



**City of Dallas**

# **Long Range Water Supply Plan Update**

**Transportation and  
Infrastructure  
November 8, 2022**

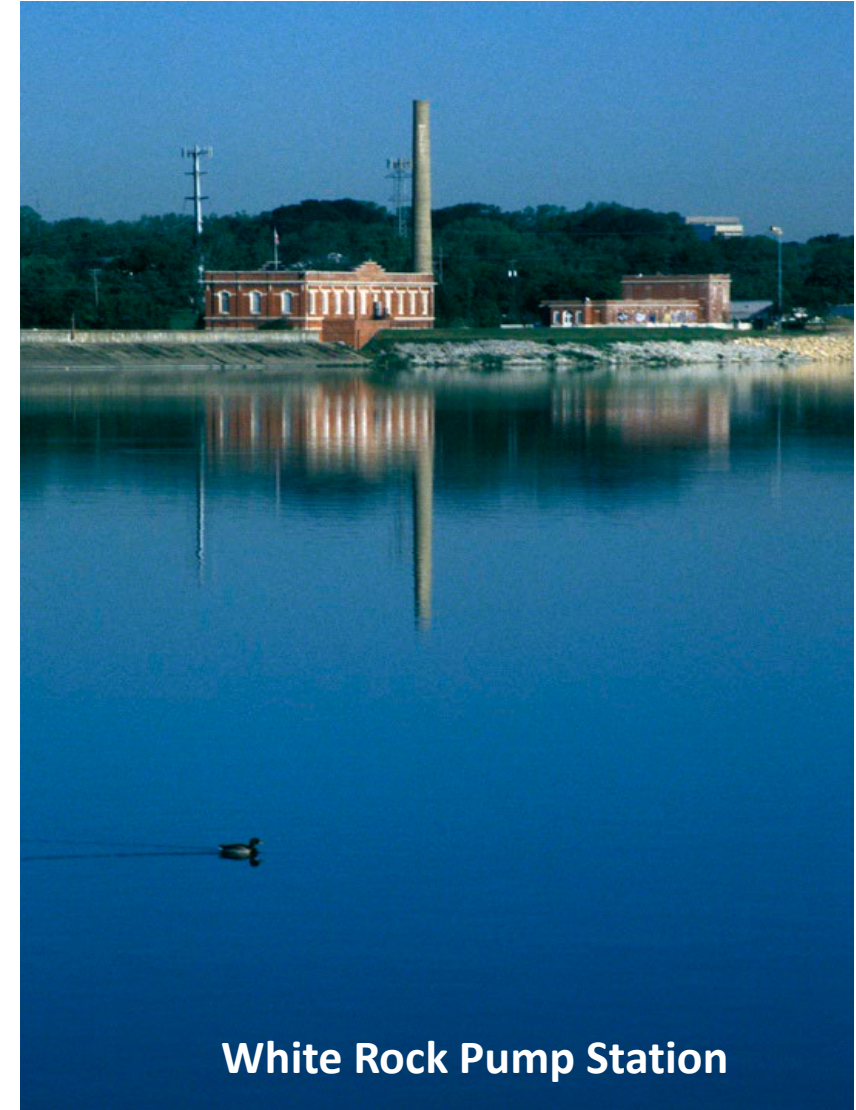
Terry S. Lowery, Director  
Dallas Water Utilities  
City of Dallas

# Purpose



This briefing provides:

- Current and projected Water Supply Conditions
- Introduction to Water Planning
- Statewide Water Plan
- Dallas' 2014 Long Range Water Supply Plan
- Dallas' Long Range Water Supply Plan Update
- Summary



White Rock Pump Station





# Current Water Supply Conditions

“If you don't like our weather just wait a minute!”

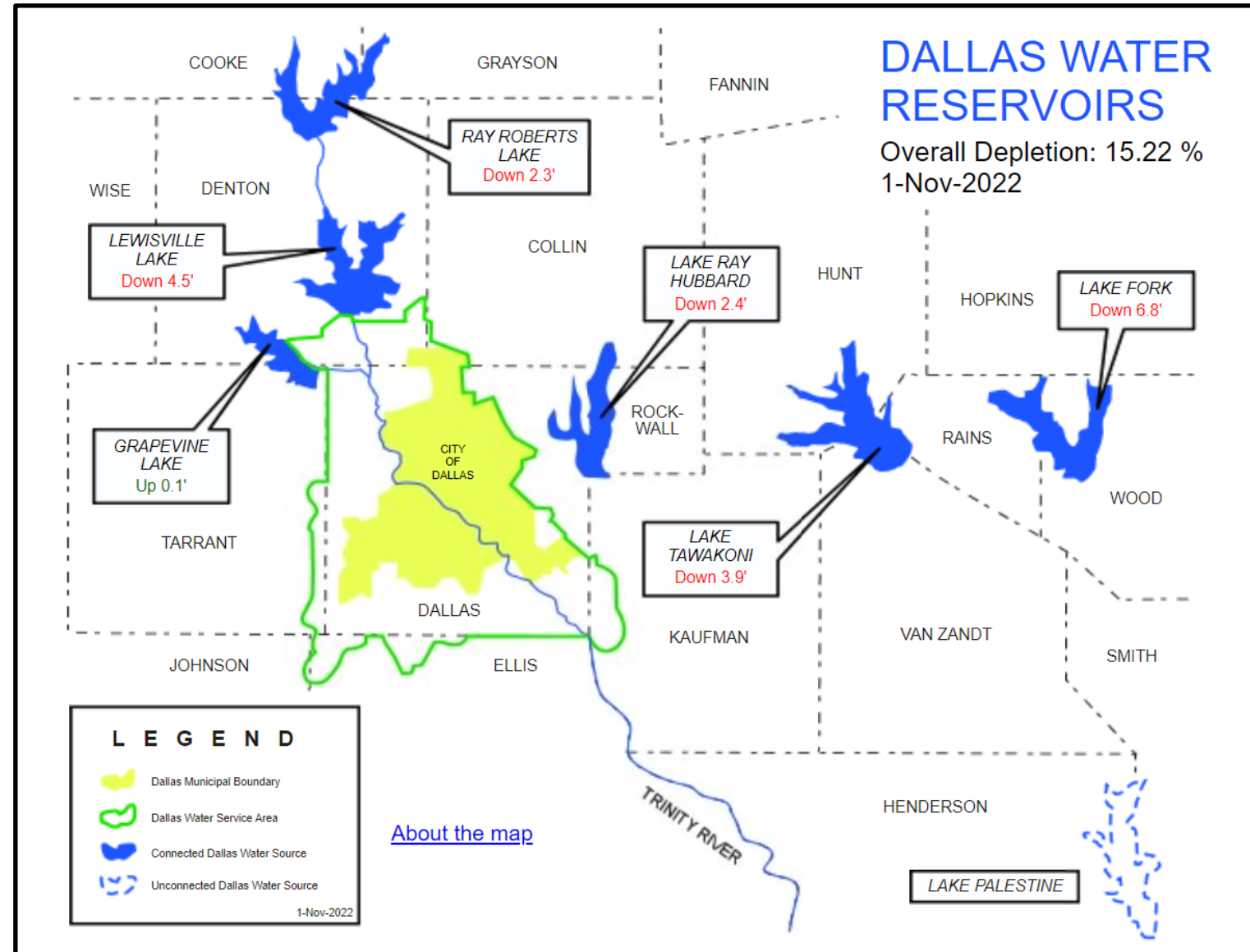
Mark Twain



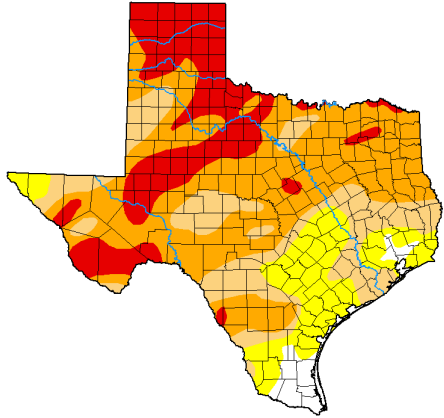
# Current Status of Water Supplies



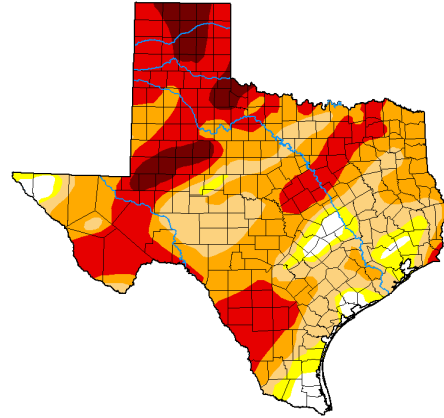
**15.22% Depleted  
(84.78% Full)**



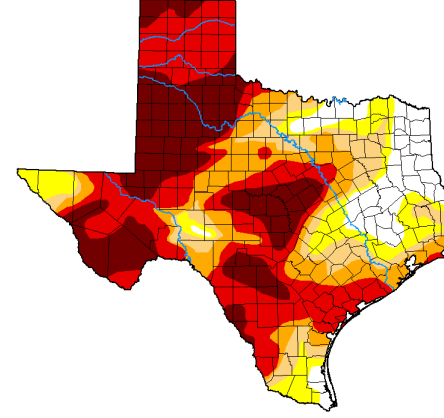
# Drought Monitor



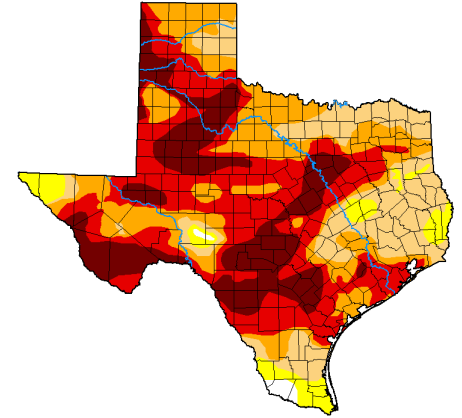
January 11, 2022



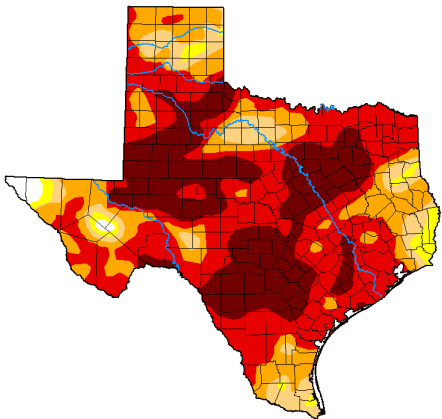
March 8, 2022



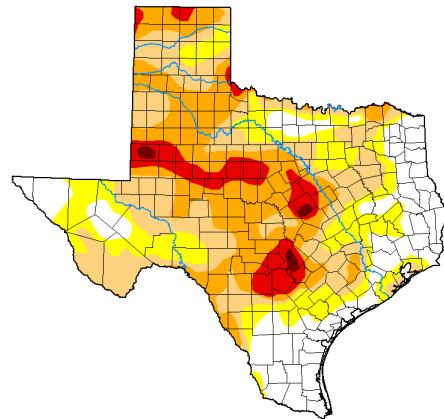
May 10, 2022



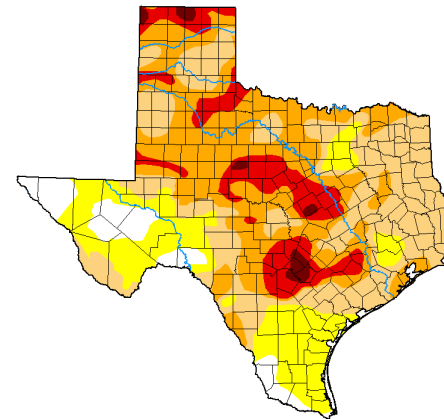
July 12, 2022



August 9, 2022



September 13, 2022



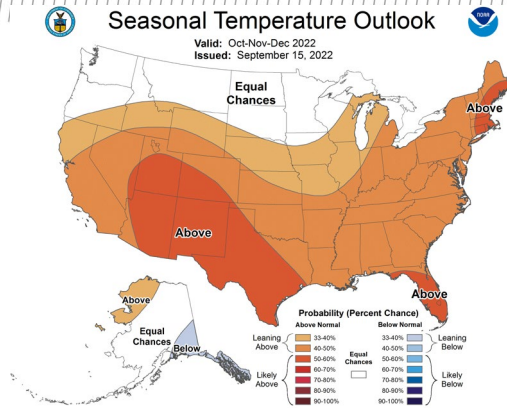
October 27, 2022

## Intensity:

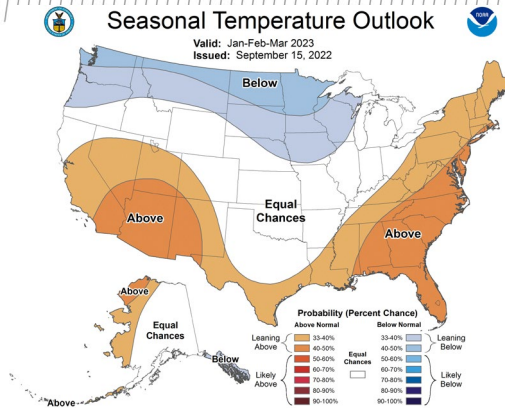
- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought



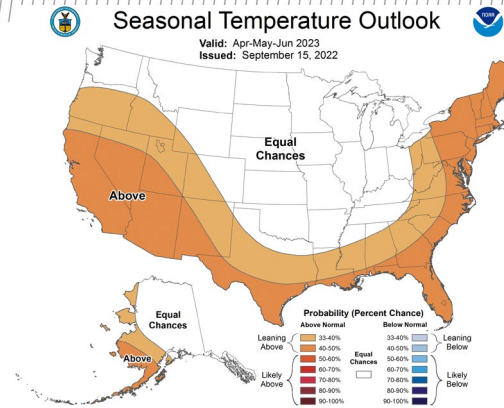
# Temperature and Precipitation Forecast



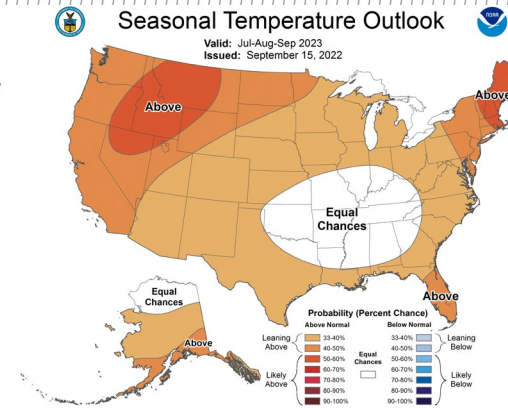
Oct - Nov - Dec



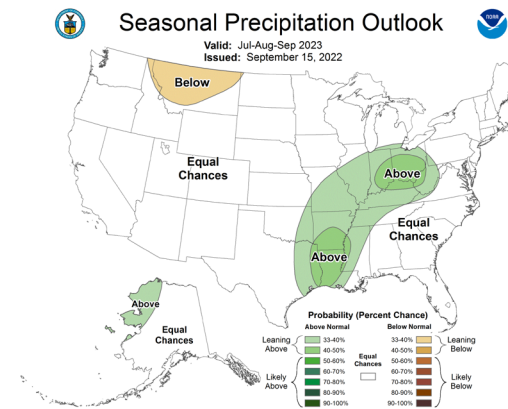
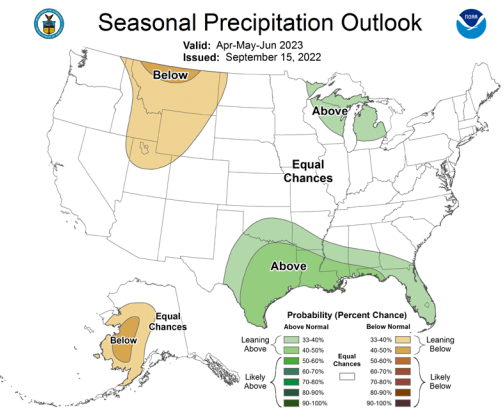
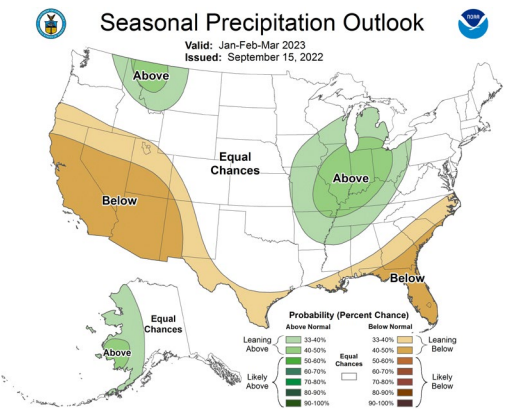
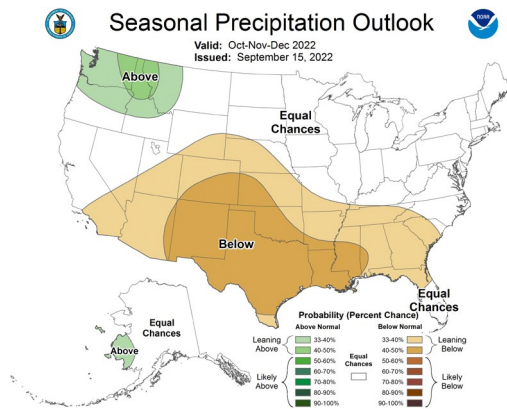
Jan - Feb - Mar



Apr - May - Jun



Jul - Aug - Sep

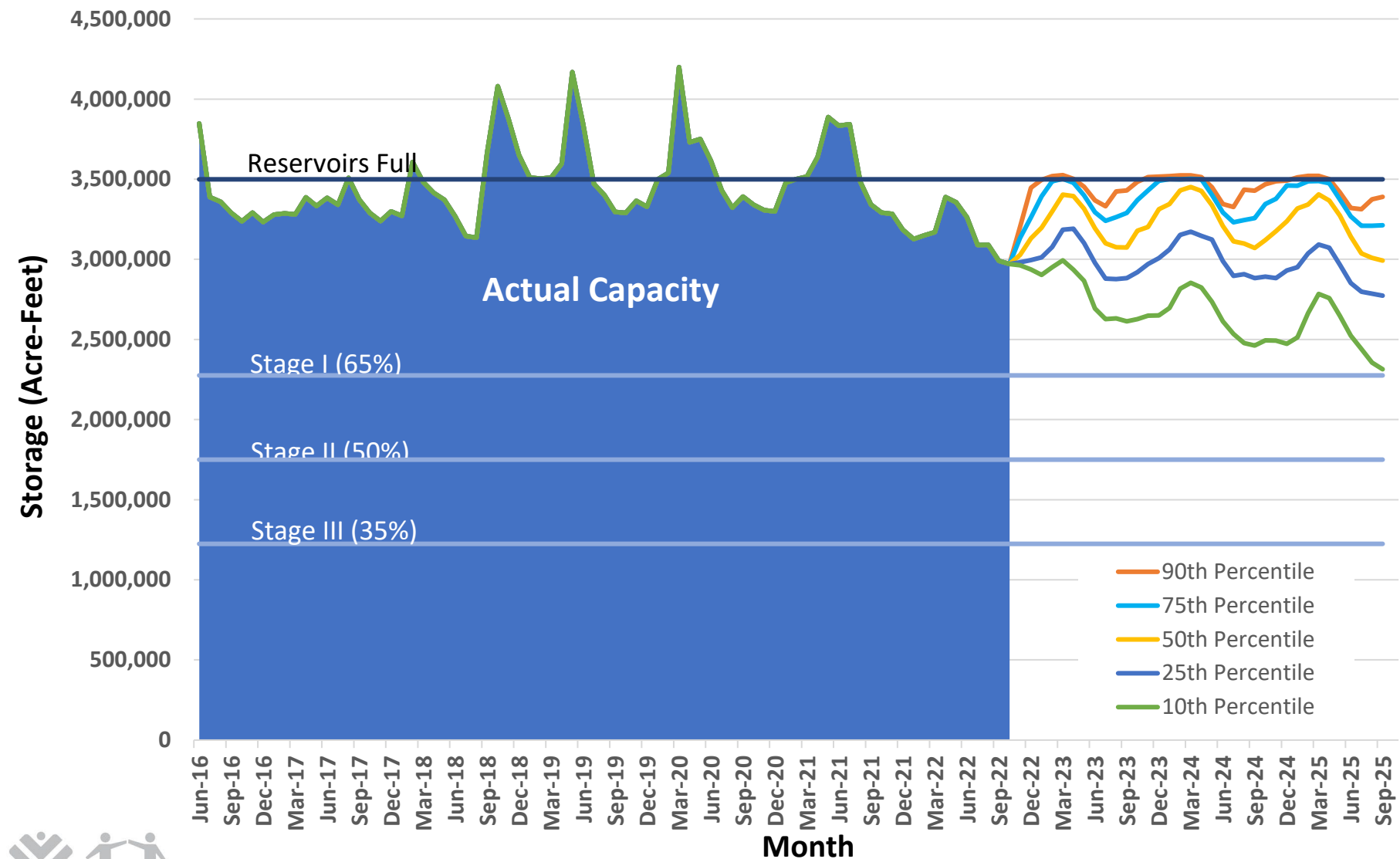


Temperature – Fall, above average; Winter and Spring average; and Summer above average temperature

Precipitation – Below average; Winter average; Spring above average; and Summer average precipitation



# Water Supply Projections as of October 31, 2022





# Introduction to Water Planning

“When the well is dry, we know the worth of water.”

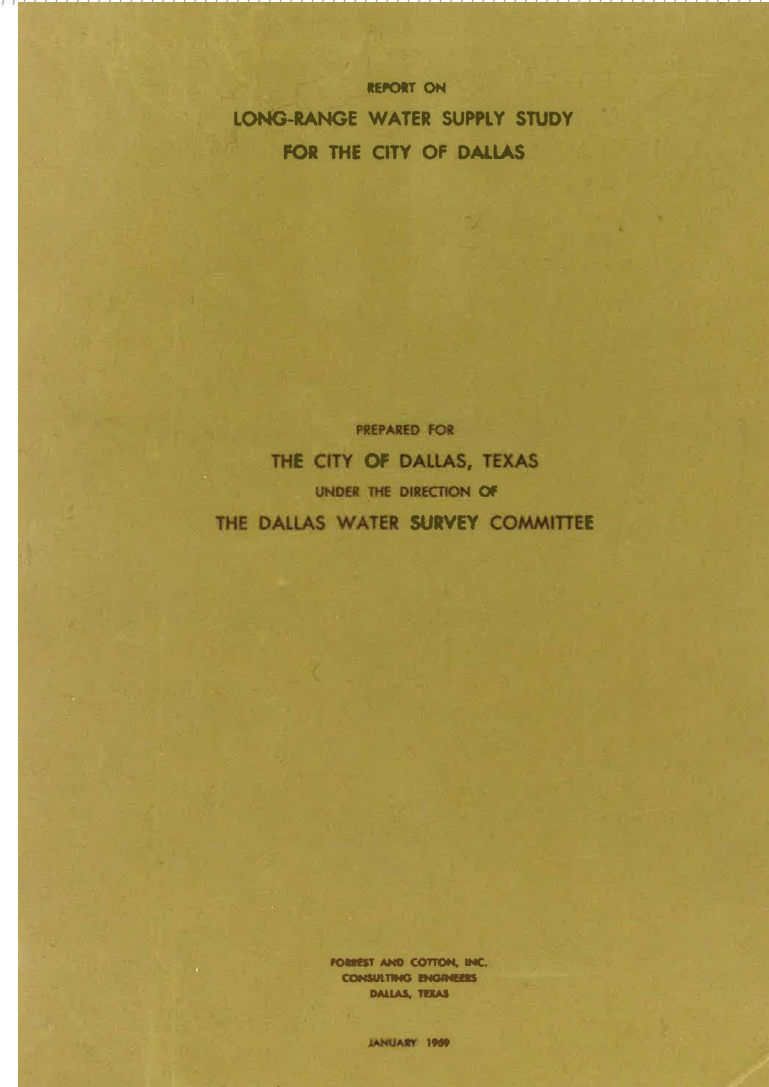
Benjamin Franklin, Poor Richard's Almanac, 1746



# 1950's Drought



City of Dallas Red River Pump Station, 1953-1957



Long Range Water Supply Plan 1959.



# Long Range Water Supply Planning



- The current era of long range water supply planning was in response to the drought of the 1950's
- The 1959 Plan was updated in 1975, 1989, 2000, 2005, and 2014
- As a result of the City's planning, the following lakes were constructed and/or contracted for:
  - Grapevine Lake (1952)
  - Lake Tawakoni (1964)
  - Lake Ray Hubbard (1973)
  - Ray Roberts Lake (1989)
  - Lewisville Lake (1955)
  - Lake Palestine (1971)
  - Lake Fork (1980)
- Later studies encouraged aggressive water conservation and reuse, connecting existing reservoirs, and revising Dallas Water Utilities' service area
- A new update is scheduled to begin in November 2022



Forney Dam at Lake Ray Hubbard  
Tainter Gates



# Planning Guidelines



- **Dallas plans to have enough reservoir firm yield to meet water demands equivalent to the 1950s drought of record**
- Dallas' ranking for planned new water supply sources has been based on:
  - Costs – capital construction and power
  - Efficiency
  - Environmental impact
  - Likelihood for development
  - Treatability
- Water located closer to the City is generally less expensive
  - Lower infrastructure costs due to shorter pipelines
  - Lower pumping (energy) costs – a recurring, annual expense
- Working with other area water providers to achieve greater economies of scale and thus reduce costs



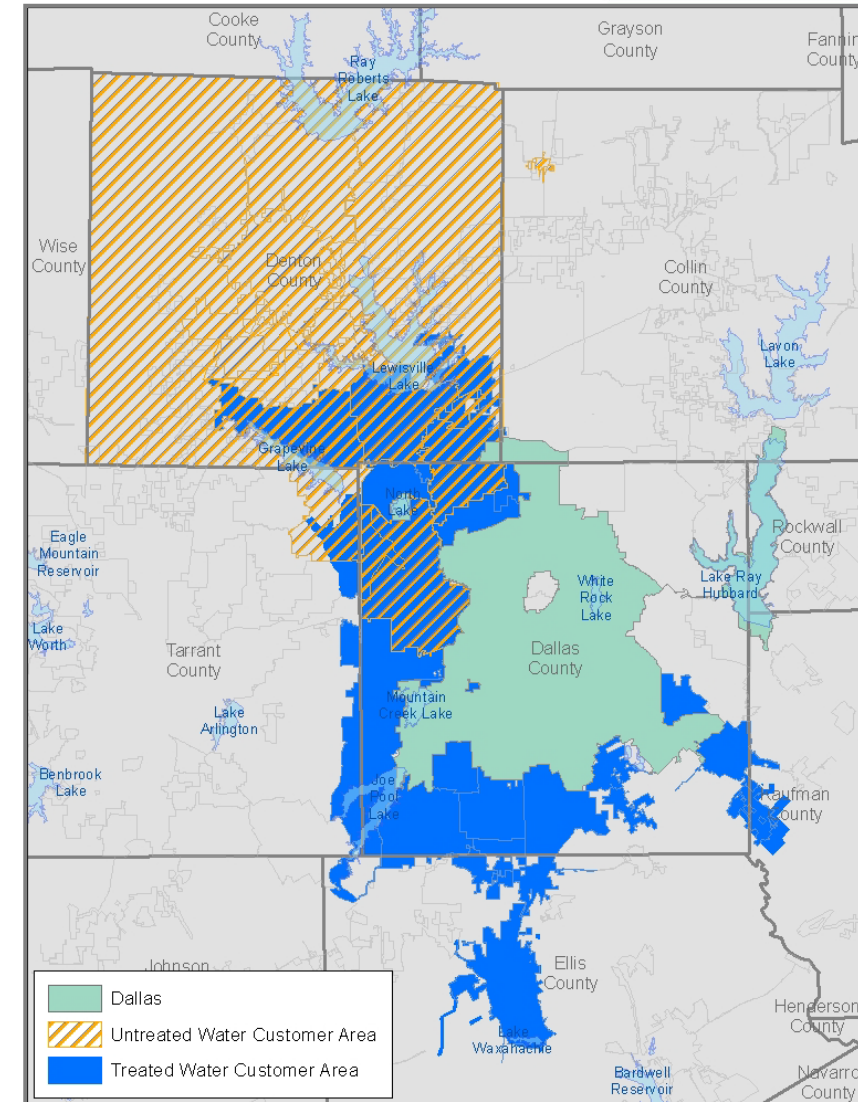
Installation of 108-inch pipe along IPL Section 17



# Planning Area



- Dallas' 1959 Plan recommended that Dallas supply water to surrounding cities
- Under the Texas Constitution and state law, all surface water is owned by the State of Texas
- The state has granted Dallas extensive water rights in return for its promise to serve a defined area approved by City Council and included in the state water plan
- Defined service area includes customer cities



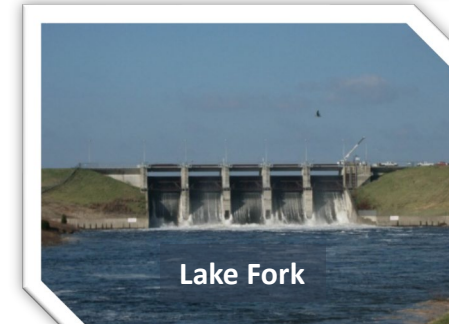
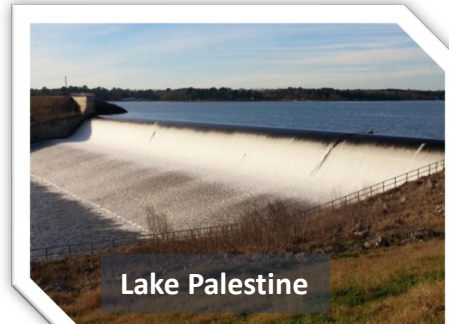
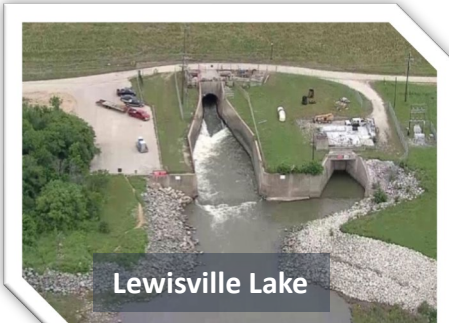
# Foundation of Water Supply Planning



Existing Infrastructure must be:

**Maintained,  
Operational,  
and  
Storing Water**

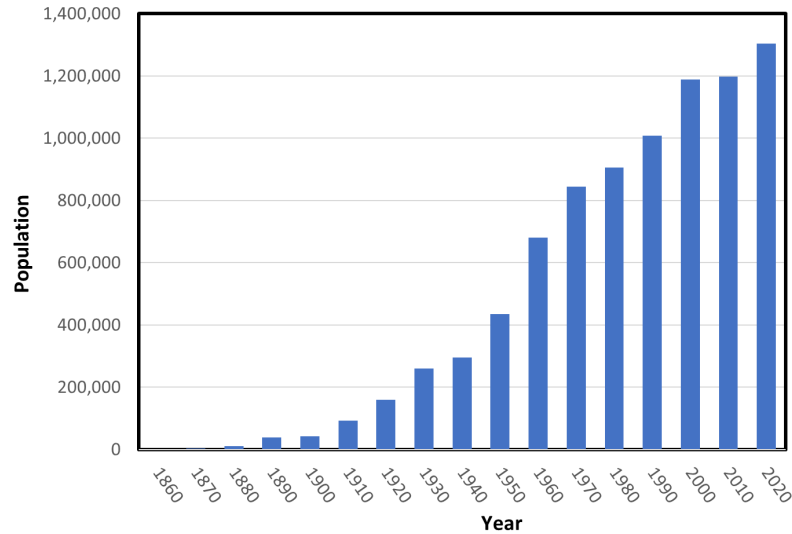
throughout the Planning Horizon



# Water Demand Development

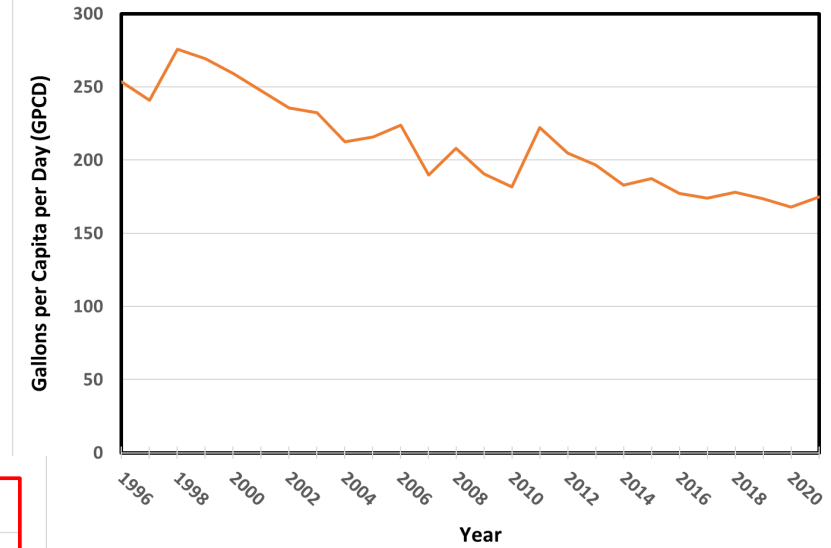


## Population

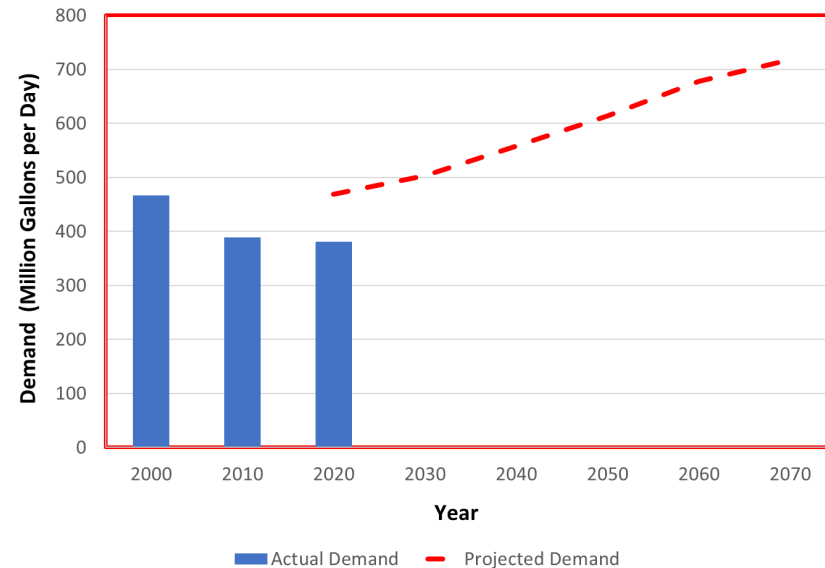


$$\text{Population} \times \text{GPCD} = \text{Demand}$$

## Gallons per Capita per Day (GPCD)



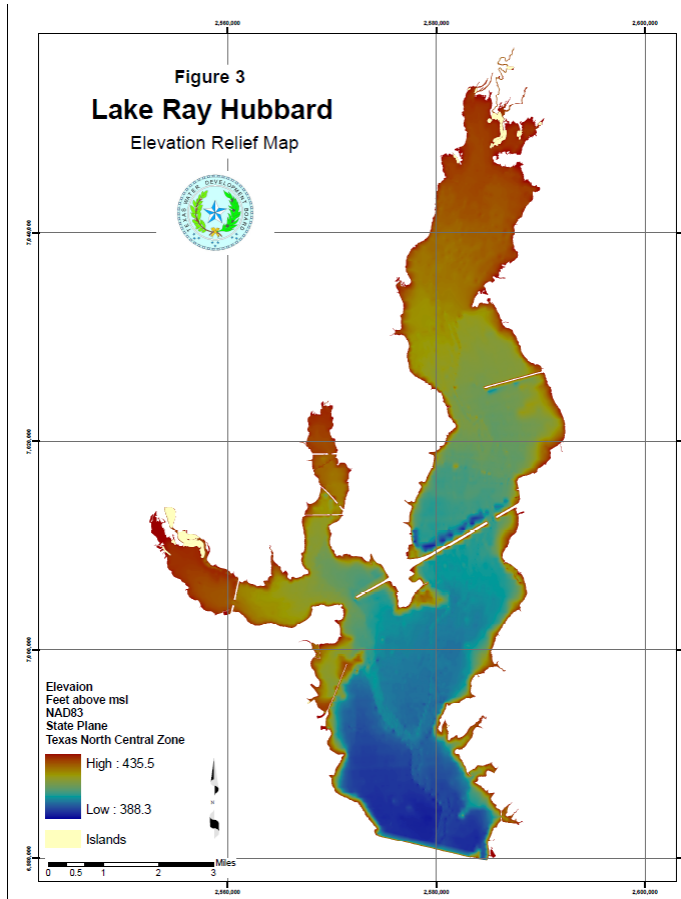
## Demand



# Effects on Existing Supplies

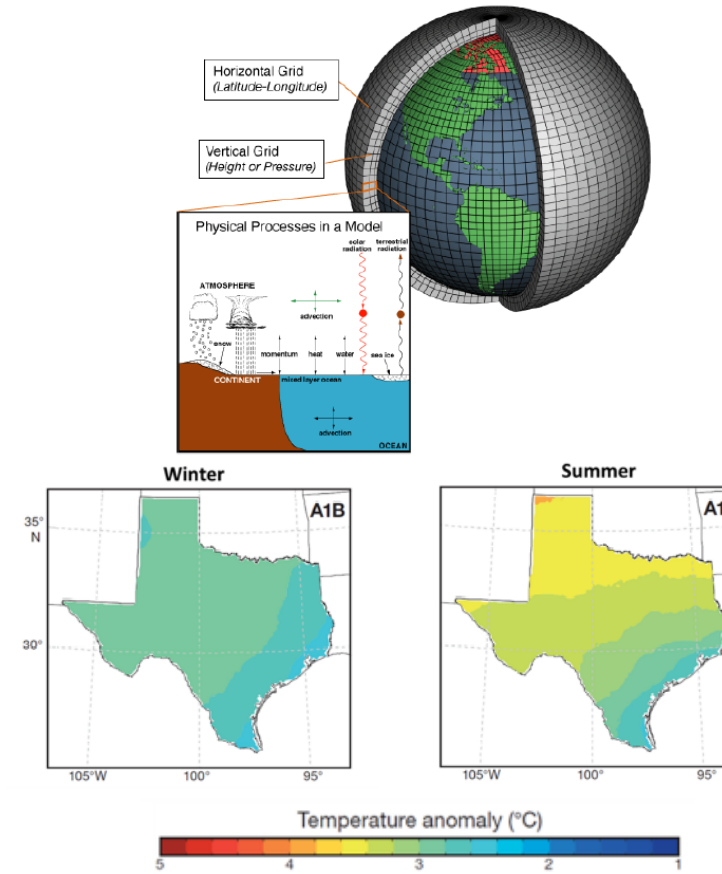


## Sedimentation



Decreased Storage Volume

## Climate Change



Increased Evaporation





# Statewide Water Plan

“Water, not oil, is the life blood of Texas...”

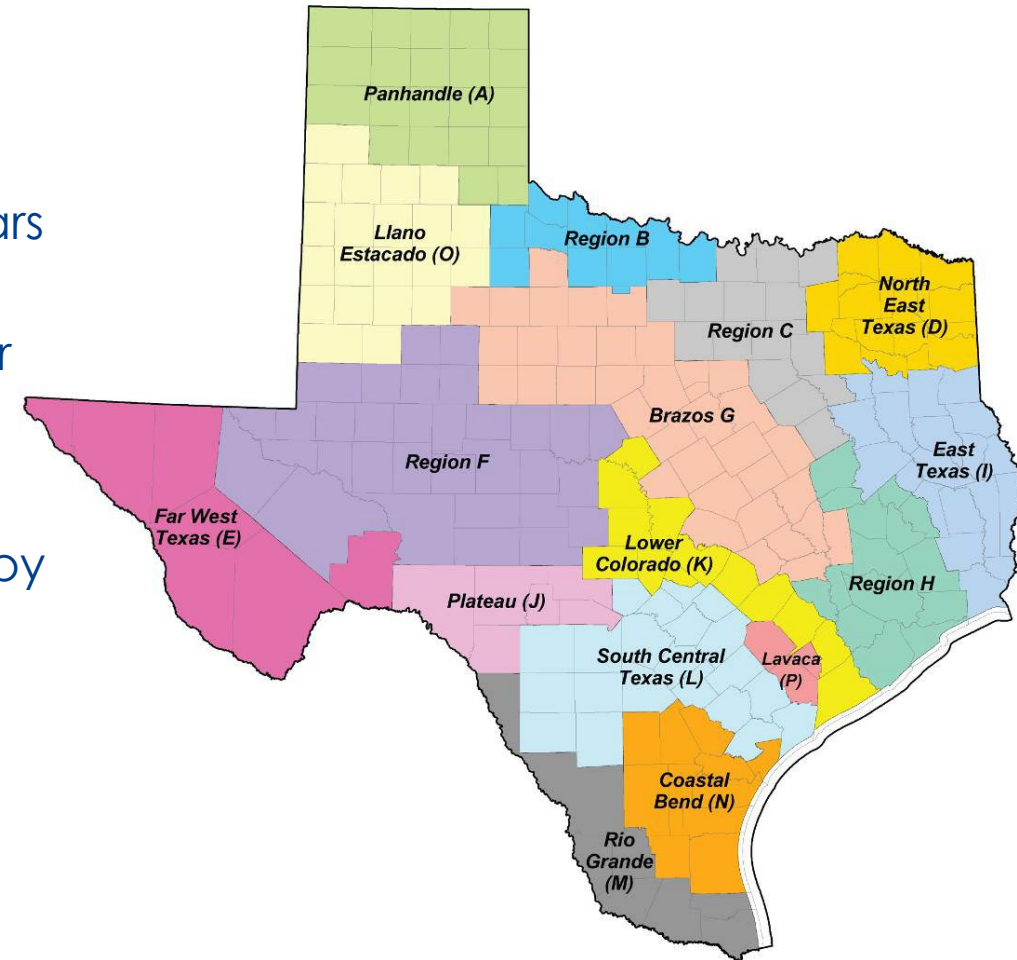
James A. Michener



# State and Regional Water Planning



- The passage of Senate Bill 1 of the 75th Legislative Session in 1997 changed water supply planning throughout the State
  - Regional water planning groups established
  - Regional and State water plans required every five years
  - Local plans to be provided to the Regional Water Planning Group for consideration in the Regional Water Plan
- 6th State Planning Cycle
  - Local water management strategies due to Region C by January 2025
  - Region C Water Plan is due to Texas Water Development Board (TWDB) in November 2025
  - State Water Plan due to Governor and Legislature in 2027





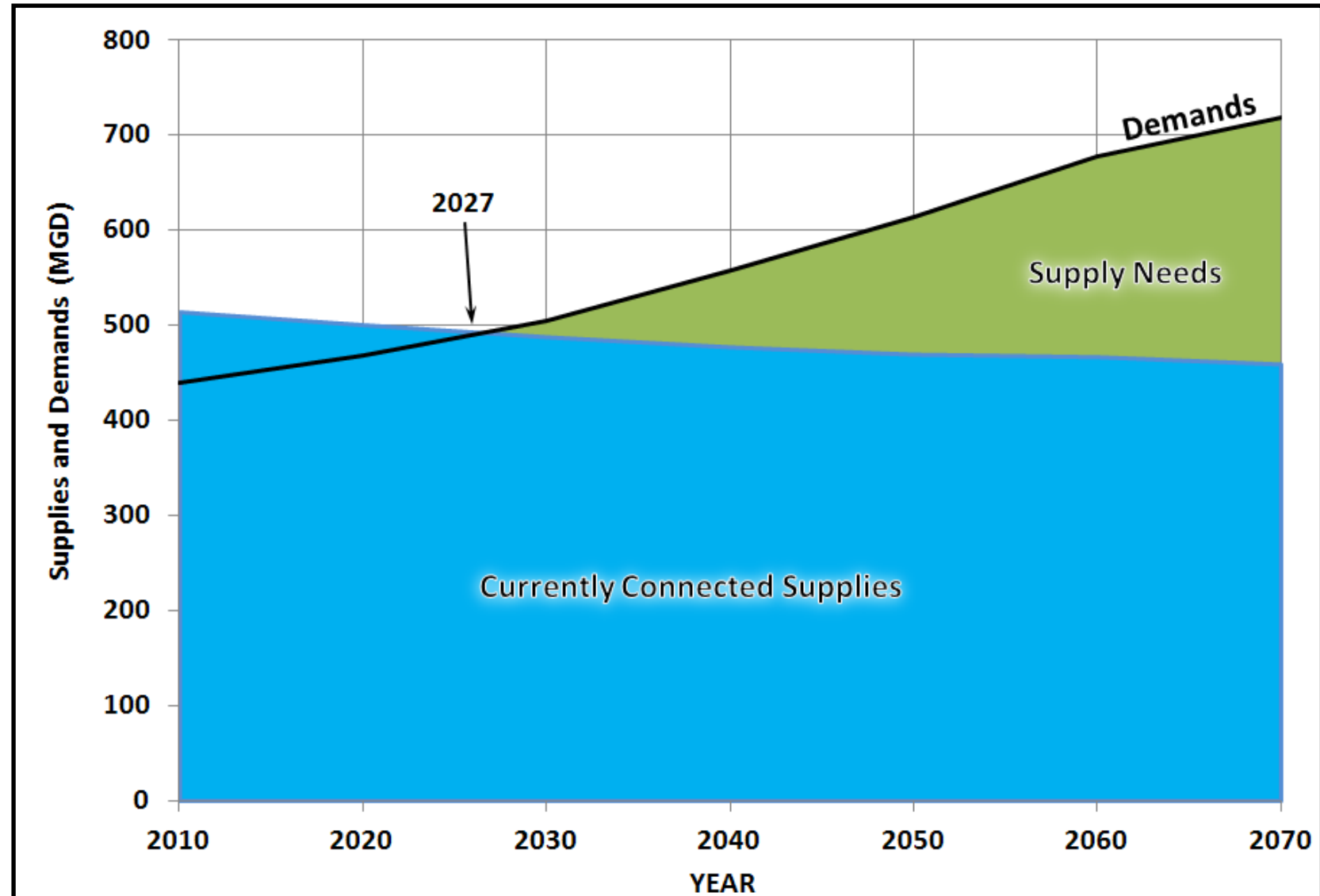
# Dallas' 2014 Long Range Water Supply Plan

“Water is the driving force in nature.”

Leonardo da Vinci



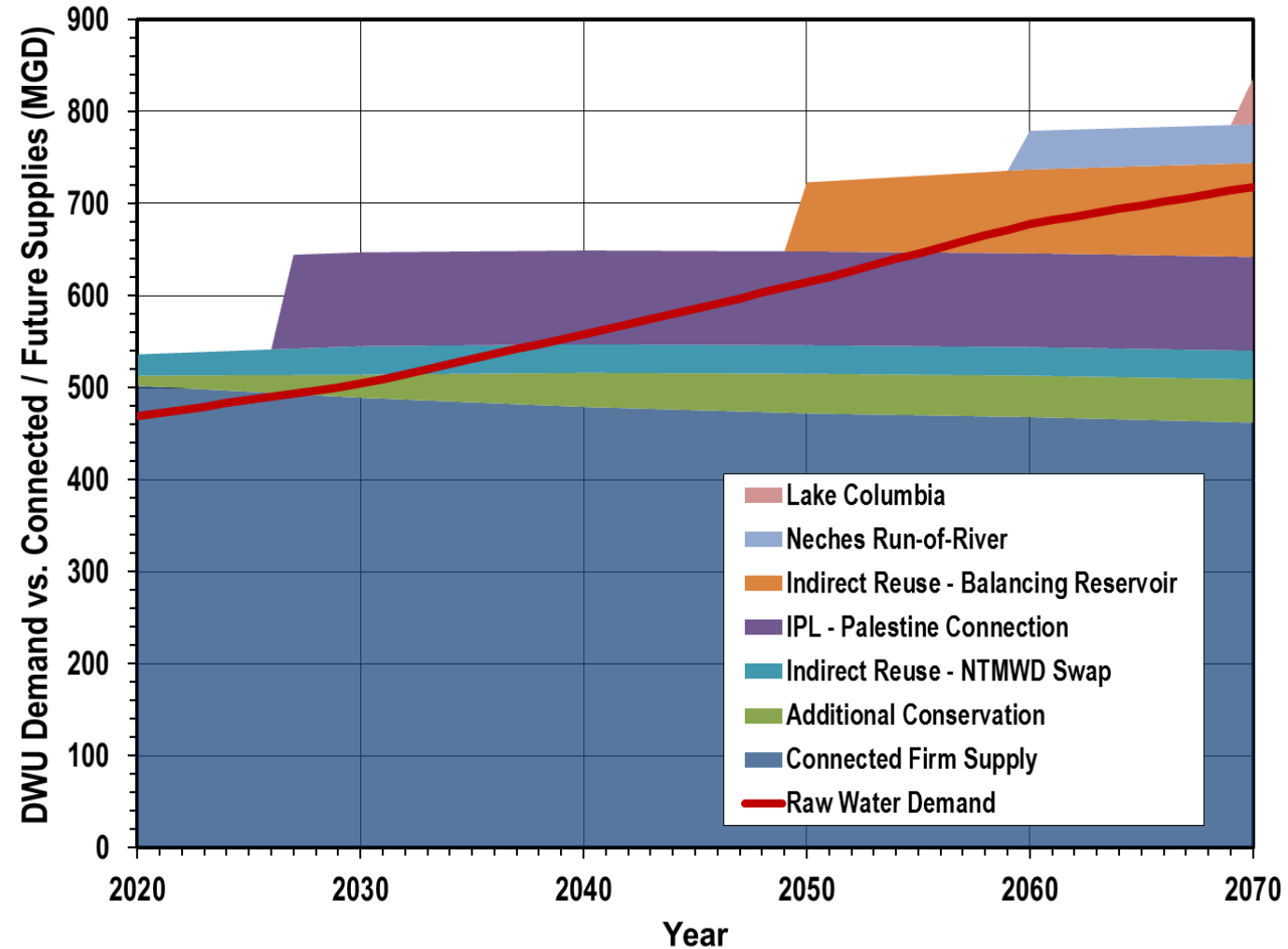
# Supply vs. Demand



# Recommended Strategy Implementation

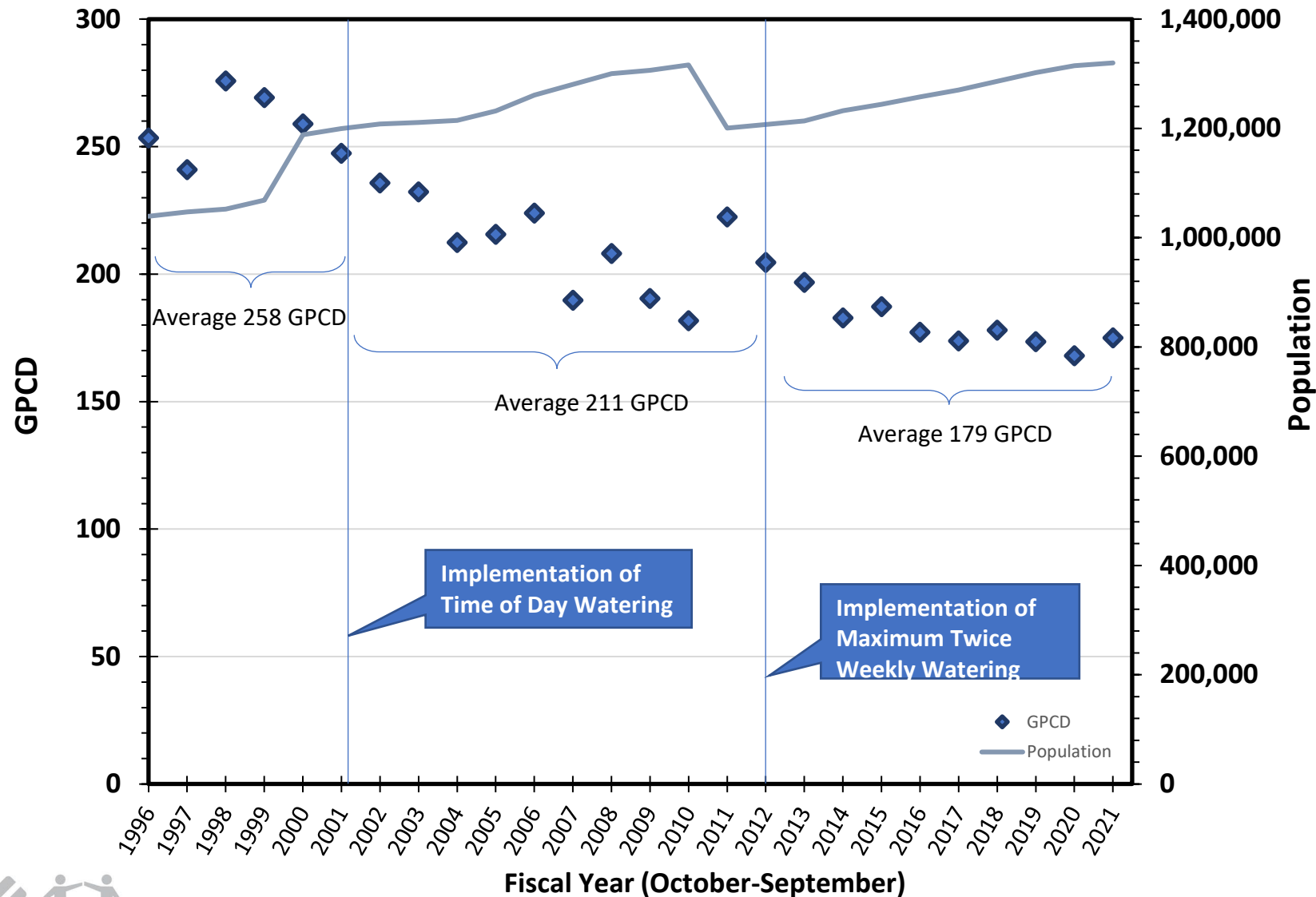


| Adopted Water Management Strategies                                           | Projected Supply (MGD) | Date    |
|-------------------------------------------------------------------------------|------------------------|---------|
| Additional Conservation                                                       | 46.4                   | Ongoing |
| Indirect Reuse Implementation - Main Stem Pump Station – NTMWD Swap Agreement | 31.1                   | 2020    |
| Connect Lake Palestine                                                        | 102                    | 2030    |
| Indirect Reuse Implementation - Main Stem Balancing Reservoir                 | 102                    | 2050    |
| Neches Run-of-River                                                           | 42.2                   | 2060    |
| Lake Columbia                                                                 | 50.0                   | 2070    |
| <b>Totals</b>                                                                 | <b>373.7</b>           |         |





# Impacts of Water Conservation Program



# Dallas Long Range Water Supply Plan Update

“No man ever steps in the same river twice, for it's not the same river and he's not the same man.”

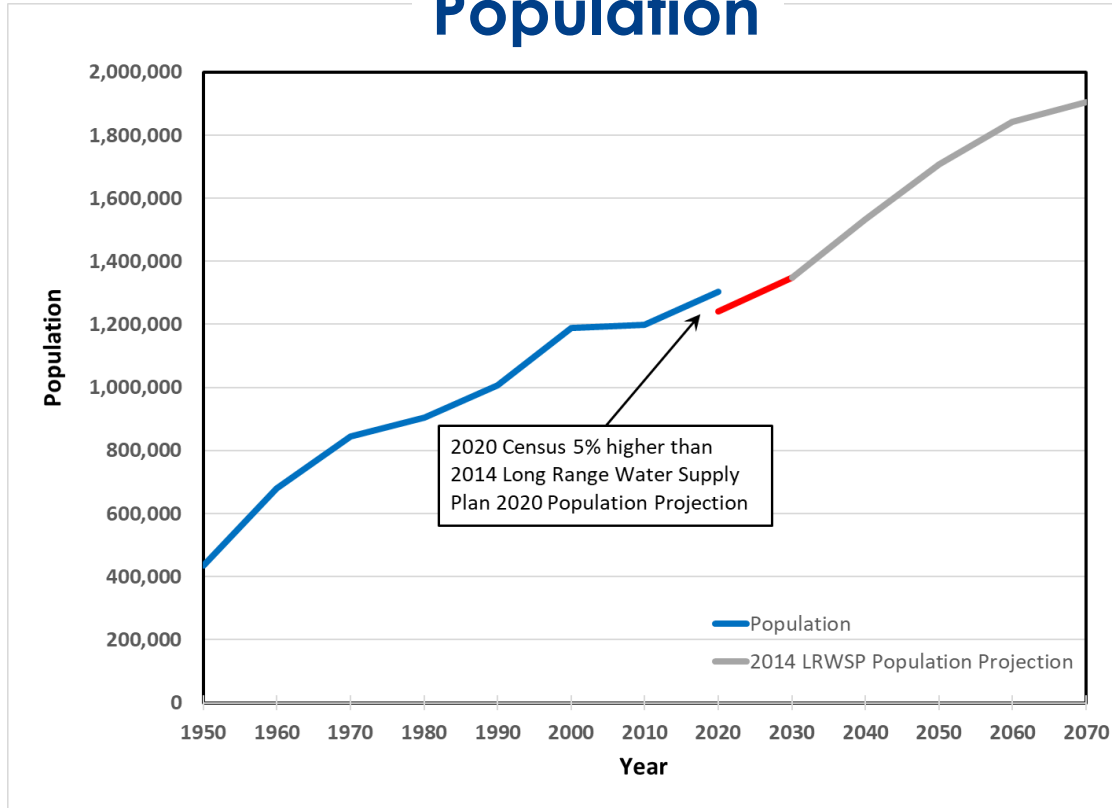
Heraclitus

# Long Range Water Supply Plan (LRWSP) Update

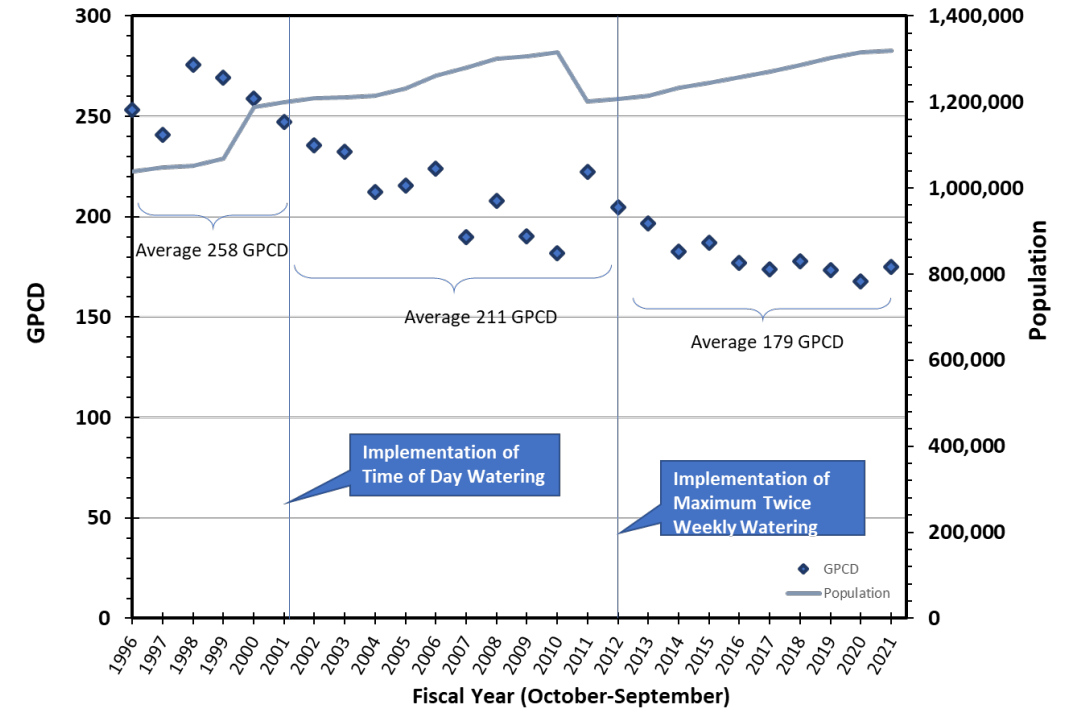


- Since the 2014 Update to the Long Range Water Supply Plan various 2014 planning assumptions have changed

## Population



## Water Conservation





## Climate Change

- Review 2014 LRWSP climate change assumptions
- Evaluate climate change models
- Recommend three scenarios (high, medium, and low)
- Adjust reservoir inflows, precipitation, and evaporation in reservoir operations model



## Equity

- Equity analysis of water management strategy sources, transmission and delivery areas
- Consider and report on:
  - Community needs
  - Historic and current lack of access and resources
  - Structural and institutional barriers
- Future measurable equity indicators for water supply



# Summary

“Water is the lifeblood of our bodies, our economy, our nation and our well-being.”

Stephen Johnson.



# Summary



- Dallas' current water supplies are approximately 16% depleted (84% full)
- Temperature and Precipitation outlooks
  - Temperature probability leaning to above average in the Fall and Summer 2023
  - Precipitation probability leaning to above average in Spring 2023
- Dallas' water management strategies due to Region C by January 2025
- Since the 2014 Update to the Long Range Water Supply Plan planning assumptions have changed
  - 2020 Census (5% increase in population above projected)
  - Water Conservation has reduced GPCD
- Long Range Water Supply Plan Update contract scheduled for November 9, 2022, City Council Agenda



Ray Roberts Lake 2004

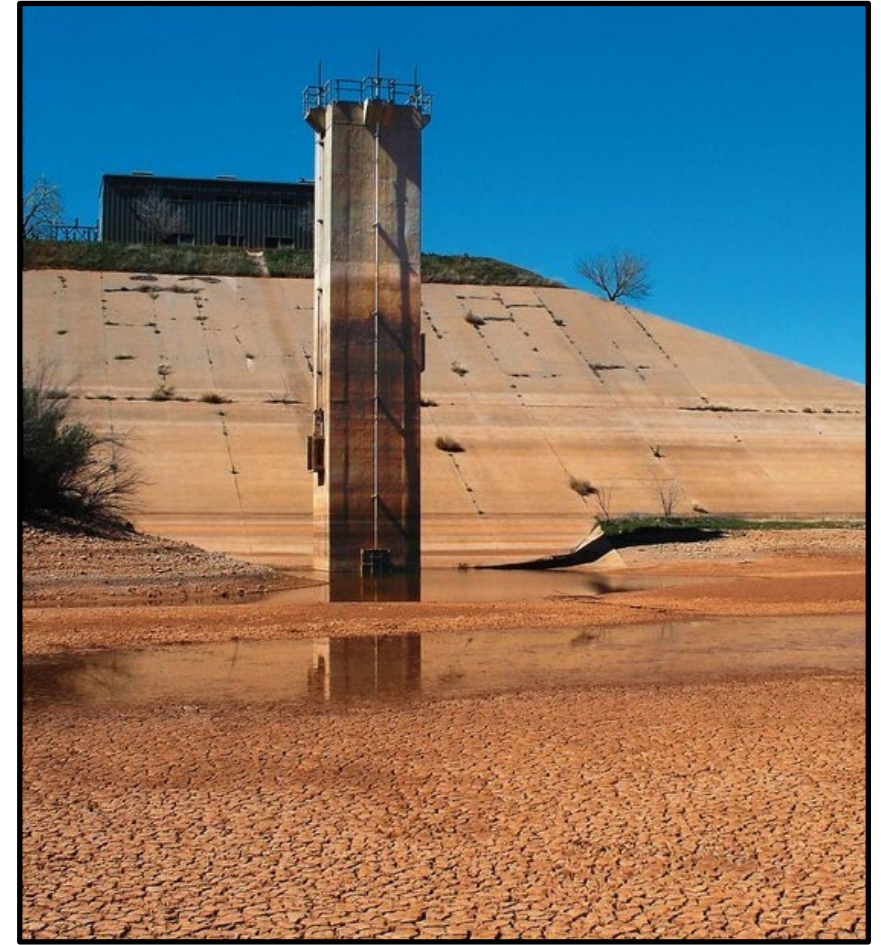




Grapevine Lake

***“The future  
depends on  
what you do  
today.”***

**Mahatma Gandhi**



E.V. Spence Reservoir, 2010  
Civil Engineering, January 2014, Vol 84, Issue 1



**City of Dallas**

# **Long Range Water Supply Plan Update**

**Transportation and  
Infrastructure  
November 8, 2022**

Terry S. Lowery, Director  
Dallas Water Utilities  
City of Dallas



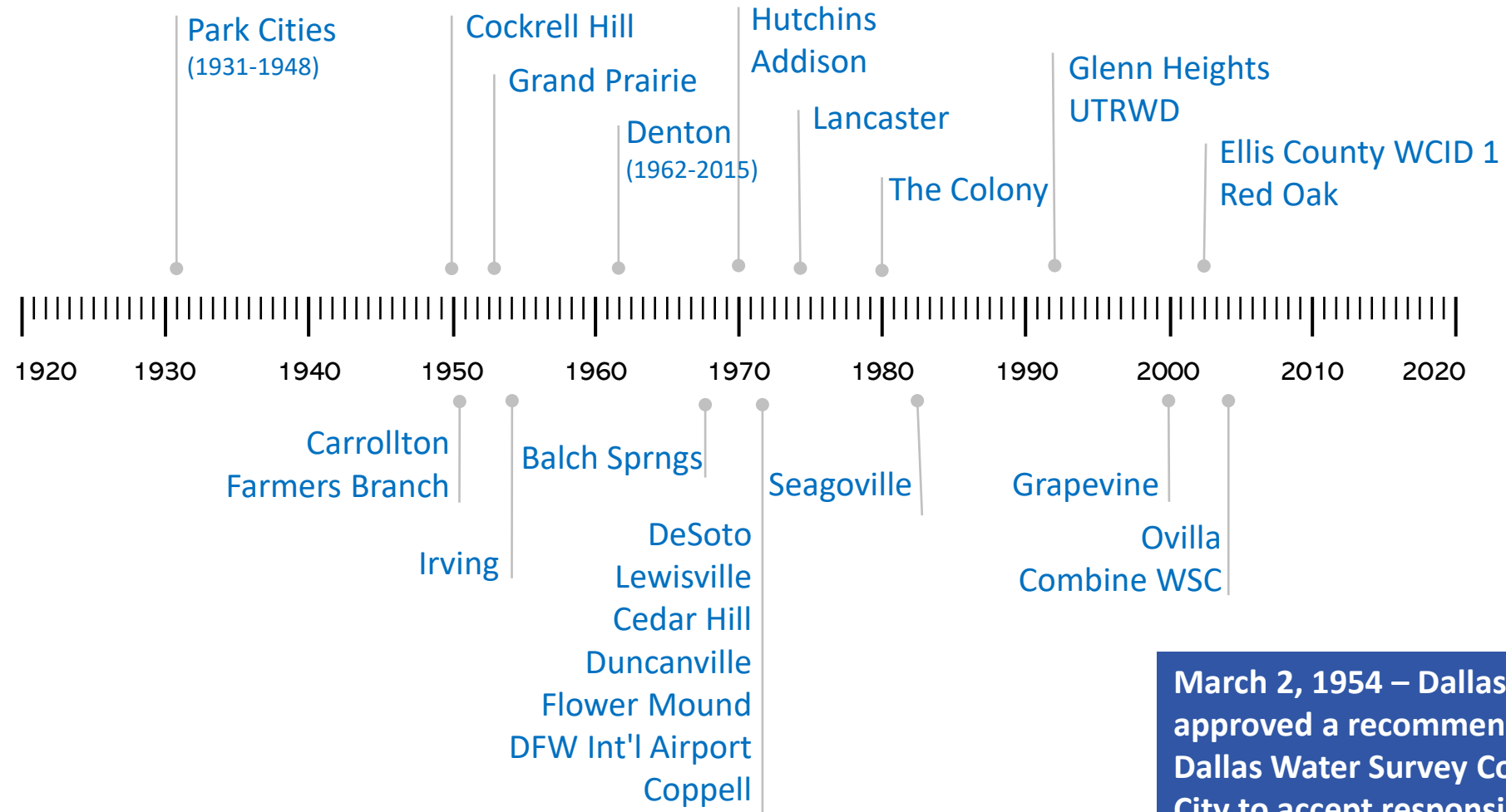
# Appendix

“Water is the driving force of all nature”

Leonardo de Vinci



# Wholesale Treated and Untreated Water Customers



March 2, 1954 – Dallas City Council approved a recommendation by the Dallas Water Survey Committee for the City to accept responsibility for providing water supplies to all of Dallas County



# Customer Cities

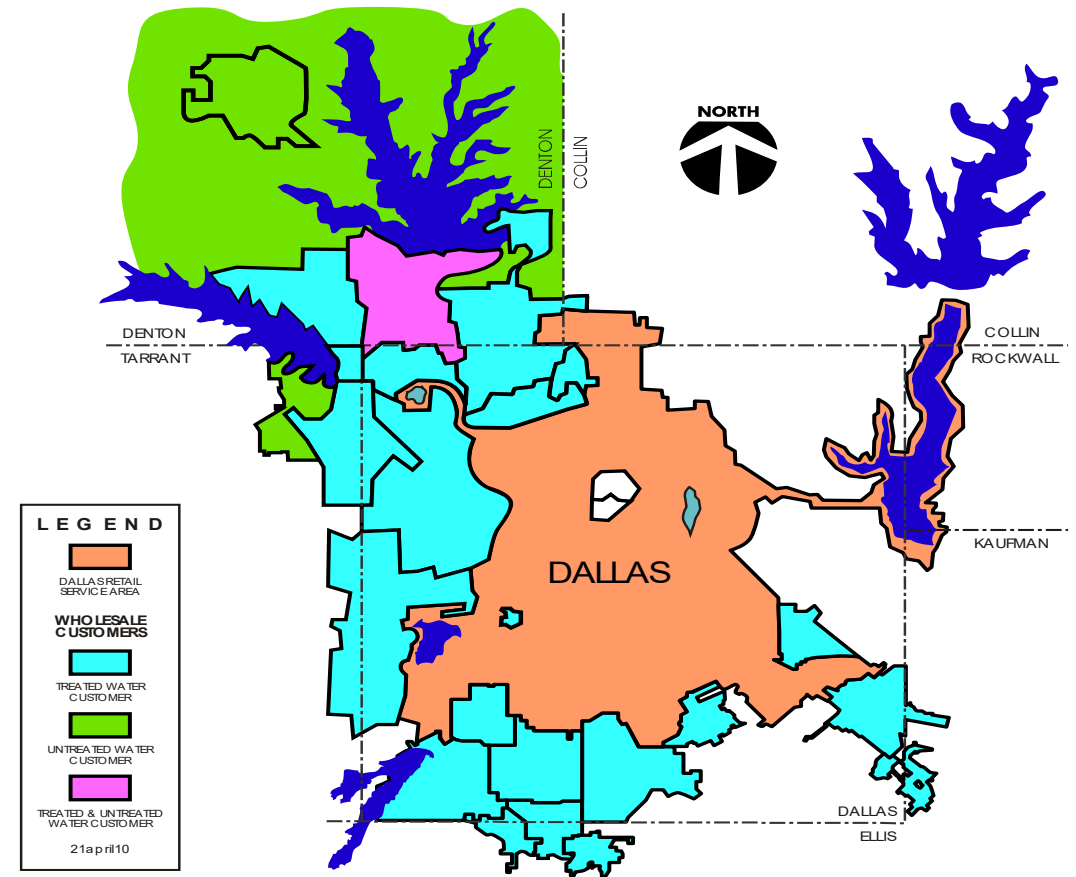


## Treated Water Contracts

- Addison
- Balch Springs
- Carrollton
- Cedar Hill
- Cockrell Hill
- Combine WSC
- Coppell
- D/FW International Airport
- DeSoto
- Duncanville
- Ellis County WCID #1
- Farmers Branch
- Flower Mound
- Glenn Heights
- Grand Prairie
- Hutchins
- Irving
- Lancaster
- Lewisville
- Ovilla
- Red Oak
- Seagoville
- The Colony

## Untreated Water Contracts

- Grapevine
- Lewisville
- Upper Trinity Regional Water District



# Historic Implementation of LRWSP



| Water Management Strategy                | LRWSP                 | I | U | S | N | O |
|------------------------------------------|-----------------------|---|---|---|---|---|
| Iron Bridge Reservoir (Lake Tawakoni)    | 1959                  | X |   |   |   |   |
| Forney Reservoir (Lake Ray Hubbard)      | 1959                  | X |   |   |   |   |
| Aubrey Reservoir (Lake Ray Roberts)      | 1959 & 1975           | X |   |   |   |   |
| Enlarge Lake Lavon                       | 1959                  |   |   |   |   | X |
| Roanoke Reservoir                        | 1959                  |   |   |   | X |   |
| Lake Cooper Pipeline                     | 1975                  |   |   |   |   | X |
| Lake Palestine                           | 1975                  | X |   |   |   |   |
| Lake Fork                                | 1968 State Water Plan | X |   |   |   |   |
| Sulphur Bluff Reservoir (Marvin Nichols) | 1975/2000             |   |   | X |   |   |

I- Implemented

U- Underway

S – Study/Evaluation

N- No Longer Available

O- Implemented by Others



# Historic Implementation of LRWSP (Continued)



| Water Management Strategy     | LRWSP               | I | U | S | N | O |
|-------------------------------|---------------------|---|---|---|---|---|
| Tennessee Colony Reservoir    | 1975                |   |   |   |   |   |
| Lake Mineola                  | 1975                |   |   |   |   |   |
| Connect Lake Fork             | 1989                | X |   |   |   |   |
| Connect Lake Palestine        | 1989/2000/2005/2014 |   | X | X |   |   |
| Reuse                         | 1989/2000/2005/2014 | X | X | X |   |   |
| Conservation                  | 2000/2005/2014      | X | X | X |   |   |
| Wright Patman                 | 2005                |   |   | X |   |   |
| Lake Fastrill                 | 2005                |   |   |   | X |   |
| Main Stem Balancing Reservoir | 2014                |   |   | X |   |   |
| Neches River Run-of-River     | 2014                |   |   |   |   |   |
| Lake Columbia                 | 2014                |   |   |   |   |   |

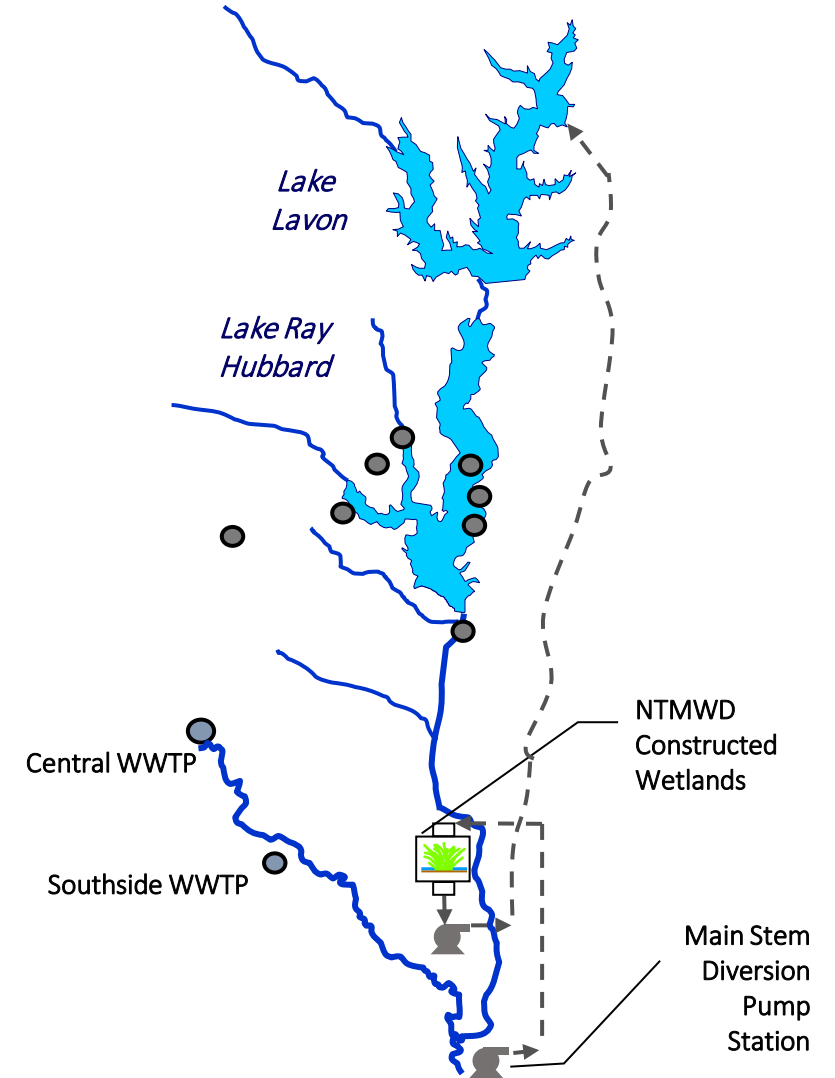
I- Implemented    U- Underway    S – Study/Evaluation    N- No Longer Available    O- Implemented by Others



# Indirect Reuse Agreement



- Partner - North Texas Municipal Water District
- “Swap” Agreement December 2008
- Exchange treated effluent
- NTMWD’s Permitted Return flows into Lake Ray Hubbard and Lewisville Lake for an equal amount of Dallas Central and Southside WWTP return flows into the Trinity River
- Estimated Yield ~30 MGD



# Integrated Pipeline (IPL) Project



- Partner - Tarrant Regional Water District
- 350 MGD Total System Capacity –
  - 150 Dallas
  - 200 TRWD
- 149.5 miles of 108, 96, and 84 inch pipe
- Three lake pump stations
- Three booster pump stations
- One 450 million gallon balancing reservoir
- Three redundant IPL interconnect facilities



Midlothian Balancing Reservoir



Joint Booster Pump  
Station 3 (JB3)



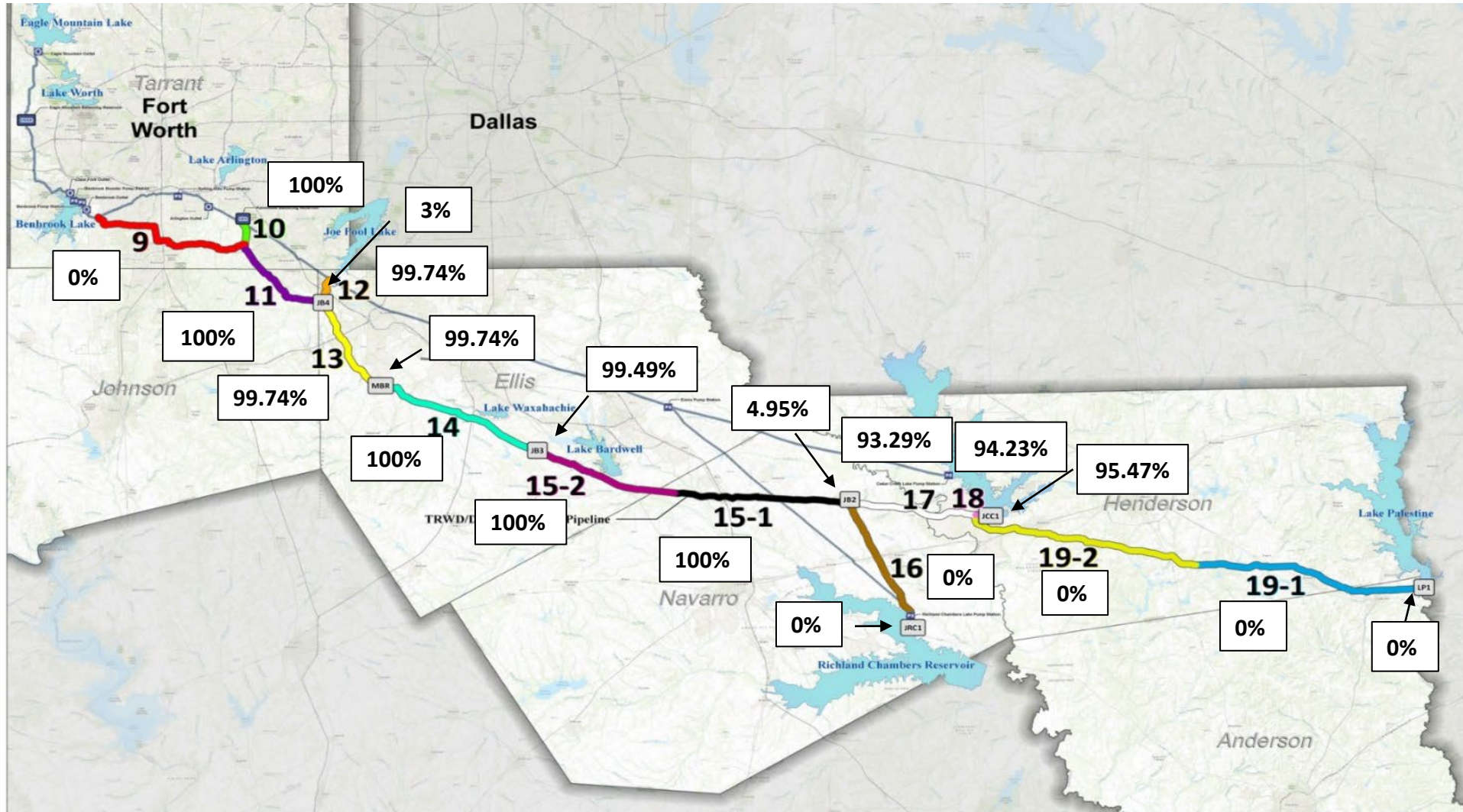
Kennedale Balancing Reservoir  
Pressure Control Station



Installation of 108-inch  
pipe along Section 17



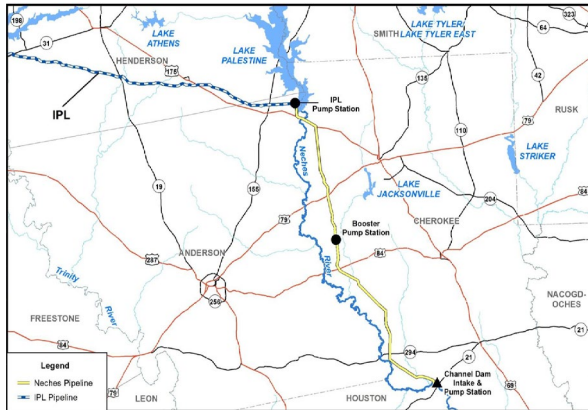
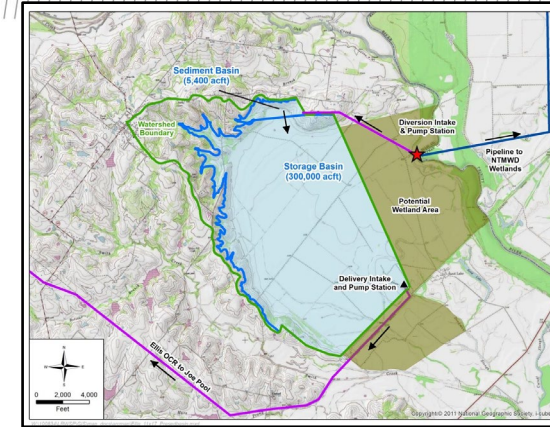
# IPL Progress



# Future Projects



- Main Stem Balancing Reservoir (2050)
  - Develop scope of work for preliminary engineering, geotechnical evaluation and land acquisition
  - Evaluate financing alternatives



- Neches Run-of-River (2060)
  - Develop agreement with Upper Neches River Municipal Water Authority
  - Assist with water rights permitting

- Lake Columbia (2070)
  - Develop agreement with Angelina Neches River Authority

