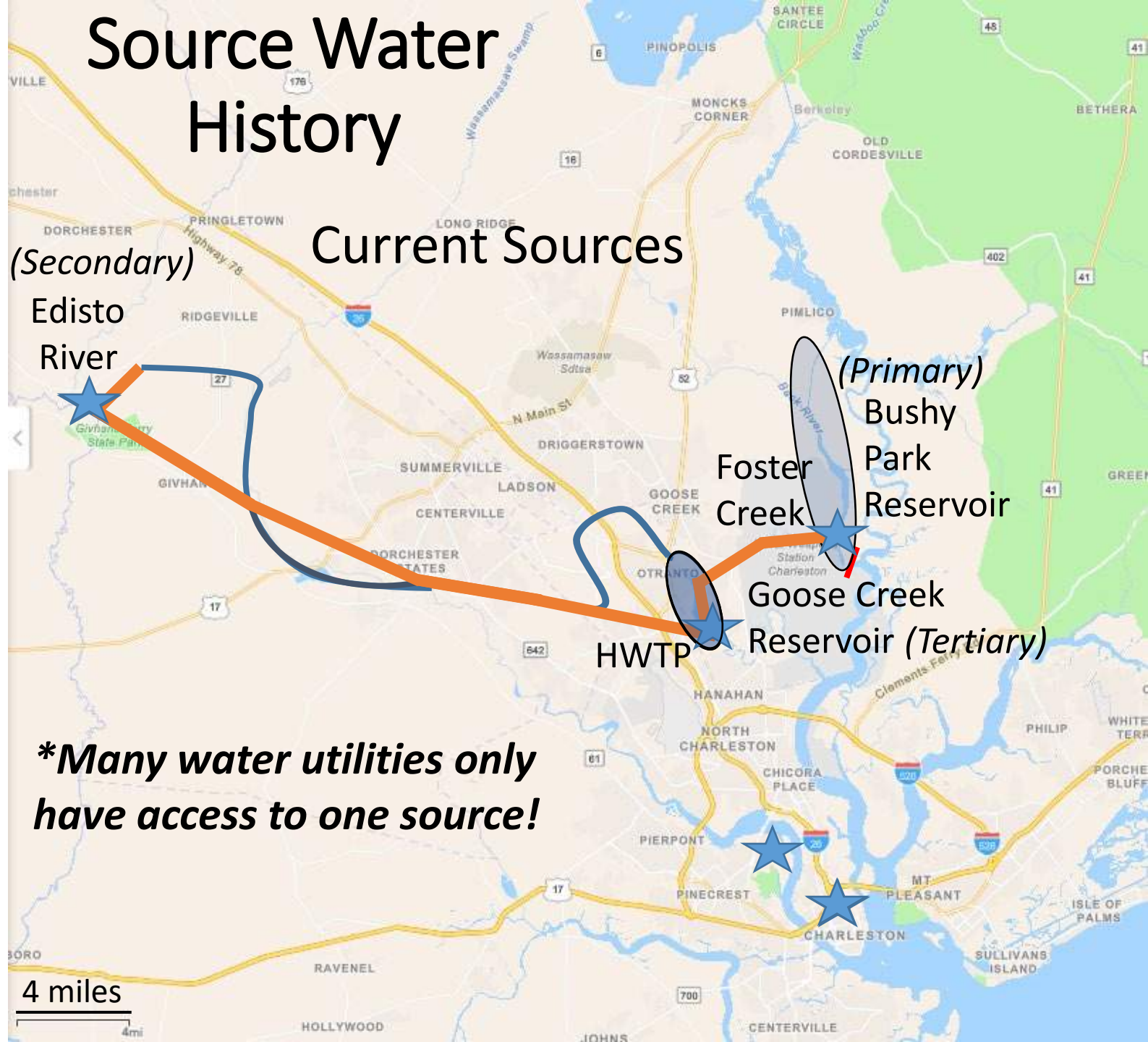


# Charleston Water System Sources



*10 Million Acres  
of Watersheds!*

# Source Water History



## Current Sources

(Secondary)

Edisto River

(Primary)

Bushy Park Reservoir

Foster Creek

Goose Creek Reservoir (Tertiary)

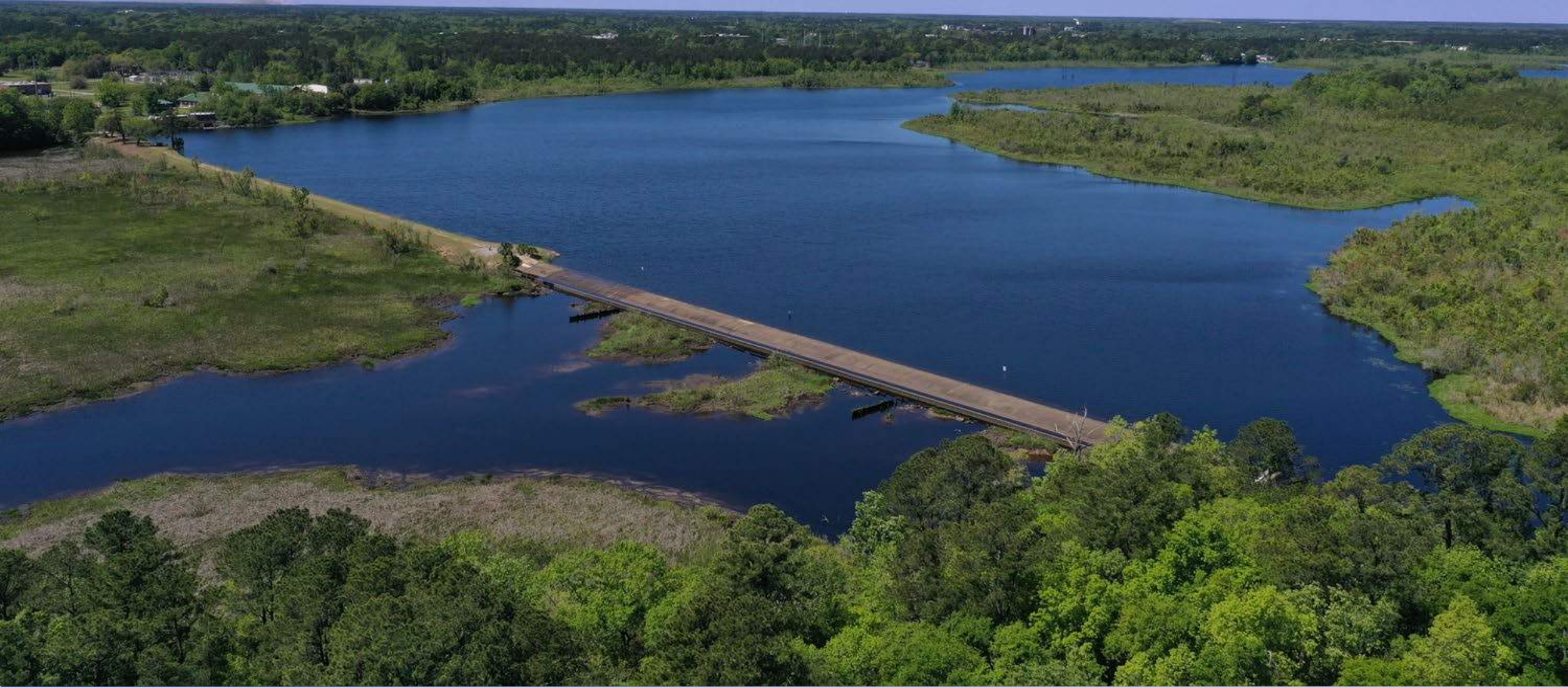
HWTP

***\*Many water utilities only have access to one source!***

4 miles



# Goose Creek Dam and Reservoir





# Goose Creek Dam and Reservoir







Edisto River Source





1928

# TUNNEL PROJECT BEGUN



EDISTO-ASHLEY RIVER TUNNEL. EAST HEADING. INTERMEDIATE SHAFT NO. 1. MAY 27, 1928.



# Bushy Park Tunnel



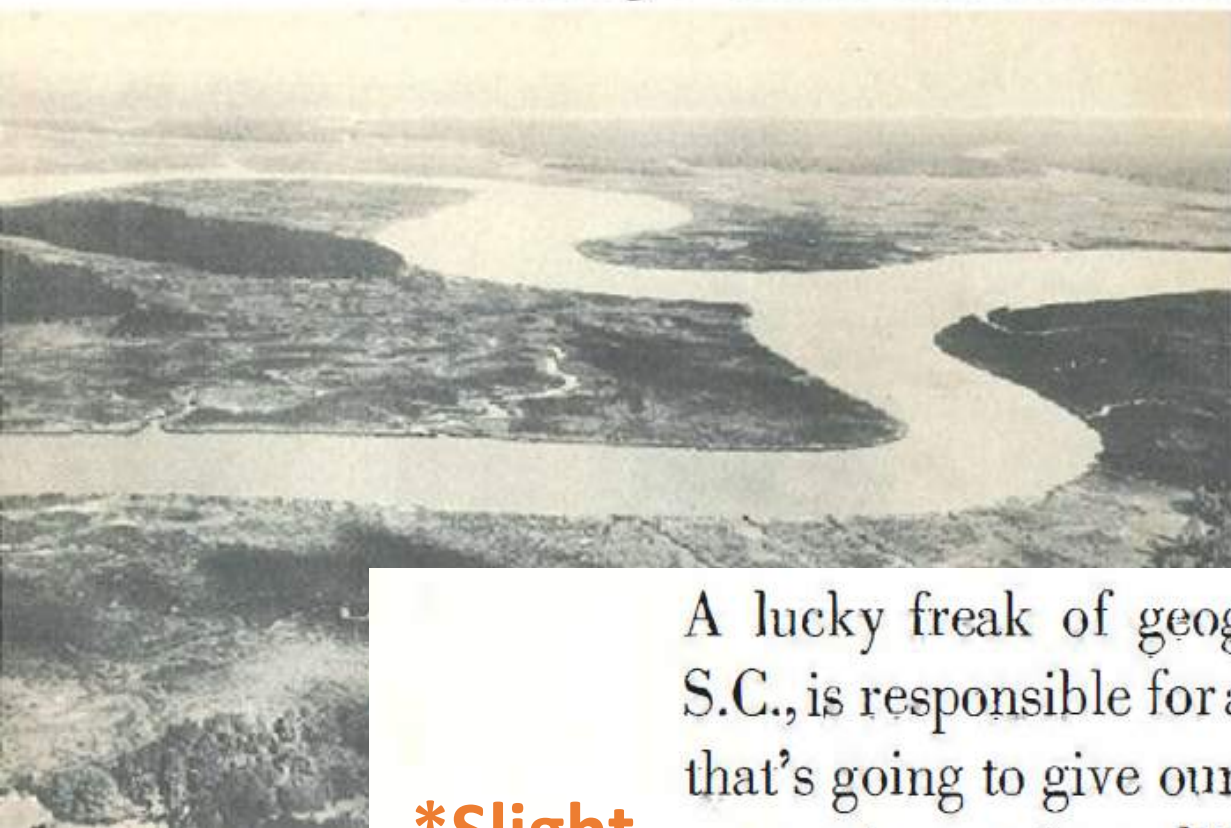
Tunnel Bore  
Machine







## Bushy Park Dam and Boat Landing - 1951 vs 2021



**\*Slight**

**Exaggeration...**

# Ten Billion Gallons a Day

*By HERBERT RAVENEL SASS*

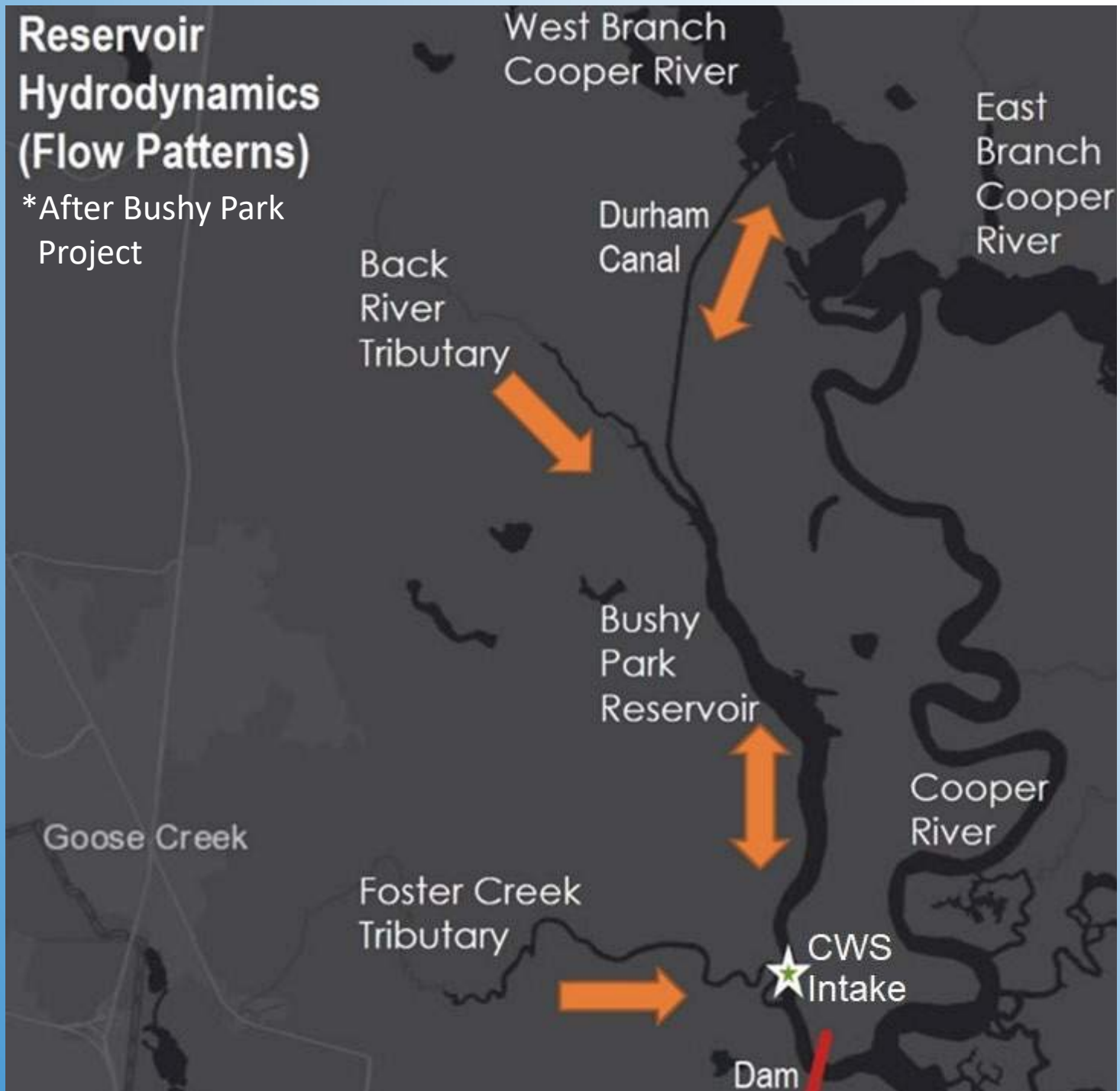
January 6, 1951 issue of The Saturday Evening Post



# Dependence of the Bushy Park Project (Reservoir) on the Santee Cooper Diversion Project (Lake Releases)

- The Bushy Park Project was enabled by the Santee Cooper Diversion project and subsequent regular freshwater inputs into the Cooper River
- The Bushy Park Project (dam, dikes, and Durham Canal) changed where the Bushy Park Impoundment would receive the water from the Cooper (i.e., further upstream in lower salinity waters)
- The interconnected relationship between the Diversion Project and Bushy Park Project are documented in the corresponding legislation (SC Act 355 of 1953 and SC Act 1178 of 1964), studies, contracts, and FERC license on Santee Cooper's Lakes







# Lake Releases vs Downstream Withdrawals

- The contracted Jefferies powerhouse releases from Lake Moultrie are an average weekly flow of 4,500 CFS or 88,306 MGM

*\*Since 1978, the actual monthly releases have been 100,669 MGM and 128,050 MGM (median and mean)*

- All permitted withdrawals downstream of Lake Moultrie's Jefferies Project are currently within Bushy Park Reservoir (25,547 MGM, more than half is nonconsumptive) or Goose Creek Reservoir (1,304 MGM)
- The contracted release volume is 3.5x the total downstream withdrawals in Bushy Park and most of the withdrawal is nonconsumptive and discharged back into the Cooper River

*\*Also get additional supply from precipitation to watersheds*



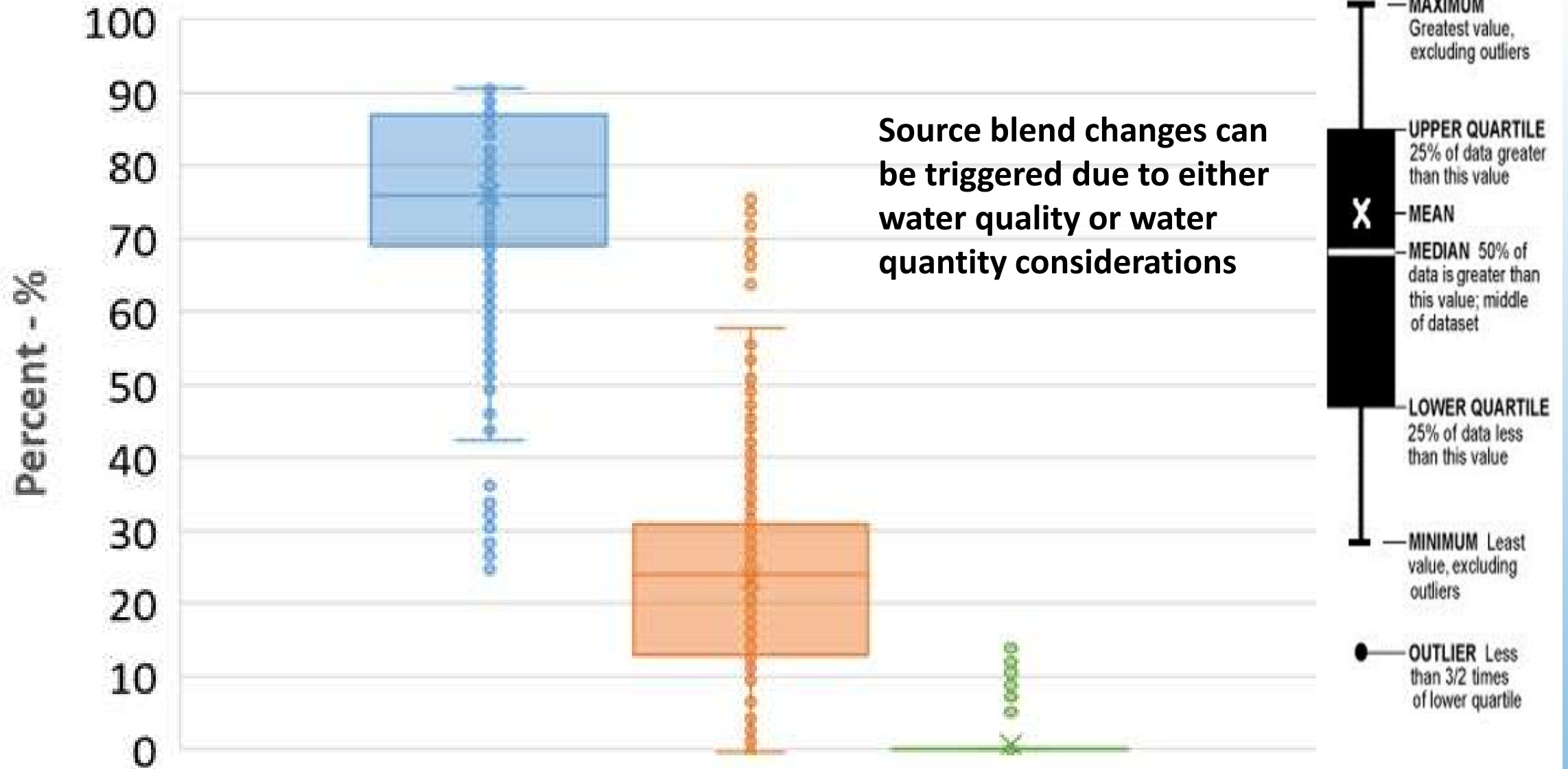
# CWS Withdrawal and Drought Plan

- CWS Withdrawal Permits
  - Bushy Park Reservoir Permit is 4,562.5 MGM (~150 MGD)
  - Edisto River Permit 8,829.36 MGM (~287 MGD)
  - Goose Creek Reservoir Permit is 304 MGM (~10 MGD)
- CWS' resiliency comes from its access to three sources
- CWS' plan is activated based on:
  - SCDNR Drought Committee drought declarations by county
  - Edisto stream flow triggers
  - Specific Conductance within Bushy Park Reservoir
  - Goose Creek Reservoir levels



# Typical Source Ratios at CWS HWTP

Bushy Park, Edisto, GCR





# CWS Drought Actions as Drought Worsens

- CWS transitions away from the Edisto source and to more reservoir (Bushy Park Reservoir and Goose Creek Reservoir) withdrawal as various low river flow triggers are reached
- CWS enacts various types of production reductions based on the drought severity:
  - Moderate Drought – voluntary restrictions on all uses
    - Goal of 15% reduction
  - Severe Drought – voluntary on all, mandatory on non-essential
    - Goal of 20% reduction
  - Extreme Drought – mandatory restrictions on all uses
    - Goal of 25% reduction



# Further Resiliency

- Interconnected nature of the tunnel system and three sources allows shifting source ratios as needed for water quality and water quantity considerations as well as emergency conditions (hurricane, drought, etc.)
  - \*Also allows tunnel maintenance and refurbishment
- Goose Creek Reservoir can be supplemented by both the Bushy Park Reservoir and Edisto sources
- CWS has clearwells/tanks on the plant and across distribution system which can be utilized to smooth different demand/production throughout each day





# Questions