Region I
East Texas Regional
Water Planning Group

2026
Regional Water Plan

Initially Prepared Plan | February 2025

Volume I

PLUMMER

AGS
Advanced Groundwater Solutions, LLC

FREESE AND NICHOLS

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Executive Summary
2026 Initially Prepared Plan

Prepared for:
East Texas Regional Water Planning Group

February 2025

Executive Summary

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LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
DB27	Regional Water Planning Database
ETRWPA	East Texas Regional Water Planning Area
ETRWPG	East Texas Regional Water Planning Group
IPP	Initially Prepared Plan
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SWP	State Water Plan
TWDB	Texas Water Development Board
WMSs	Water Management Strategies
WUG	Water User Group
WWP	Wholesale Water Provider

EXECUTIVE SUMMARY

In 1997, the State Legislature, through Senate Bill 1, determined that water planning should be accomplished at a regional level rather than with the centralized approach employed previously by the Texas Water Development Board (TWDB). To accomplish this task, the TWDB divided the state into 16 regional water planning areas and appointed representative Regional Water Planning Groups (RWPGs) to guide the development of each region's plan. The TWDB guides the process for each cycle of planning through rules and guidance by the agency. The planning process is cyclic, with updated Regional Water Plans (RWPs) and State Water Plans (SWPs) produced every five years.

The designated water planning area for the east and southeast portions of Texas is the East Texas Regional Water Planning Area (ETRWPA), also known as Region I or the East Texas Region. The water planning process in the ETRWPA is guided by the East Texas Regional Water Planning Group (ETRWPG). These individuals are charged with the responsibility for development of the 2026 ETRWPA Water Plan (2026 Plan). The ETRWPG is currently comprised of the following voting members representing specific community interests:

- David Alders, Agriculture
- Matthew Mettauer, Agriculture
- Judge Chris Davis, Counties
- Fred Jackson, Counties
- Mike Snyder, Electric Power
- Dr. Matthew McBroom, Environmental
- John Martin, Groundwater Management Areas
- John McFarland, Groundwater Management Areas
- David Gorsich, Industries
- Vacant, Industries
- Kate Dietz, Municipalities
- Vacant, Municipalities
- Terry Stelly, Public
- Vacant, Public
- David Montagne, River
- Monty Shank, River Authorities
- Kelley Holcomb, River
- Scott Hall, River Authorities
- Chris Wiesinger, Small Business
- Chris Wiesinger, Water Districts
- Robb Starr, Water Utilities

The regional water planning process involves the evaluation of projected water demands adopted by the Texas Water Development Board, identification of water supplies, and development of water management strategies designed to meet identified water shortages. However, the process also involves the evaluation of a broad range of issues that directly relate to water planning. Some of these issues notably include protection of natural resources and agricultural resources, water conservation and drought contingency, and water management strategy quantity, reliability, and cost.

Regional water planning in the ETRWPA is a public process, involving frequent public meetings of the ETRWPG, careful consideration of the requests and needs of various water user groups and wholesale water providers in the region, and an understanding of the need to allow for public comment throughout the planning cycle. For an in-depth discussion of any of the topics addressed in this Executive Summary, the reader is referred to the full 2026 Plan. An electronic copy of the 2026 Plan is available online at the ETRWPA website http://www.etexwaterplan.org/ and will be available at the TWDB website https://www.twdb.texas.gov/waterplanning/rwp/index.asp upon the submission of the Initially Prepare Plan (IPP).

ES.1 REGIONAL DESCRIPTION

The ETRWPA consists of all or portions, as indicated, of the following 20 counties located in the Neches, Sabine, and Trinity River Basins, and the Neches-Trinity Coastal Basin:

- Anderson
- Angelina
- Cherokee
- Hardin
- Henderson (partial)
- Houston
- Jasper
- Jefferson
- Nacogdoches
- Newton
- Orange
- Panola
- Polk (partial)
- Rusk
- Sabine
- San Augustine
- Shelby
- Smith (partial)
- Trinity (partial)
- Tyler

The region stretches over 150 miles north and northwest from the southeastern corner of the state, as illustrated in Figure ES.1. The ETRWPA consists of approximately 10,329,800 acres of land, accounting for roughly six percent of the total area of the State of Texas.

Much of the ETRWPA is forested, supporting various types of timber industry. Plant nurseries are common in portions of the region. Hydrocarbon production is scattered through the region, and beef cattle are prominent. Poultry production and processing are prevalent and there is diverse manufacturing in addition to timber industries. Commercial fishing is an important economic characteristic of Sabine Lake. Tourism is important in many areas, especially on and around large reservoirs, Sabine Lake, and the Gulf of Mexico. Timbered areas include a number of state parks and national forests, etc., that offer recreational and hunting opportunities.

Agriculture is a vital component of the ETRWPA economy and culture. According to the United States Department of Agriculture, the 20 counties that make up the ETRWPA contain over 21,000 farms with a total of over 3.6 million acres of cropland[1].

Figure ES.1 Region I Reference Map

Note: Sourced from Texas Water Development Board

ES.2 COUNTY SUMMARY SHEETS

Following the Executive Summary is a section with a summary sheet for each county in the ETRWPA. Each sheet includes the water-dependent economy, water sources, population projections, demand projections, available supply summary, and Recommended Water Management Strategies for the county.

ES.3 REGIONAL WATER PLANNING APPLICATION

The Regional Water Planning Database (DB27) is an online database created by the Texas Water Development Board. RWPGs submit all data generated during the planning cycle to the TWDB through the DB27's web interface. Once data is entered into the DB27 by each RWPG, the data can be queried to generate various summary reports referred to as DB27 Reports. The following DB27 Reports are required by the TWDB to be included in this Executive Summary and can be found in Volume II of the 2026 Plan as Appendix ES-A. These reports may be accessed by:

1. Navigate to the TWDB Database Reports application at https://www3.twdb.texas.gov/apps/SARA/reports/list
2. Enter '2026 Regional Water Plan' into the "Report Name" field to show all DB27 reports associated with the 2026 Regional Water Plans
    a. DRAFT Report 1 - WUG Population
    b. DRAFT Report 2 - WUG Demand
    c. DRAFT Report 3 - Source Total Availability
    d. DRAFT Report 4 - Water User Group Existing Water Supply
    e. DRAFT Report 5 - Water User Group Needs or Surplus
    f. DRAFT Report 6 - WUG Second-Tier Identified Water Need
    g. DRAFT Report 7 - WUG Data Comparison to 2021 RWP
    h. DRAFT Report 8 - Source Data Comparison to 2021 RWP
    i. DRAFT Report 9 - WUG Unmet Needs
    j. DRAFT Report 10 - Recommended WUG Water Management Strategies
    k. DRAFT Report 11 - Recommended Projects Associated with Water Management Strategies
    l. DRAFT Report 12 - Alternative WUG Water Management Strategies
    m. DRAFT Report 13 - Alternative Projects Associated with Water Management Strategies
    n. DRAFT Report 14 - WUG Management Supply Factor
    o. DRAFT Report 15 - Recommended WMS Supply Associated with New/Amended IBT Permit
    p. DRAFT Report 16 - Recommended WMS with New/Amended IBT Permit & Conservation
    q. DRAFT Report 17 - Sponsored Recommended WMS Supplies Unallocated to WUGs
    r. DRAFT Report 18 - Major Water Provider Existing Sales and Transfers
    s. DRAFT Report 19 - Major Water Provider WMS Summary
3. Click on the report name hyperlink to load the desired report.
4. From drop-down list, select planning region letter parameter.
5. Click "View Report".

LIST OF REFERENCES

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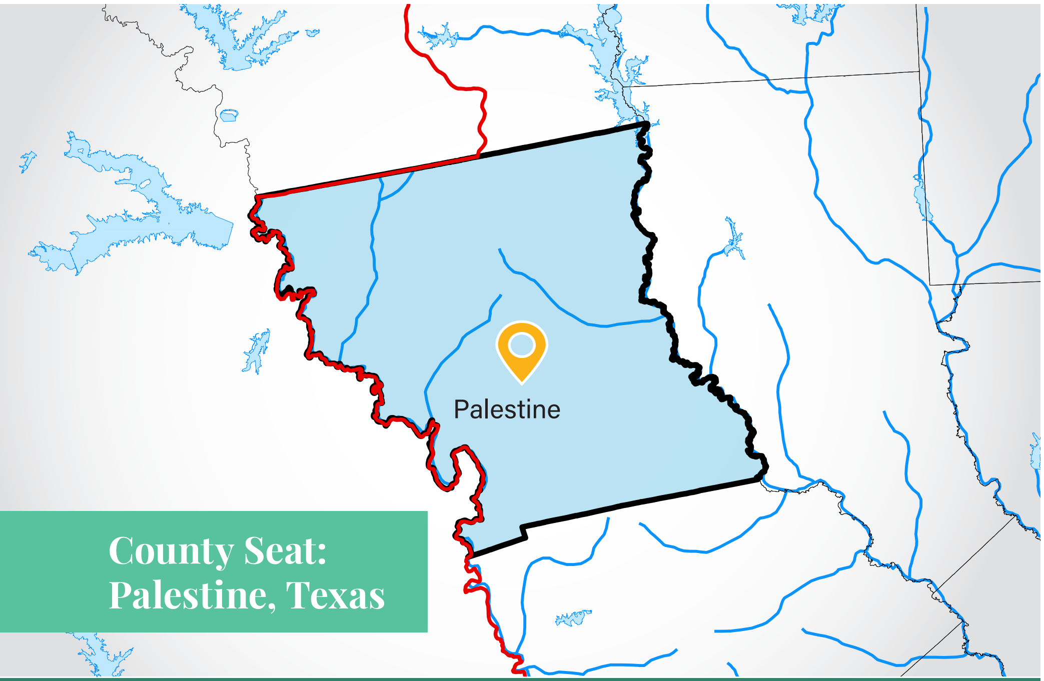
[1] U.S. Department of Agriculture. (2017). 2017 Census of Agriculture Highlights. URL: https://www.nass.usda.gov/Publications/AgCensus/2017/index.php, accessed April 2019. As of August 2023, USDA has not released any updated statistics.

Anderson County

The East Texas Water Planning Area (Region I)



County Seat: Palestine, Texas

Anderson County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Anderson County Cedar Creek WSC
- B B S WSC
- B C Y WSC
- Brushy Creek WSC
- County-Other, Anderson
- Elkhart
- Four Pines WSC
- Frankston
- Frankston Rural WSC
- Neches WSC
- Norwood WSC
- Palestine
- Pleasant Springs WSC
- Slocum WSC
- TDCJ Beto Gurney & Powledge Units
- TDCJ Coffield Michael
- Tucker WSC
- Walston Springs WSC

Your Water-Dependent Economy:

Livestock
Hydrocarbon Production
Recreation

Your Water Sources:

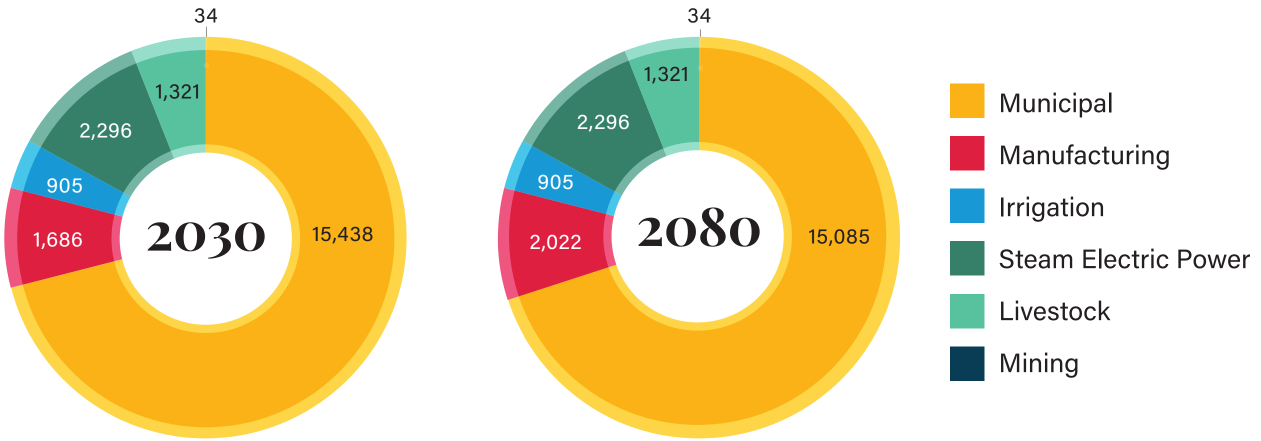
Groundwater Wells
Neches River
Lake Palestine
Carrizo-Wilcox Aquifer
Local Supplies
Queen City Aquifer
Trinity River
Sparta Aquifer

Projected Growth

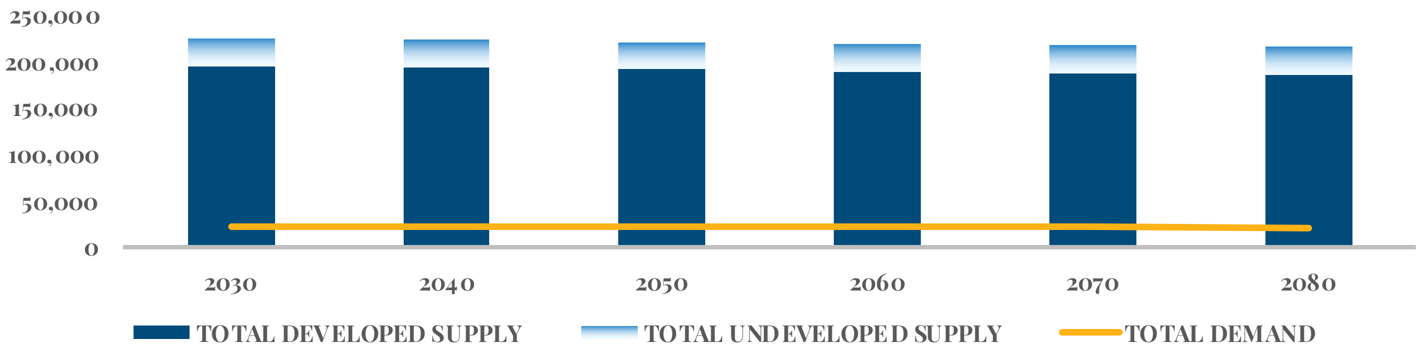
per TWDB Population Projections

2030	59,147
2040	59,243
2050	58,964
2060	58,619
2070	58,279
2080	57,944

Your County Water Demand (acre-feet)



Your Available Water Supply (ac-ft/yr)



Anderson County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Municipal	No Water Shortage Identified
B C Y WSC	No Water Shortage Identified; WMS - New Wells in Carrizo-Wilcox Aquifer
Manufacturing	No Water Shortage Identified
Irrigation	No Water Shortage Identified
Livestock	No Water Shortage Identified
Mining	No Water Shortage Identified
Steam Electric Power	Water Shortage Identified, WMS - New Wells in Carrizo-Wilcox Aquifer

Angelina County

The East Texas Water Planning Area (Region I)

County Seat: Lufkin, Texas

Angelina County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Angelina WSC
- Central WCID of Angelina County
- County-Other, Angelina
- Diboll
- Four Way SUD
- Hudson WSC
- Huntington
- Lufkin
- M & M WSC
- Pollok-Redtown WSC
- Redland WSC
- Woodlawn WSC
- Zavalla

$

Your Water-Dependent Economy:

Agriculture
Industry
Recreation
Timber

Your Water Sources:

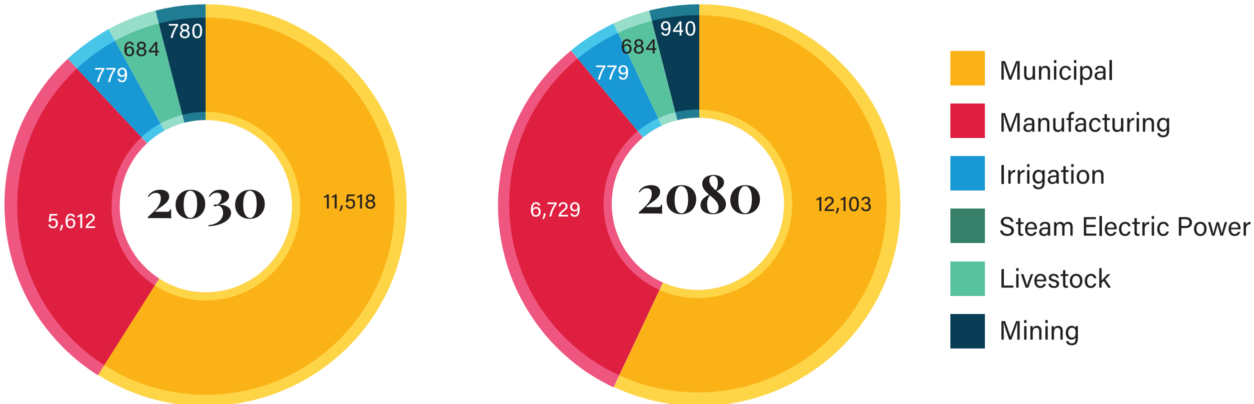
Groundwater Wells
Lake Kurth
Local Supplies
Neches River
Yegua-Jackson Aquifer
Carrizo-Wilcox Aquifer
Queen City Aquifer
Sparta Aquifer

Projected Growth

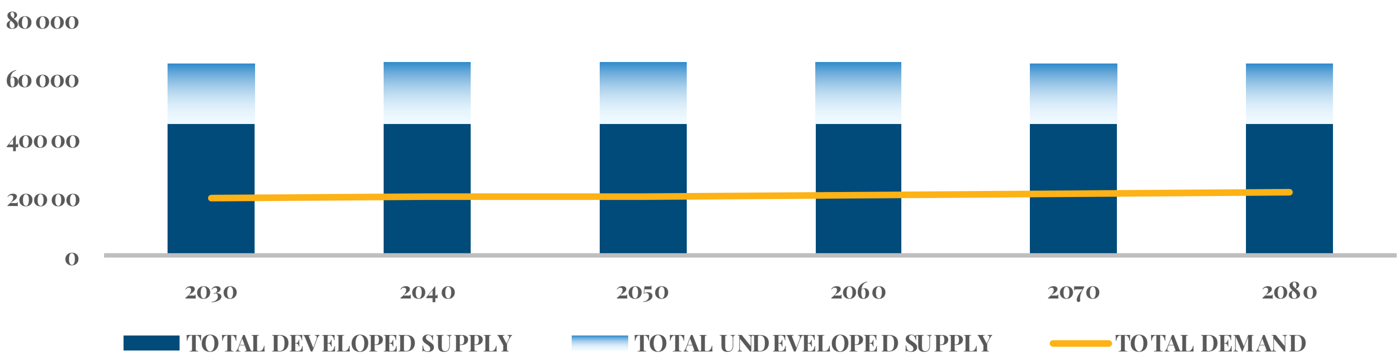
per TWDB Population Projections

2030	88,634
2040	90,179
2050	90,902
2060	91,791
2070	92,671
2080	93,542

Your County Water Demand (acre-feet)



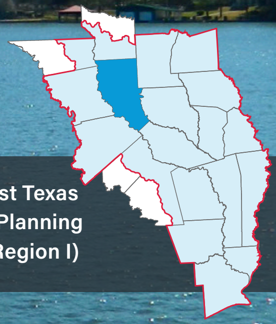
Your Available Water Supply (ac-ft/yr)



Angelina County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Municipal	No Water Shortage Identified, WMS - Municipal Conservation
Manufacturing	Water Shortage Identified, WMS - Purchase Additional Supply from Lufkin
Irrigation	No Water Shortage Identified
Steam Electric Power	No Water Shortage Identified
Livestock	No Water Shortage Identified
Mining	Water Shortage Identified, WMS - Purchase Additional Supply from ANRA

Cherokee County



The East Texas Water Planning Area (Region I)

County Seat: Rusk, Texas

Cherokee County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Afton Grove WSC
- Alto
- Alto Rural WSC
- Blackjack WSC
- County-Other, Cherokee
- Craft Turney WSC
- Gum Creek WSC
- Jacksonville
- New Summerfield
- North Cherokee WSC
- Rusk
- Rusk Rural WSC
- Wells
- West Jacksonville WSC

Your Water-Dependent Economy:

Agriculture
Hydrocarbon Production
Timber

Your Water Sources:

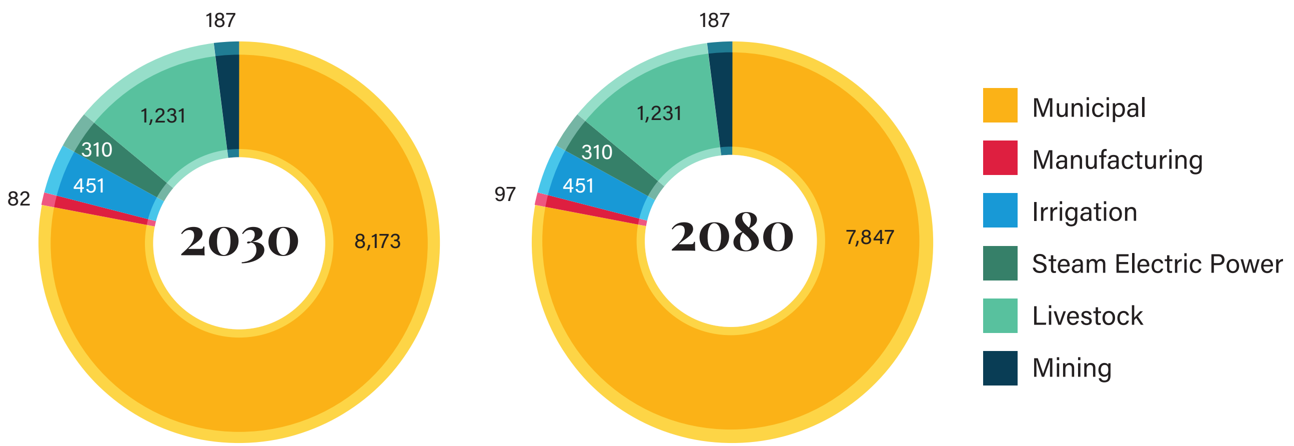
Groundwater Wells
Lake Jacksonville
Rusk City Lake
Neches River
Cherokee Lake
Carrizo-Wilcox Aquifer
Queen City Aquifer
Sparta Aquifer
Local Supplies

Projected Growth

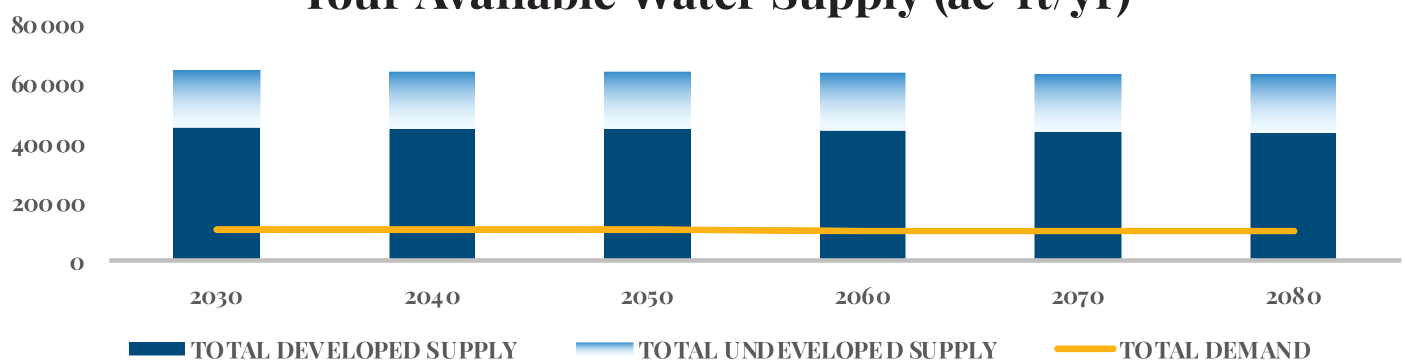
per TWDB Population Projections

2030	50,217
2040	49,789
2050	48,968
2060	48,043
2070	47,127
2080	46,220

Your County Water Demand (acre-feet)



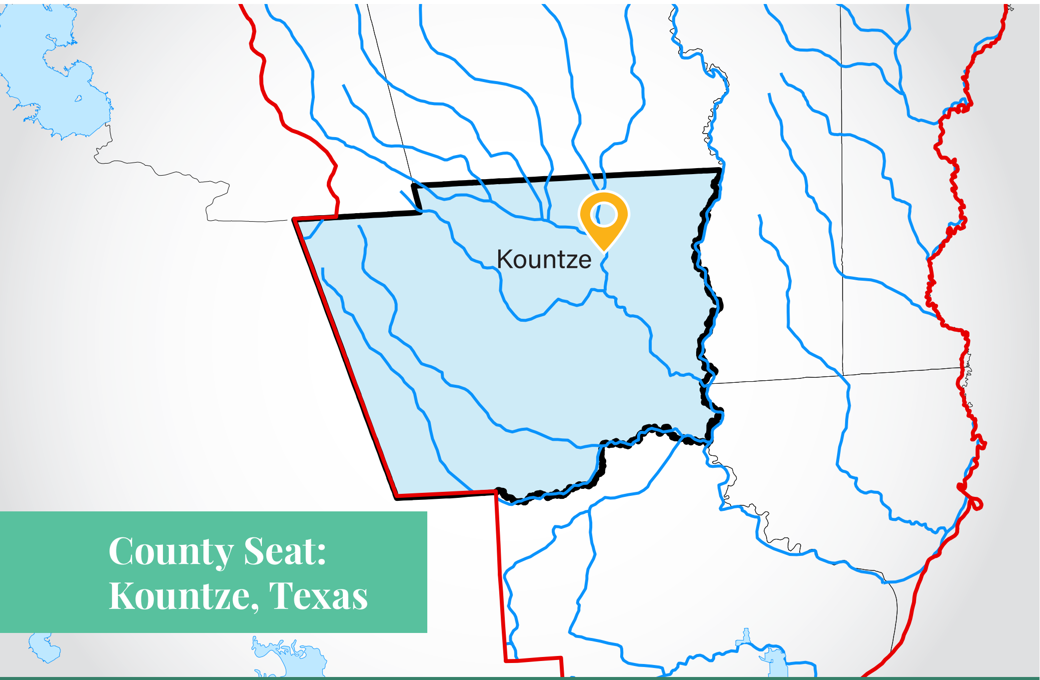
Your Available Water Supply (ac-ft/yr)



Cherokee County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Alto Rural WSC	WMS - Additional Wells in Carrizo Aquifer, Municipal Conservation
Rusk	WMS - Additional Wells in Carrizo Aquifer, Municipal Conservation
Wright City WSC	No Water Shortage Identified
Manufacturing	No Water Shortage Identified
Irrigation	No Water Shortage Identified
Steam Electric Power	No Water Shortage Identified
Livestock	No Water Shortage Identified
Mining	Water Shortage Identified, WMS - Purchase Additional Supply from ANRA

Hardin County



County Seat: Kountze, Texas

Hardin County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- County-Other, Hardin
- Hardin County WCID 1
- Kountze
- Lumberton MUD
- North Hardin WSC
- Silsbee
- Sour Lake
- West Hardin WSC
- Wildwood POA

Your Water-Dependent Economy:

Industry
Hydrocarbon Production
Timber

Your Water Sources:

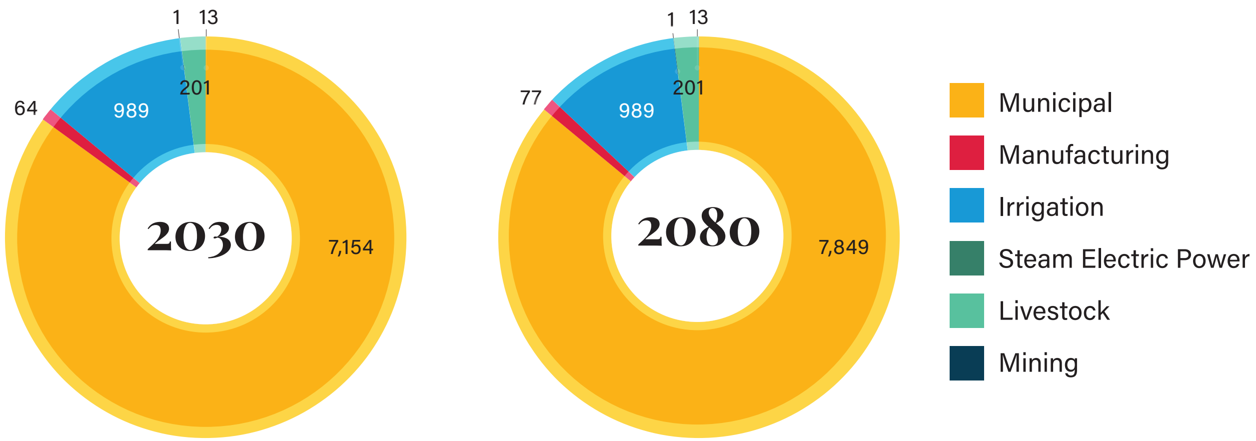
Gulf Coast Aquifer
Groundwater Wells
Neches Run-of-River Supplies
Local Supplies

Projected Growth

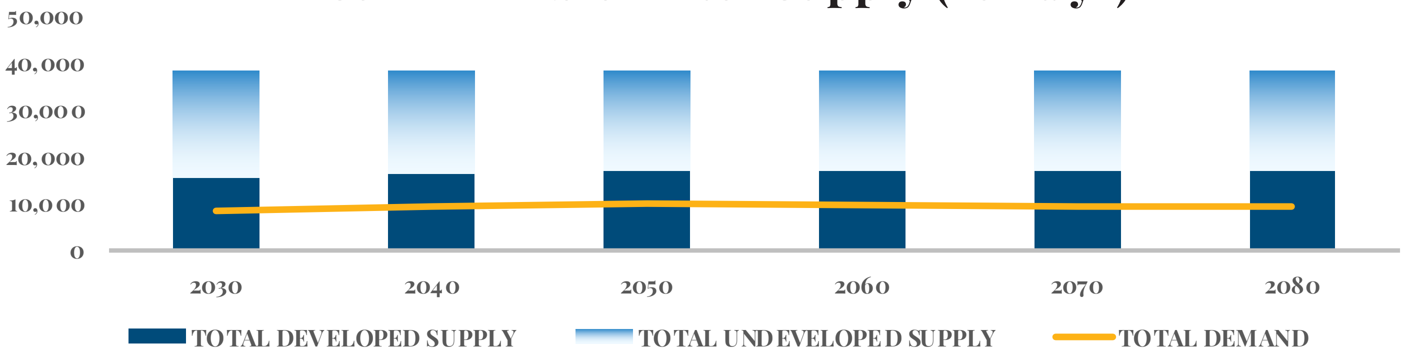
per TWDB Population Projections

2030	67,850
2040	75,133
2050	81,452
2060	79,574
2070	77,719
2080	75,894

Your County Water Demand (acre-feet)



Your Available Water Supply (ac-ft/yr)



Hardin County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Municipal	No Water Shortage Identified
Manufacturing	No Water Shortage Identified
Irrigation	No Water Shortage Identified
Steam Electric Power	No Water Shortage Identified
Livestock	No Water Shortage Identified
Mining	No Water Shortage Identified

Henderson County

County Seat: Athens, Texas

This county is split between more than one TWDB regional water planning area. The projections shown in these summary sheets represent data for the portion of the county that falls within the East Texas Regional Water Planning Area.

Henderson County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Athens
- Berryville
- Bethel Ash WSC
- Brownsboro
- Chandler
- County-Other, Henderson
- Leagueville WSC
- Moore Station WSC
- Murchison
- Virginia Hill WSC

Your Water-Dependent Economy:

Livestock
Hydrocarbon Production
Recreation

Your Water Sources:

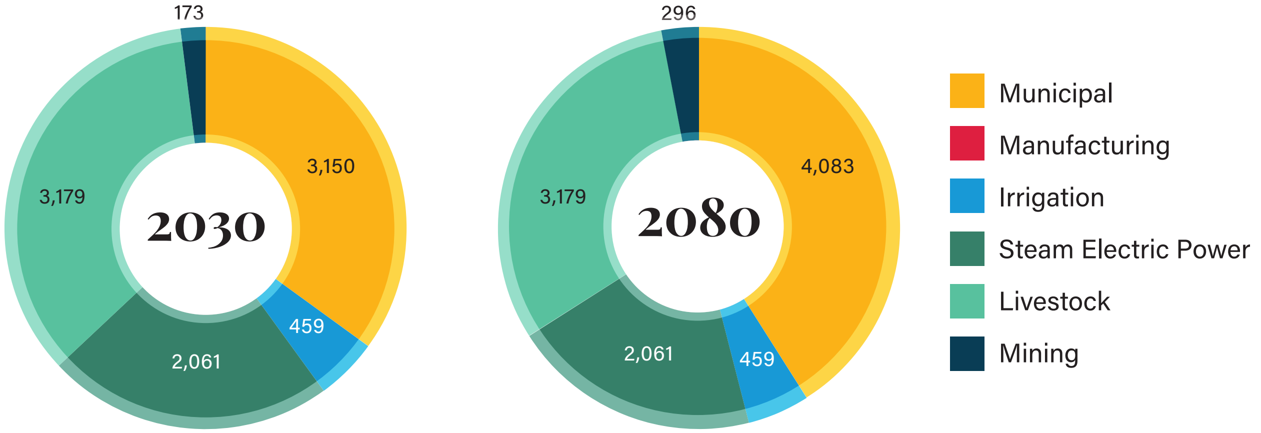
Groundwater Wells
Lake Athens
Local Supplies
Carrizo-Wilcox Aquifer
Queen City Aquifer

Projected Growth

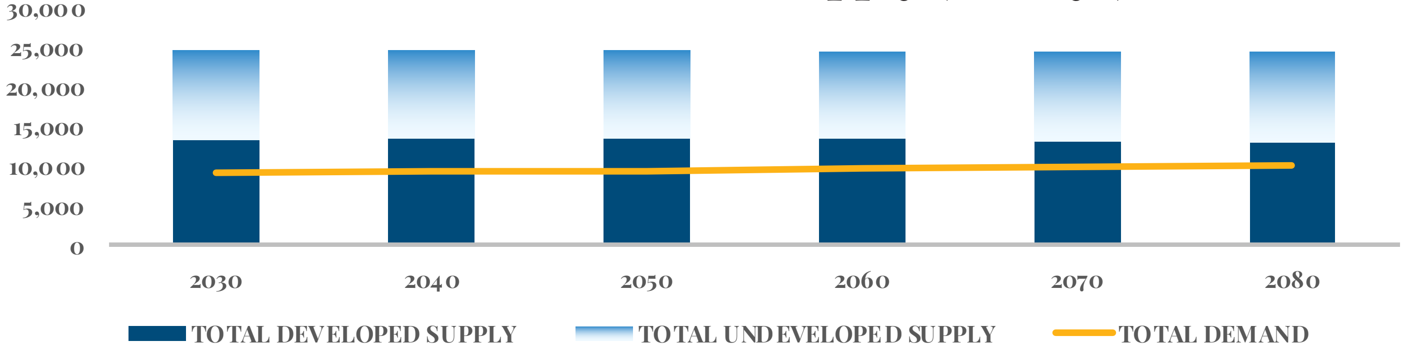
per TWDB Population Projections

2030	25,474
2040	26,404
2050	26,918
2060	27,503
2070	28,080
2080	28,649

Your County Water Demand (acre-feet)



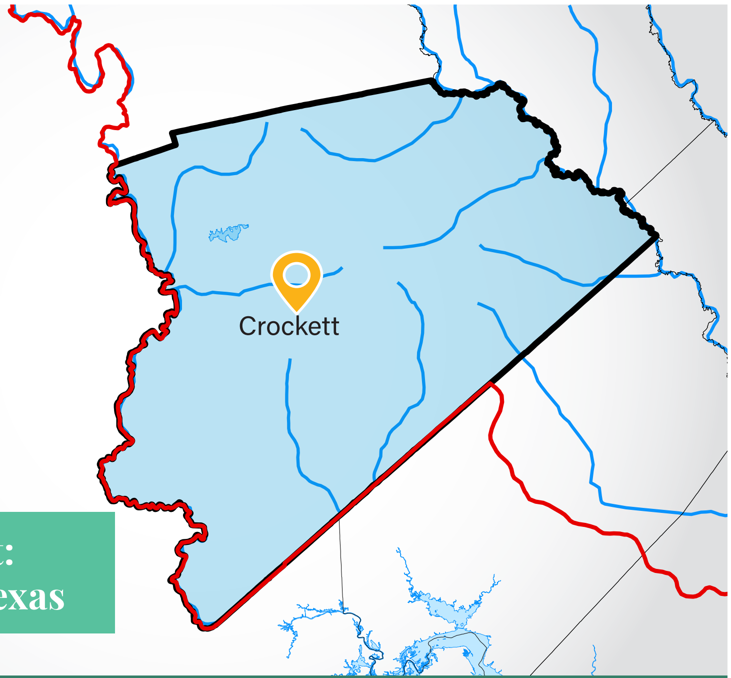
Your Available Water Supply (ac-ft/yr)



Henderson County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Athens	WMS - Athens MWA Strategies, Municipal Conservation
Chandler	WMS - Purchase from Tyler, Municipal Conservation
Edom WSC	WMS - Municipal Conservation
Manufacturing	No Water Shortage Identified
Irrigation	No Water Shortage Identified
Steam Electric Power	Water Shortage Identified, No WMS Identified - Demand No Longer Exists
Livestock	Water Shortage Identified, WMS - Athens WMA Indirect Reuse
Mining	Water Shortage Identified, WMS - New Wells in Queen City Aquifer

Houston County



County Seat:
Crockett, Texas

Houston County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- County-Other, Houston
- Crockett
- Grapeland
- Lovelady
- TDCJ Eastham Unit
- The Consolidated WSC

Your Water-Dependent Economy:

Agriculture
Livestock
Hydrocarbon Production

Your Water Sources:

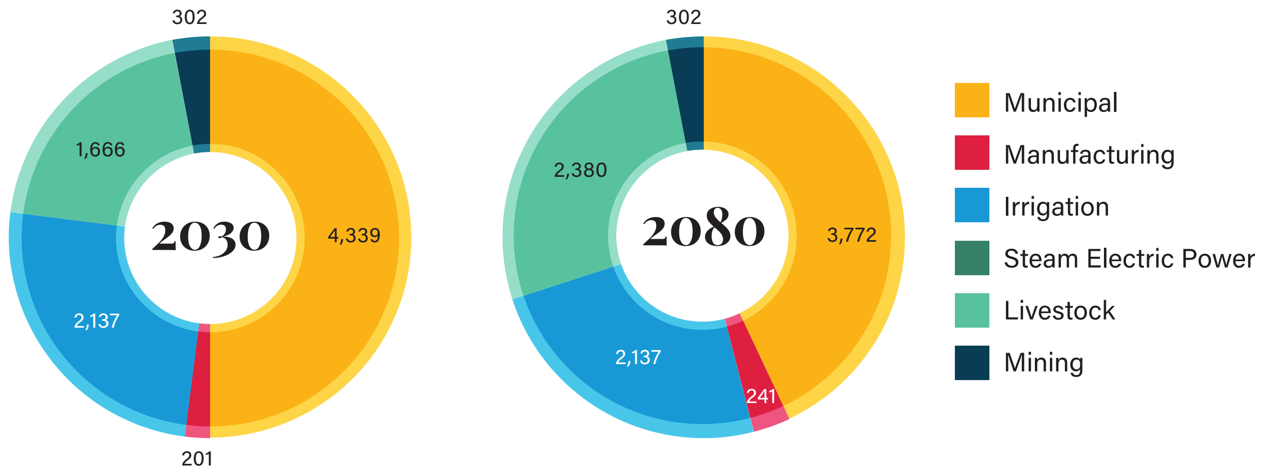
Groundwater Wells
Houston County Lake
Local Supplies
Queen City Aquifer
Sparta Aquifer
Neches River
Trinity River
Carrizo-Wilcox Aquifer
Yegua-Jackson Aquifer

Projected Growth

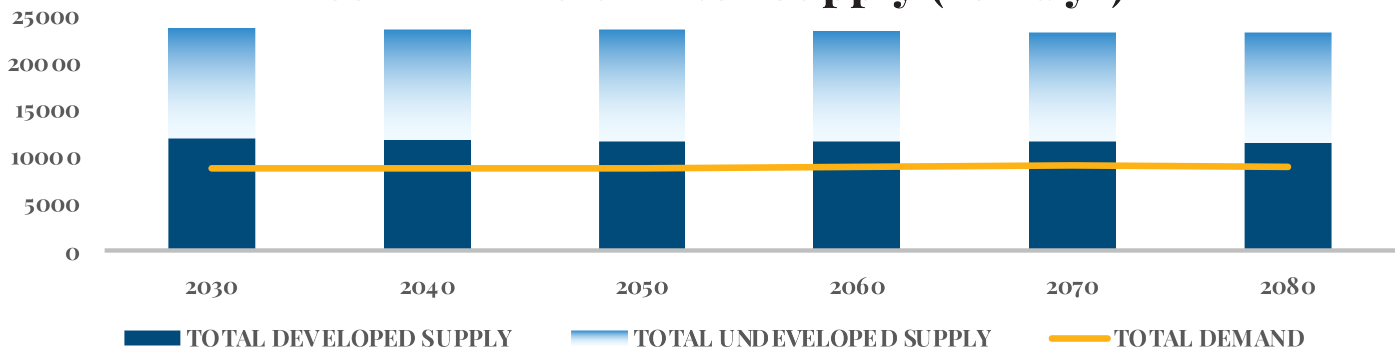
per TWDB Population Projections

2030	21,221
2040	20,385
2050	19,547
2060	19,032
2070	18,522
2080	18,017

Your County Water Demand (acre-feet)



Your Available Water Supply (ac-ft/yr)

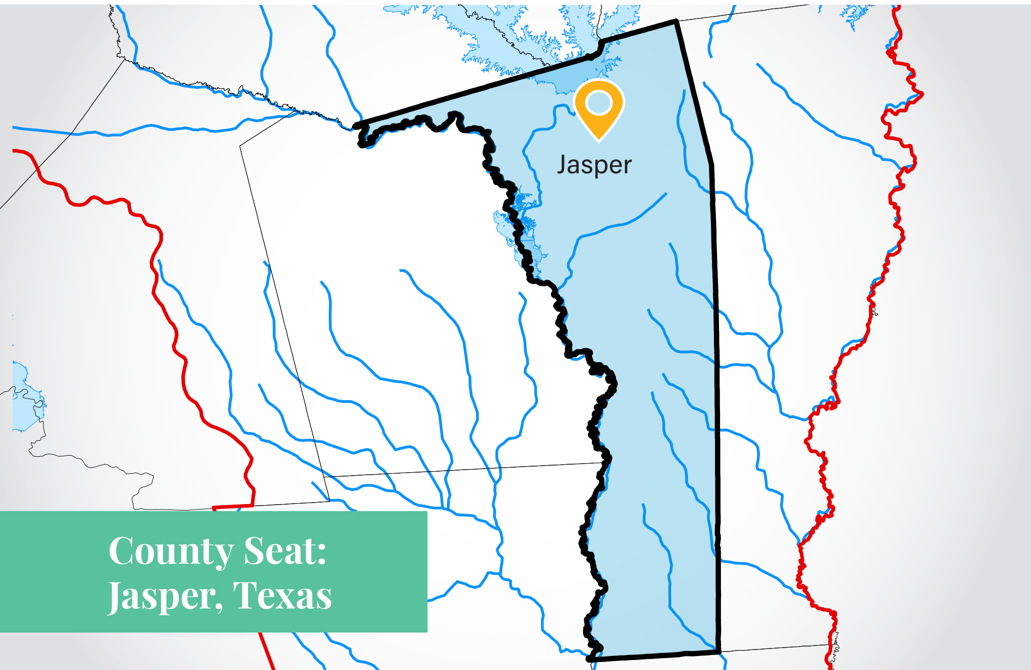


Houston County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
TDCJ Eastham Unit	WMS - Additional Wells in Carrizo-Wilcox Aquifer, Municipal Conservation
Manufacturing	No Water Shortage Identified
Irrigation	No Water Shortage Identified
Steam Electric Power	No Demand Projected
Livestock	Water Shortage Identified, WMS - Additional Wells in Carrizo-Wilcox Aquifer
Mining	No Water Shortage Identified

Jasper County

The East Texas Water Planning Area (Region I)



County Seat: Jasper, Texas

Jasper County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- County-Other, Jasper
- Jasper
- Jasper County WCID 1
- Kirbyville
- Rayburn Country MUD
- Rural WSC
- South Jasper County WSC
- South Kirbyville Rural WSC
- Upper Jasper County Water Authority

Your Water-Dependent Economy:

Agriculture
Timber

Your Water Sources:

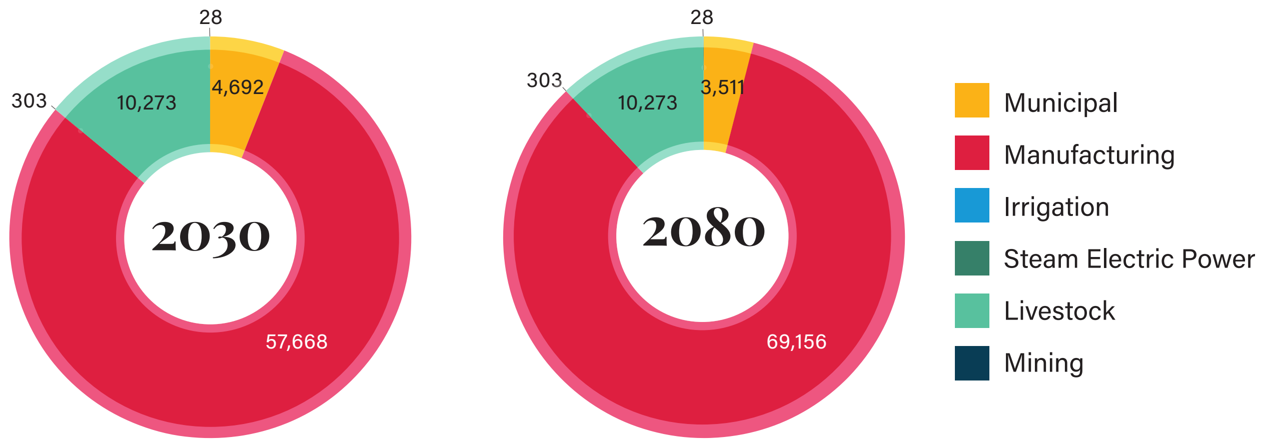
Rayburn-Steinhagen Reservoir System
Groundwater Wells
Local Supplies
Neches River
Gulf Coast Aquifer
Purchase from MWPs

Projected Growth

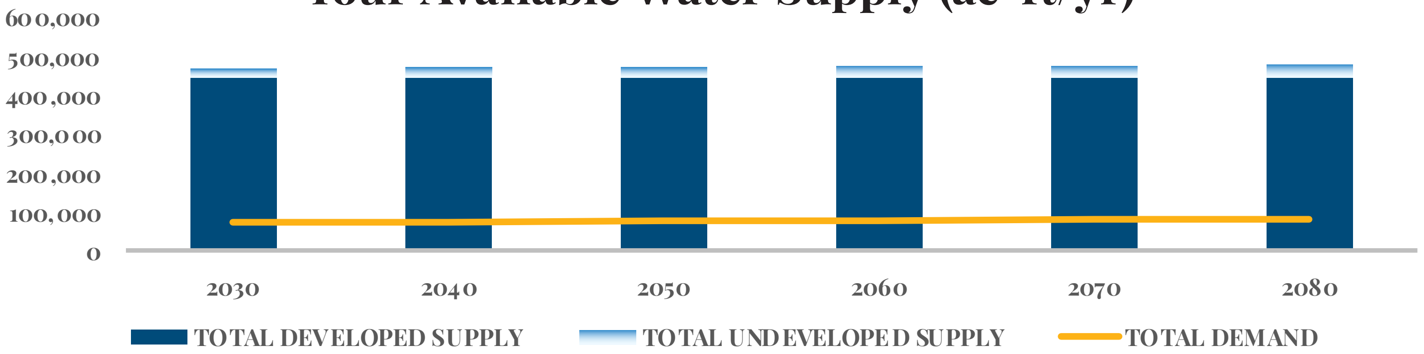
per TWDB Population Projections

2030	31,617
2040	30,090
2050	28,222
2060	26,537
2070	24,869
2080	23,217

Your County Water Demand (acre-feet)



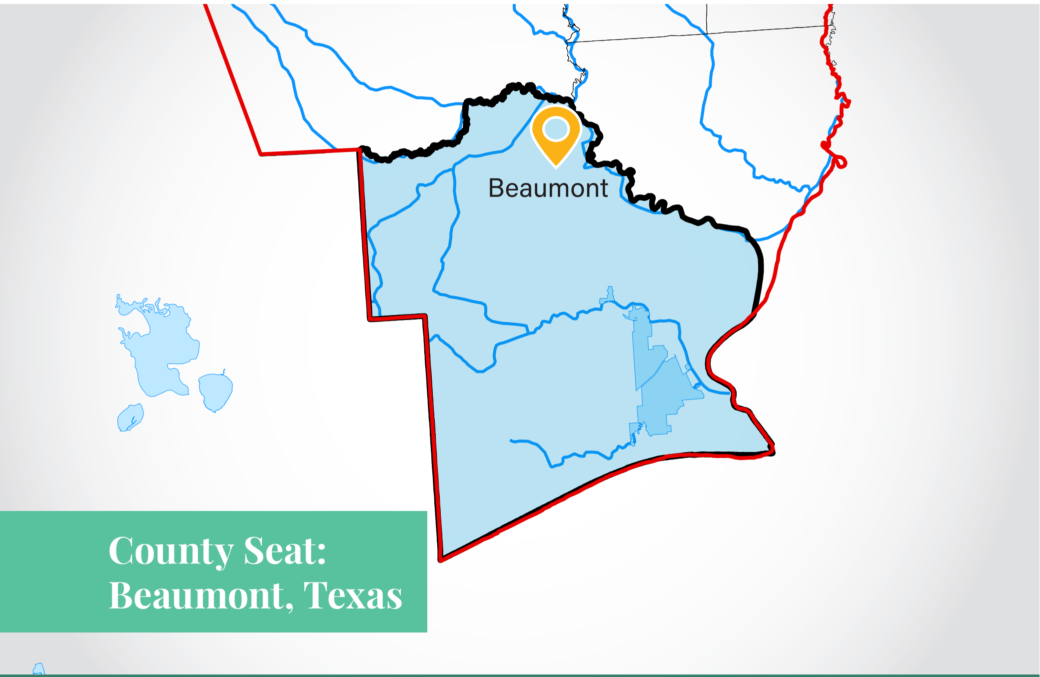
Your Available Water Supply (ac-ft/yr)



Jasper County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Municipal	No Water Shortage Identified
South Jasper Co. WSC	No Water Shortage Identified, WMS - New Wells in Gulf Coast Aquifer
Manufacturing	Water Shortage Identified, WMS - Purchase from LNVA
Irrigation	No Water Shortage Identified
Steam Electric Power	No Demand Projected
Livestock	No Water Shortage Identified
Mining	No Water Shortage Identified

Jefferson County



County Seat: Beaumont, Texas

Jefferson County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Beaumont
- Bevil Oaks
- China
- County-Other, Jefferson
- Federal Correctional Complex Beaumont
- Groves
- Jefferson County WCID 10
- Meeker MWD
- Nederland
- Nome
- Port Arthur
- Port Neches
- West Jefferson County MWD

Your Water-Dependent Economy:

- Agriculture
- Education
- Industry
- Recreation

Your Water Sources:

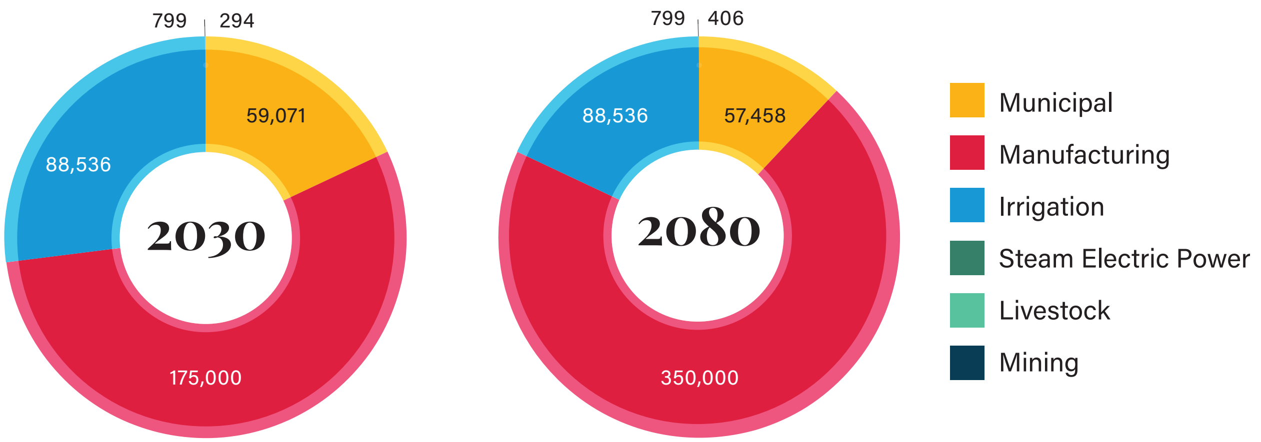
- Groundwater Wells
- Indirect Reuse
- Local Supplies
- Neches River
- Neches-Trinity River
- Gulf Coast Aquifer
- Rayburn-Steinhagen Reservoir System
- Purchase from MWPs

Projected Growth

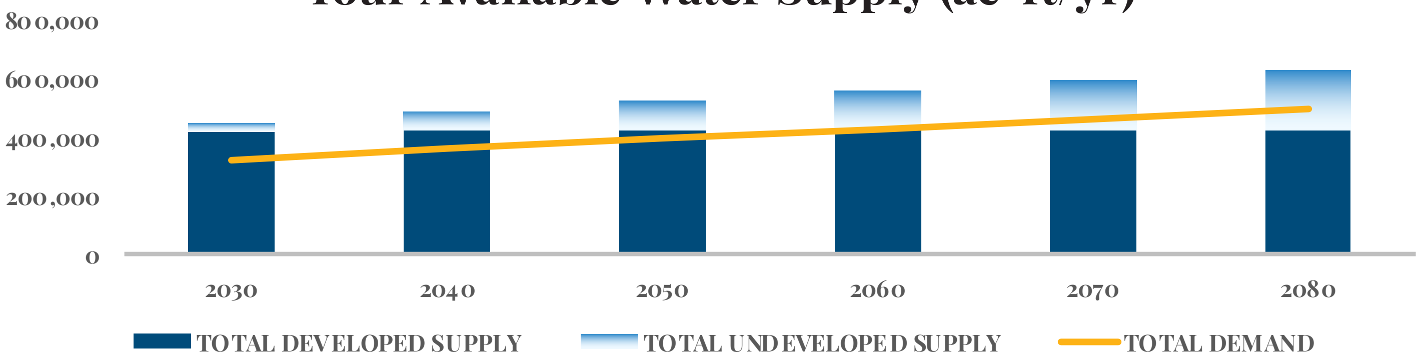
per TWDB Population Projections

2030	260,350
2040	262,787
2050	262,035
2060	258,655
2070	255,308
2080	251,994

Your County Water Demand (acre-feet)



Your Available Water Supply (ac-ft/yr)

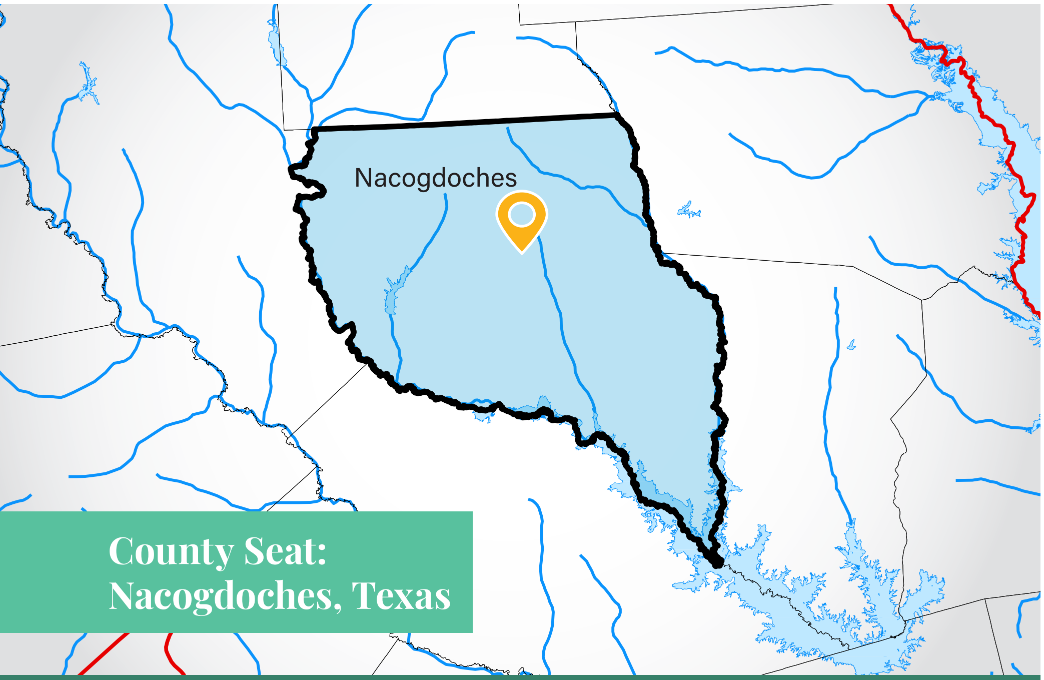


Jefferson County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Beaumont	WMS - Municipal Conservation, Well Field Infrastructure Improvements, Purchase Additional Supply from LNVA, Bunn's Canal Rehabilitation, New Westside Surface WTP
China	No Water Shortage Identified, WMS - New Wells in Gulf Coast Aquifer
Trinity Bay Conservation District	WMS - Municipal Conservation
Manufacturing	Water Shortage Identified, WMS - Purchase from LNVA
Irrigation	No Water Shortage Identified
Steam Electric Power	No Demand Projected
Livestock	No Water Shortage Identified
Mining	No Water Shortage Identified

Nacogdoches County

The East Texas Water Planning Area (Region I)



County Seat: Nacogdoches, Texas

Nacogdoches County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Appleby WSC
- Caro WSC
- County-Other, Nacogdoches
- Cushing
- D & M WSC
- Etoile WSC
- Garrison
- Lilly Grove SUD
- Melrose WSC
- Nacogdoches
- Swift WSC
- Woden WSC

Your Water-Dependent Economy:

Agriculture
Education
Livestock
Timber

Your Water Sources:

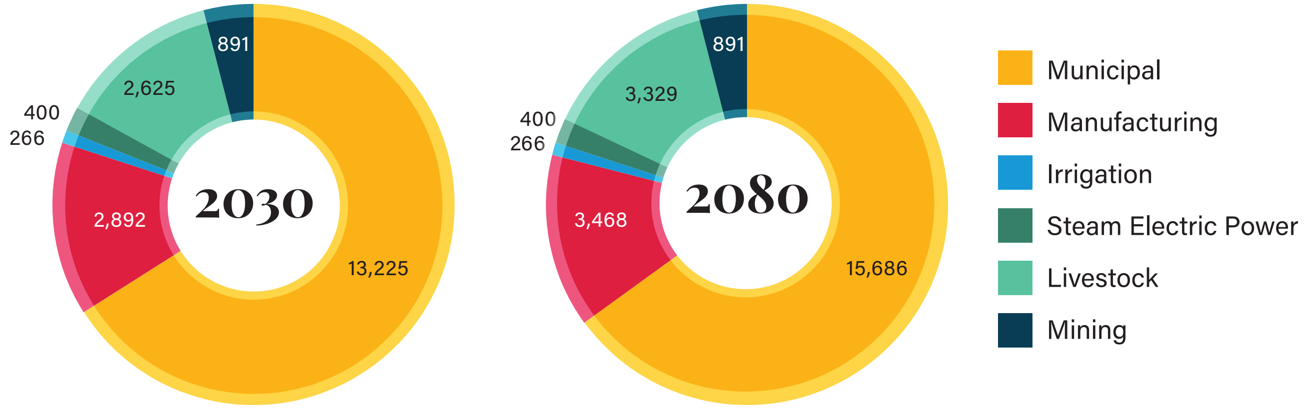
Groundwater Wells
Lake Nacogdoches
Local Supplies
Neches River
Lake Naconiche
Carrizo-Wilcox Aquifer
Queen City Aquifer
Sparta Aquifer
Yegua-Jackson Aquifer

Projected Growth

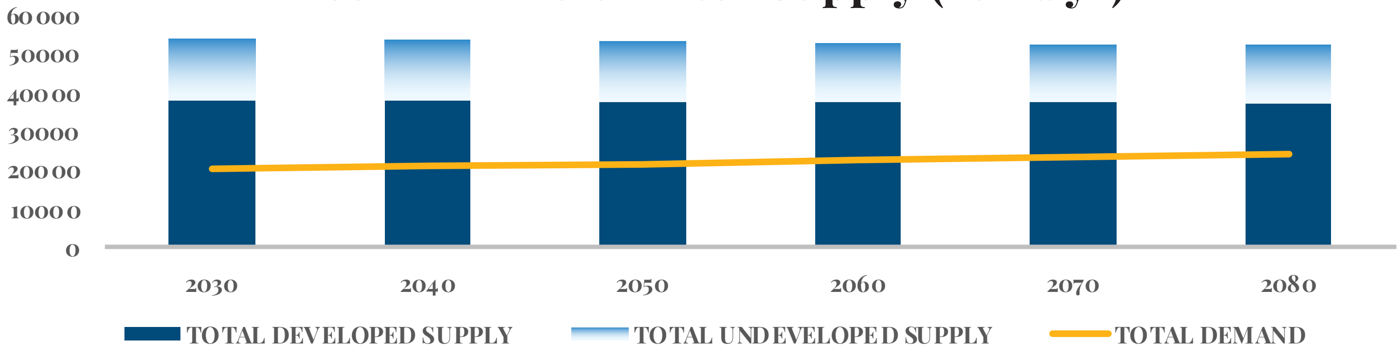
per TWDB Population Projections

2030	69,121
2040	71,271
2050	73,210
2060	76,305
2070	79,370
2080	82,405

Your County Water Demand (acre-feet)



Your Available Water Supply (ac-ft/yr)

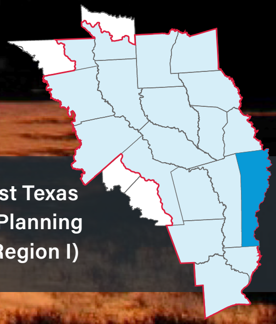


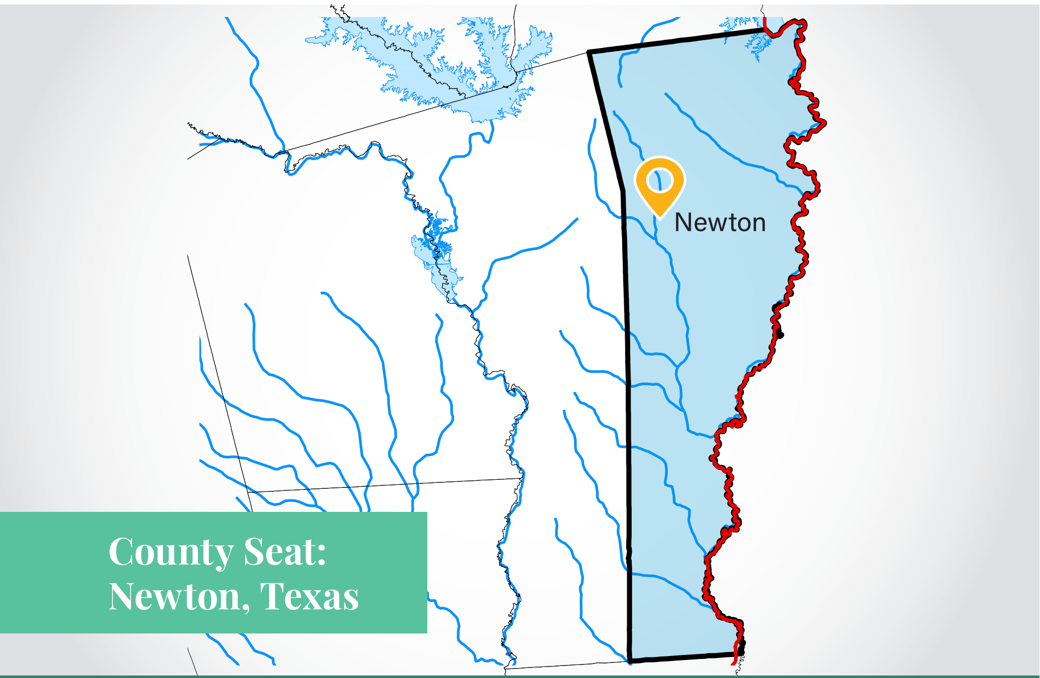
Nacogdoches County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Cushing	WMS - Municipal Conservation
D&M WSC	WMS - Additional Wells in Carrizo Aquifer, Municipal Conservation
Manufacturing	No Water Shortage Identified
Irrigation	No Water Shortage Identified
Steam Electric Power	No Water Shortage Identified
Livestock	No Water Shortage Identified
Mining	No Water Shortage Identified

Newton County

The East Texas Water Planning Area (Region I)





County Seat: Newton, Texas

Newton County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Bon Wier WSC
- County-Other, Newton
- Newton
- South Newton WSC

Your Water-Dependent Economy:

Recreation
Timber

Your Water Sources:

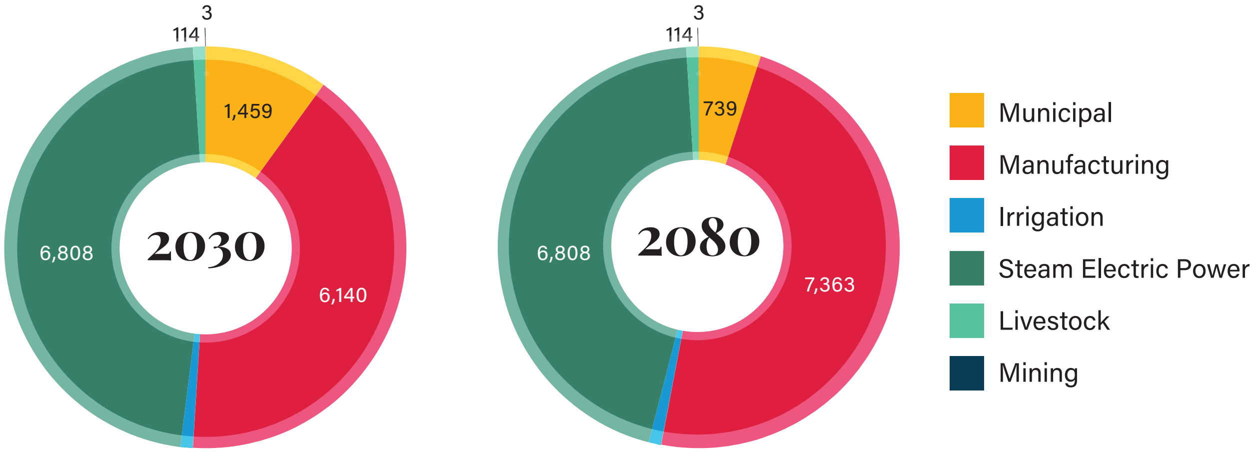
Groundwater Wells
Local Supplies
Gulf Coast Aquifer
Sabine River
Neches River

Projected Growth

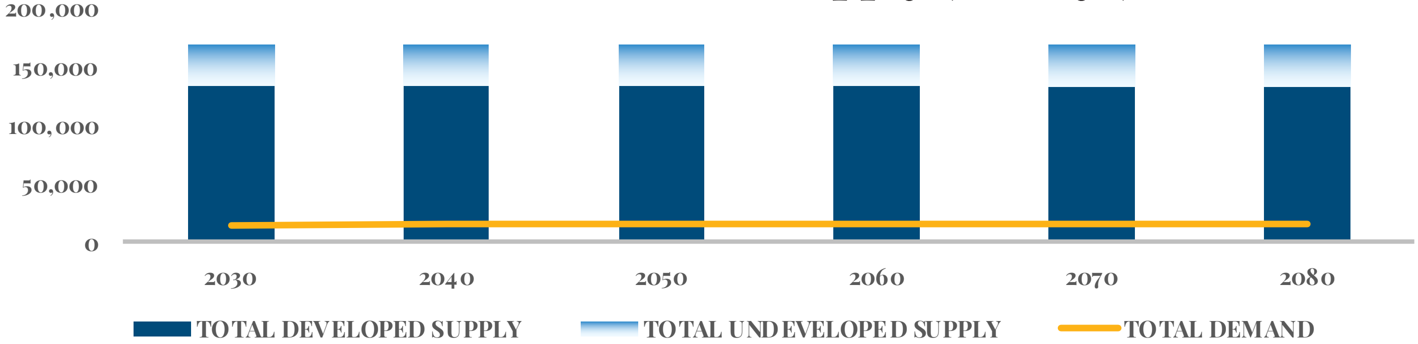
per TWDB Population Projections

2030	11,193
2040	10,105
2050	8,921
2060	7,830
2070	6,750
2080	5,681

Your County Water Demand (acre-feet)



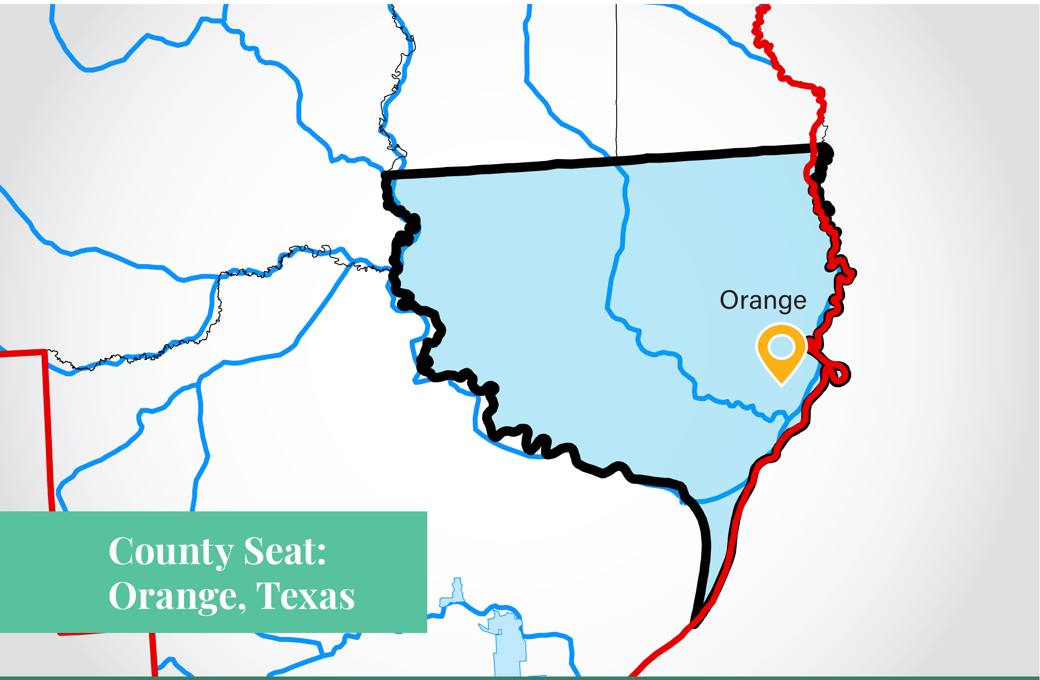
Your Available Water Supply (ac-ft/yr)



Newton County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Municipal	No Water Shortage Identified
Manufacturing	No Water Shortage Identified
Irrigation	No Water Shortage Identified
Steam Electric Power	No Water Shortage Identified
Livestock	No Water Shortage Identified
Mining	No Water Shortage Identified

Orange County



County Seat: Orange, Texas

Orange County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Bridge City
- County-Other, Orange
- Kelly G Brewer
- Mauriceville SUD
- Orange
- Orange County WCID 1
- Orange County WCID 2
- Orangefield WSC
- Pinehurst

Your Water-Dependent Economy:

Industry
Recreation
Timber

Your Water Sources:

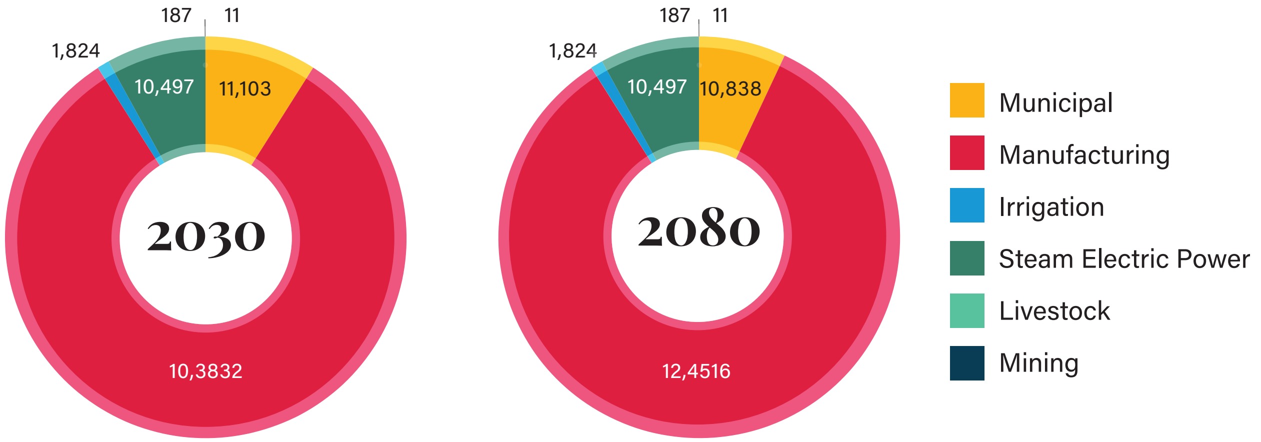
Direct Reuse
Groundwater Wells
Local Supplies
Purchase from MWPs
Neches River
Sabine River
Gulf Coast Aquifer

Projected Growth

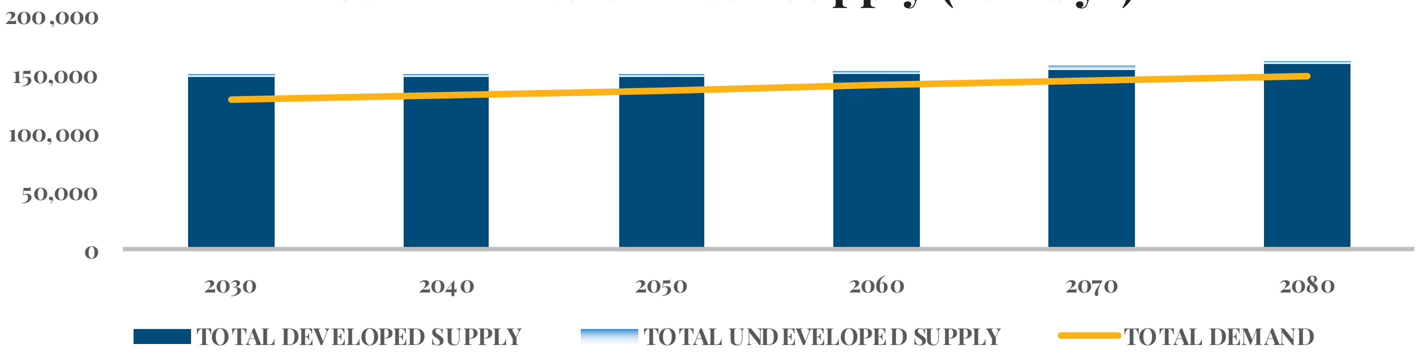
per TWDB Population Projections

2030	87,065
2040	88,479
2050	88,819
2060	87,583
2070	86,365
2080	85,164

Your County Water Demand (acre-feet)



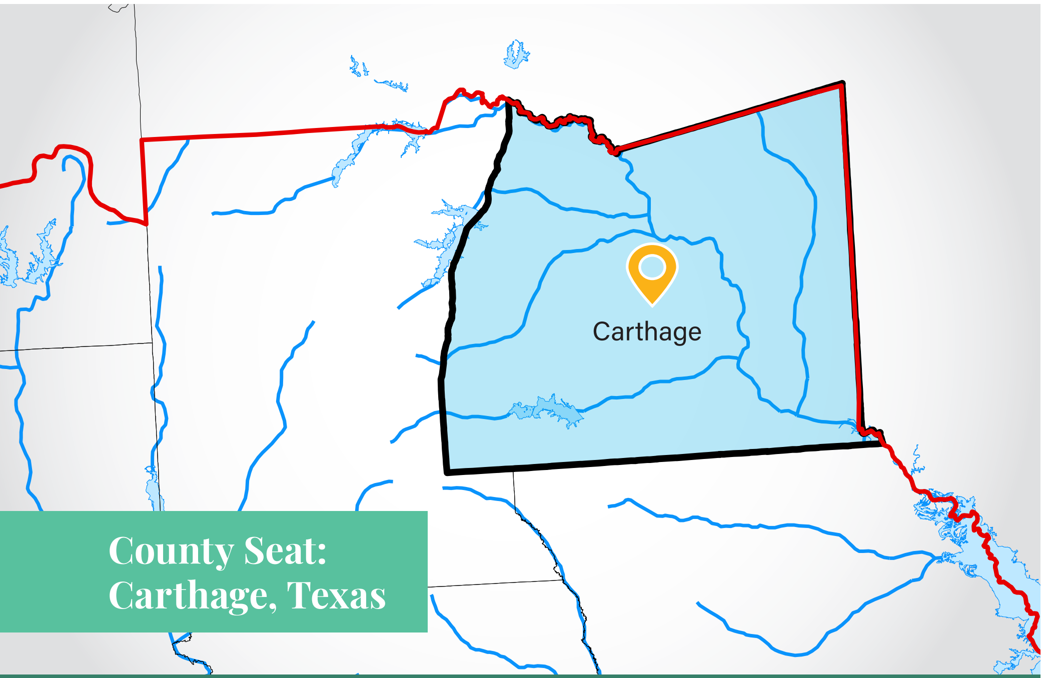
Your Available Water Supply (ac-ft/yr)



Orange County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Municipal	No Water Shortage Identified
Orange County WCID 1	No Water Shortage Identified; WMS - New Wells in Gulf Coast Aquifer
Manufacturing	No Water Shortage Identified
Irrigation	No Water Shortage Identified
Steam Electric Power	No Water Shortage Identified
Livestock	No Water Shortage Identified
Mining	No Water Shortage Identified

Panola County



County Seat: Carthage, Texas

Panola County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Beckville
- Carthage
- Clayton WSC
- County-Other, Panola
- Deberry WSC
- Hollands Quarter WSC
- Panola-Bethany WSC
- Rehobeth WSC

Your Water-Dependent Economy:

Agriculture
Livestock
Hydrocarbon Production

Your Water Sources:

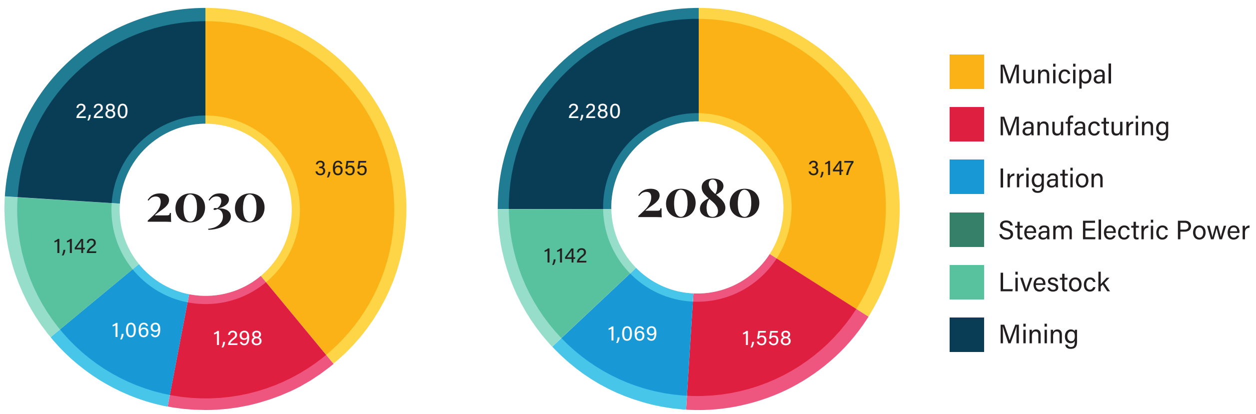
Groundwater Wells
Lake Murvaul
Local Supplies
Carrizo-Wilcox Aquifer
Sabine River
Martin Lake

Projected Growth

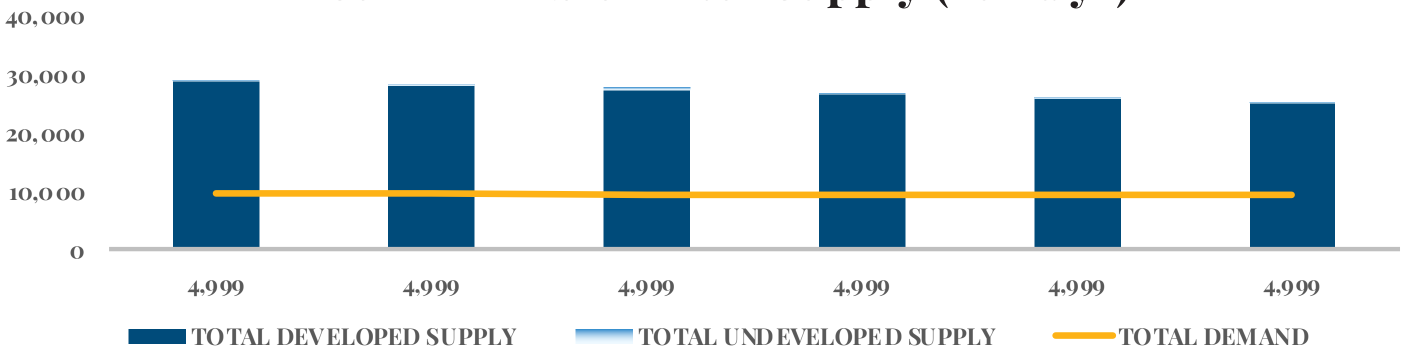
per TWDB Population Projections

2030	21,909
2040	21,174
2050	20,156
2060	19,357
2070	18,566
2080	17,783

Your County Water Demand (acre-feet)



Your Available Water Supply (ac-ft/yr)



Panola County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Municipal	No Water Shortage Identified
Manufacturing	No Water Shortage Identified
Irrigation	No Water Shortage Identified
Steam Electric Power	No Demand Projected
Livestock	No Water Shortage Identified
Mining	No Water Shortage Identified

Polk County

The East Texas Water Planning Area (Region I)

County Seat: Livingston, Texas

This county is split between more than one TWDB regional water planning area. The projections shown in these summary sheets represent data for the portion of the county that falls within the East Texas Regional Water Planning Area.

Polk County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Corrigan
- County-Other, Polk
- Damascus-Stryker WSC
- Lake Livingston WSC
- Leggett WSC
- Moscow WSC
- Soda WSC

Your Water-Dependent Economy:

Agriculture
Livestock

Your Water Sources:

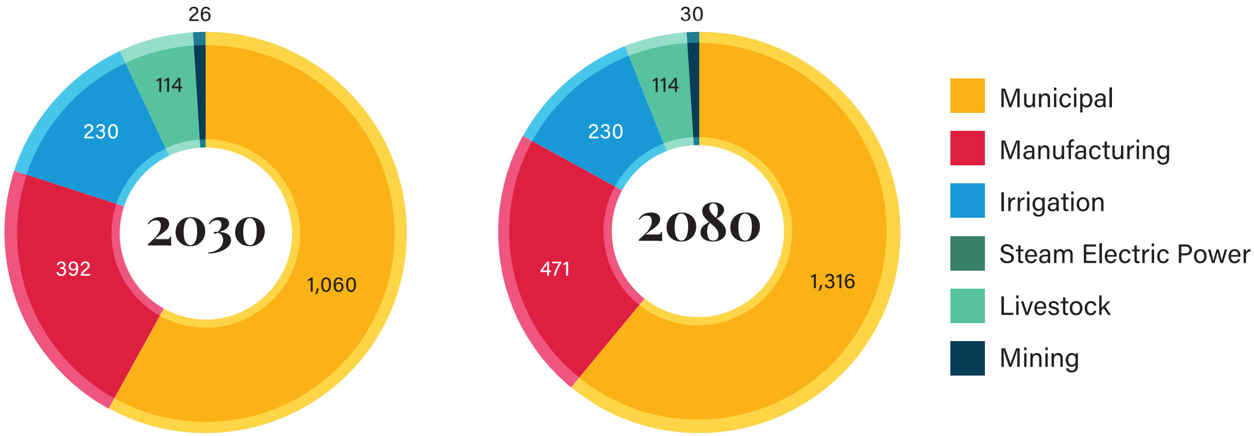
Gulf Coast Aquifer
Yegua-Jackson Aquifer
Groundwater Wells
Local Supplies
Neches River

Projected Growth

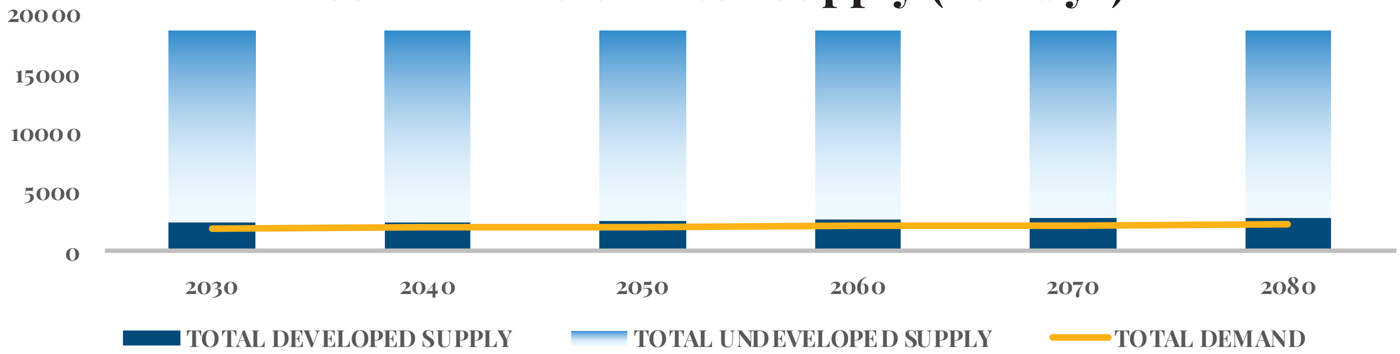
per TWDB Population Projections

2030	9,173
2040	9,905
2050	10,267
2060	10,662
2070	11,051
2080	11,434

Your County Water Demand (acre-feet)



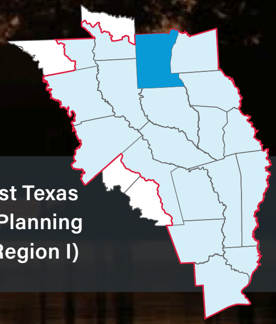
Your Available Water Supply (ac-ft/yr)

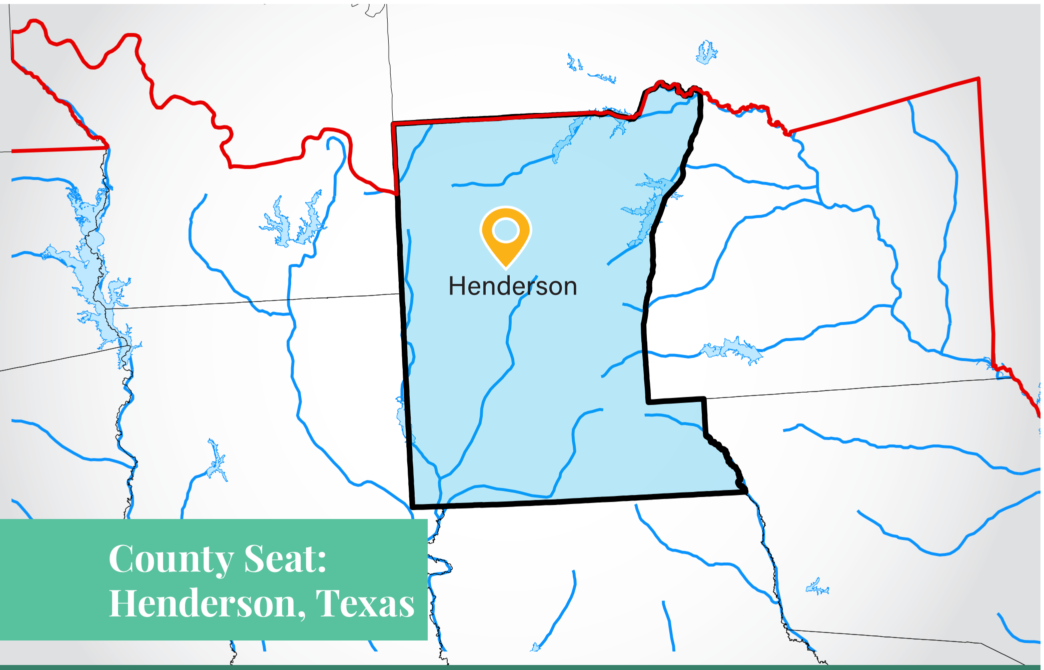


Polk County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Municipal	No Water Shortage Identified, WMS - Municipal Conservation
Manufacturing	No Water Shortage Identified
Irrigation	No Water Shortage Identified
Steam Electric Power	No Demand Projected
Livestock	No Water Shortage Identified
Mining	No Water Shortage Identified

Rusk County





County Seat:
Henderson, Texas

Rusk County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Chalk Hill SUD
- County-Other, Rusk
- Cross Roads SUD
- Crystal Farms WSC
- Ebenezer WSC
- Gaston WSC
- Goodsprings WSC
- Henderson
- Jacobs WSC
- Minden Brachfield WSC
- Mt Enterprise WSC
- New London
- New Prospect WSC
- Overton
- South Rusk County WSC
- Tatum

Your Water-Dependent Economy:

Agriculture
Livestock
Hydrocarbon Production

Your Water Sources:

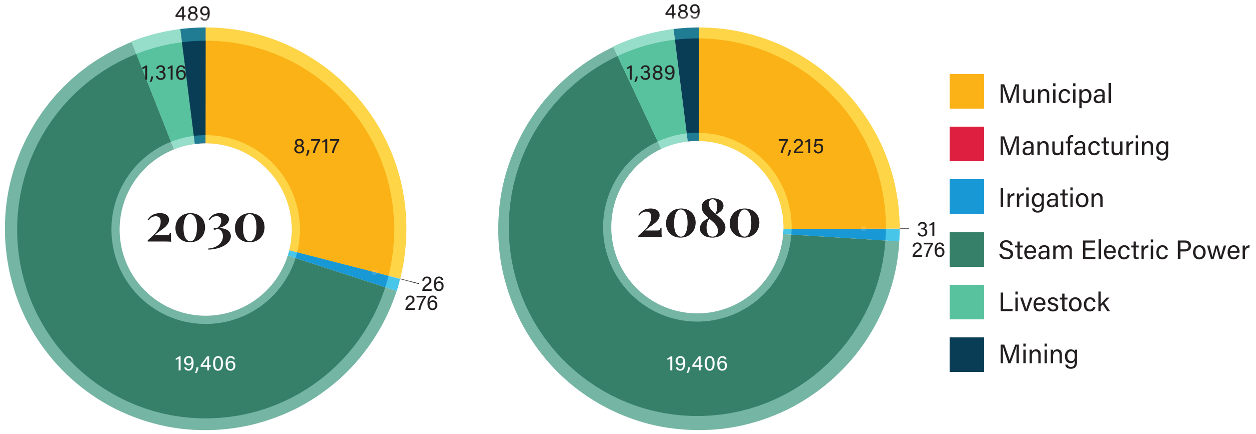
Groundwater Wells
Lake Striker
Martin Lake
Neches River
Sabine River
Local Supplies
Carrizo-Wilcox Aquifer
Queen City Aquifer

Projected Growth

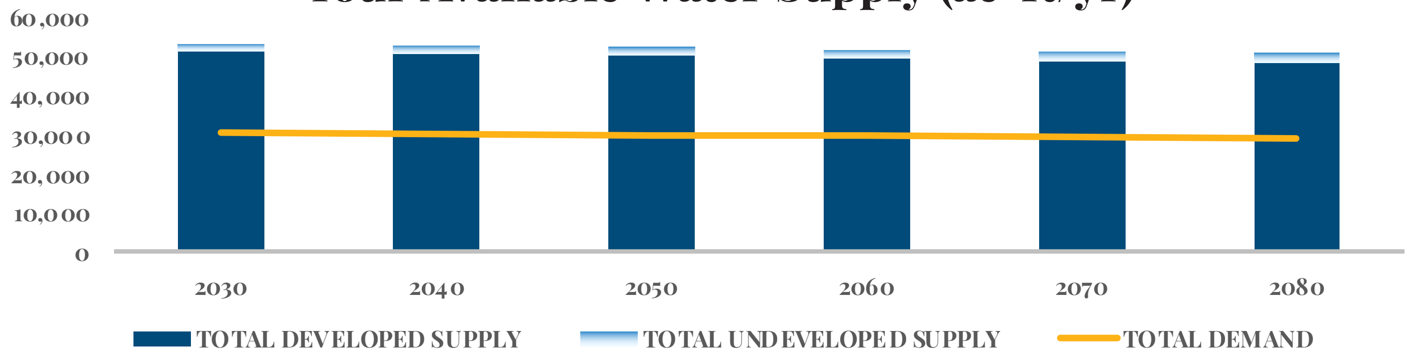
per TWDB Population Projections

2030	51,024
2040	49,735
2050	47,635
2060	45,260
2070	42,908
2080	40,579

Your County Water Demand (acre-feet)



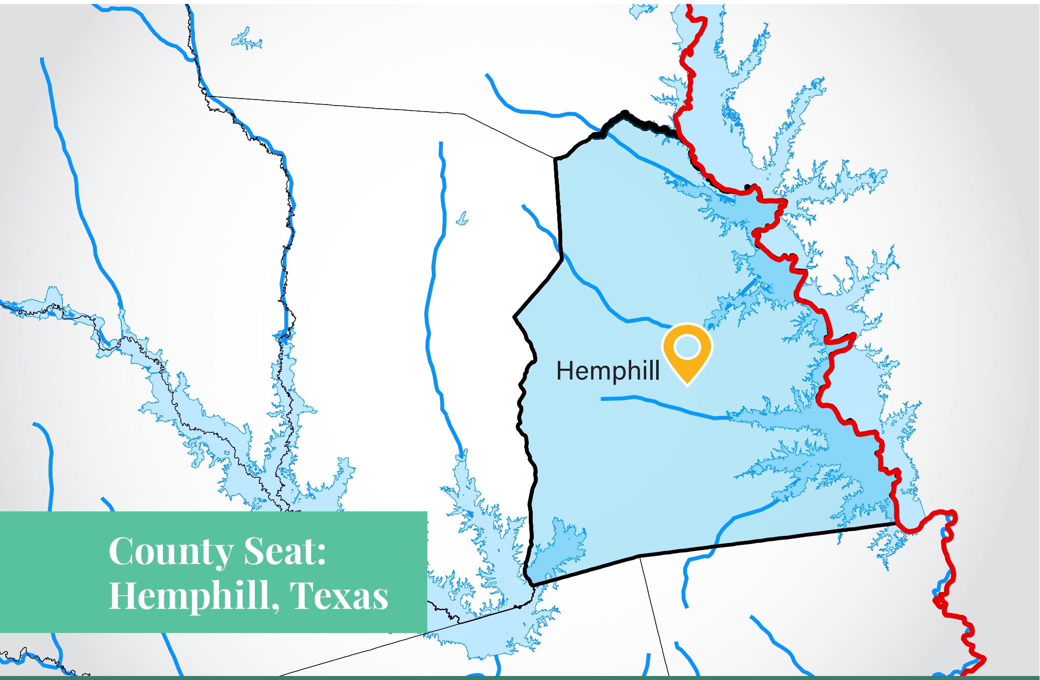
Your Available Water Supply (ac-ft/yr)



Rusk County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Jacobs WSC	WMS - New Wells in Carrizo-Wilcox Aquifer, Municipal Conservation
Gaston WSC	No Water Shortage Identified; WMS - New Wells in Carrizo-Wilcox Aquifer
Manufacturing	No Water Shortage Identified
Irrigation	No Water Shortage Identified
Steam Electric Power	No Water Shortage Identified
Livestock	No Water Shortage Identified
Mining	No Water Shortage Identified

Sabine County



County Seat:
Hemphill, Texas

Sabine County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Brookeland FWSD
- County-Other, Sabine
- G M WSC
- Hemphill
- Pineland

Your Water-Dependent Economy:

Agriculture
Recreation
Timber

Your Water Sources:

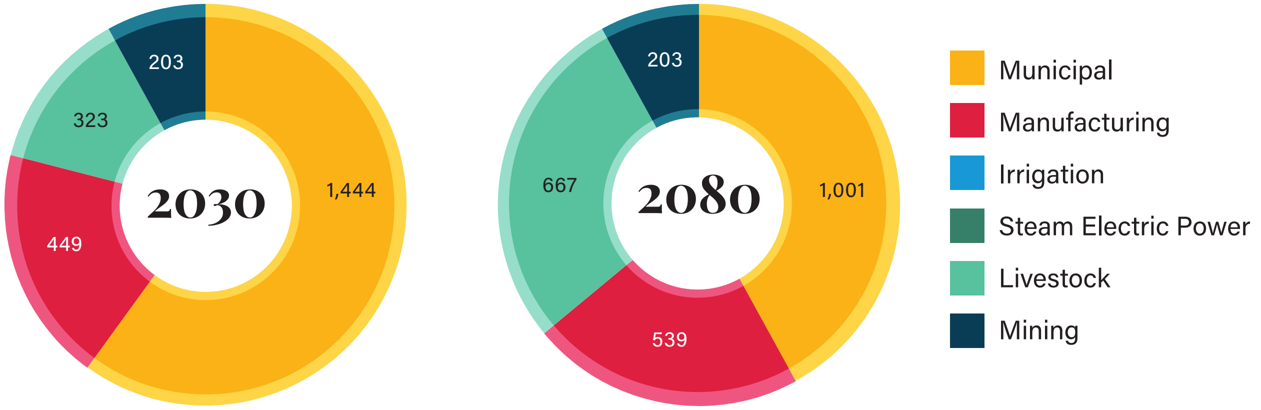
Direct Reuse
Groundwater Wells
Local Supplies
Neches River
Gulf Coast Aquifer
Toledo Bend Reservoir
Yegua-Jackson Aquifer
Carrizo-Wilcox Aquifer
Sparta Aquifer
Queen City Aquifer

Projected Growth

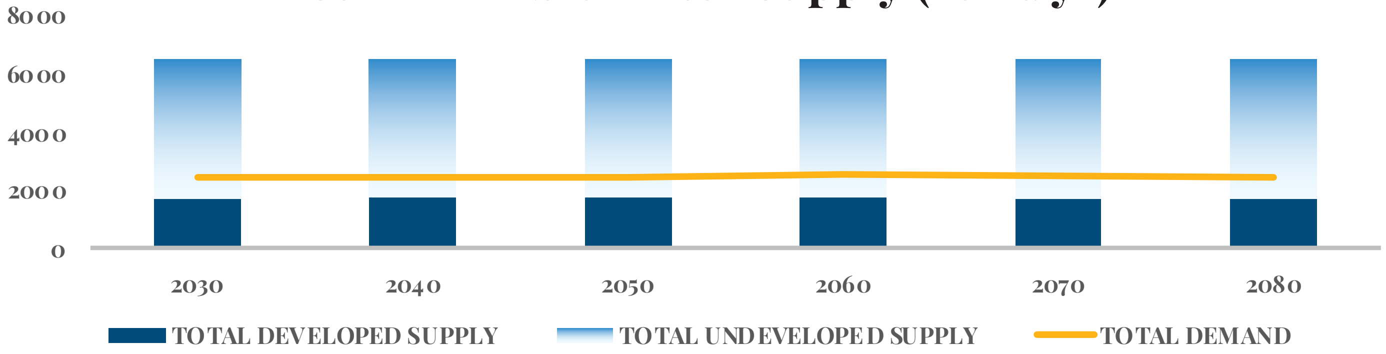
per TWDB Population Projections

2030	9,225
2040	8,415
2050	7,671
2060	7,226
2070	6,785
2080	6,348

Your County Water Demand (acre-feet)



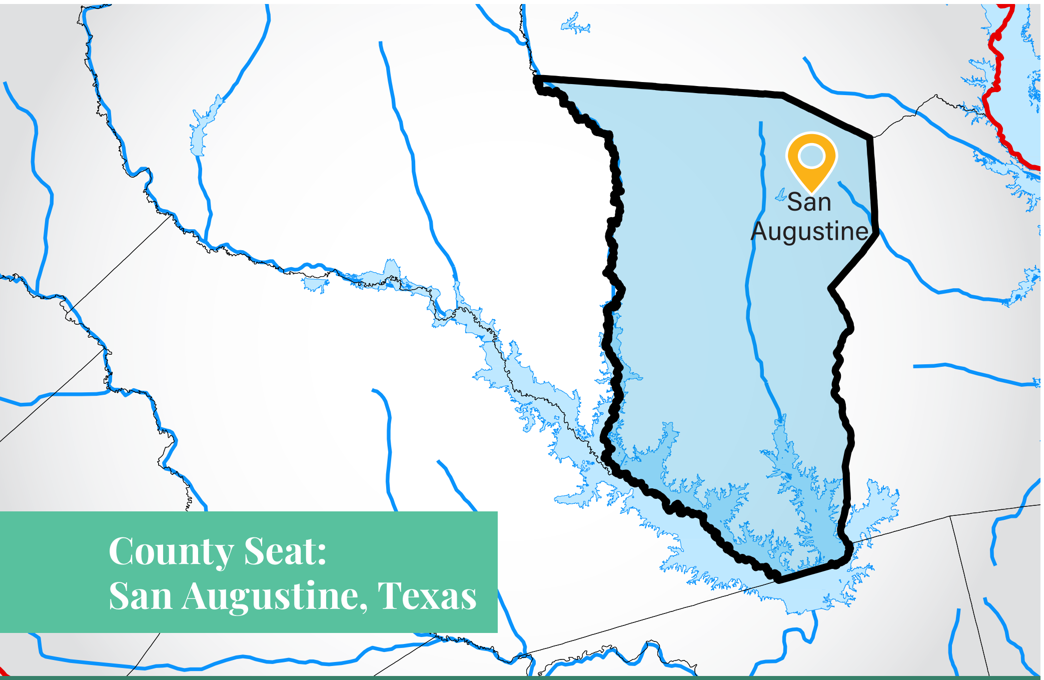
Your Available Water Supply (ac-ft/yr)



Sabine County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Municipal	No Water Shortage Identified, WMS - Municipal Conservation
Manufacturing	No Water Shortage Identified
Irrigation	No Demand Projected
Steam Electric Power	No Demand Projected
Livestock	Water Shortage Identified, WMS - Additional Wells in Yegua Jackson Aquifer
Mining	No Water Shortage Identified

San Augustine County



County Seat:
San Augustine, Texas

San Augustine County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- County-Other, San Augustine
- Denning WSC
- New WSC
- San Augustine
- San Augustine Rural WSC

Your Water-Dependent Economy:

Agriculture
Recreation
Timber

Your Water Sources:

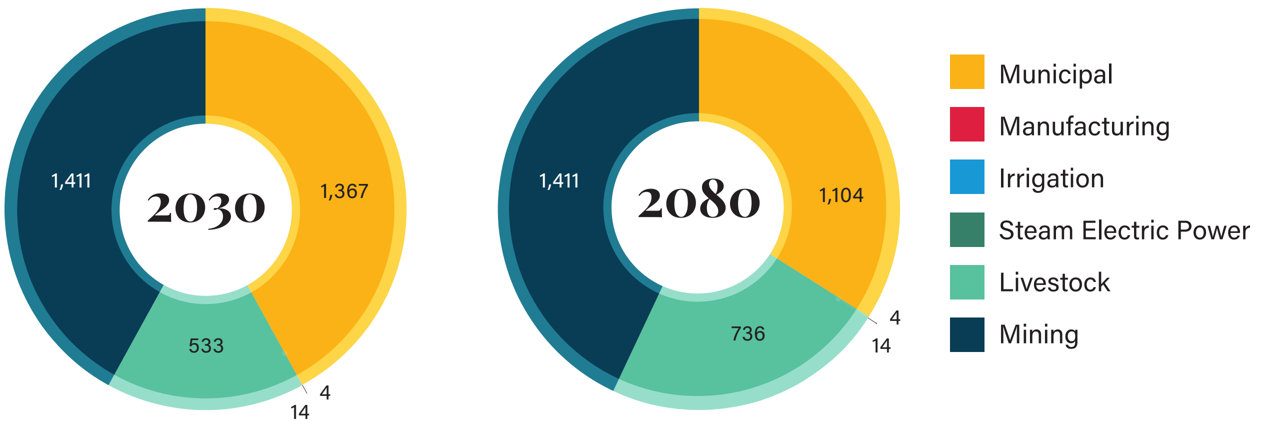
Yegua-Jackson Aquifer
Carrizo Wilcox Aquifer
Local Supplies
San Augustine City Lake
Sparta Aquifer
Other Aquifer

Projected Growth

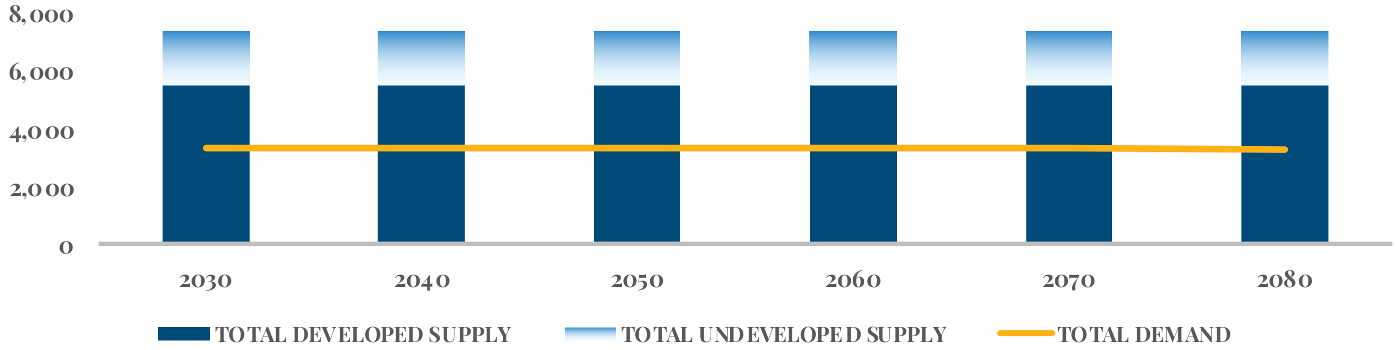
per TWDB Population Projections

2030	7,322
2040	6,728
2050	6,204
2060	5,805
2070	5,410
2080	5,019

Your County Water Demand (acre-feet)



Your Available Water Supply (ac-ft/yr)

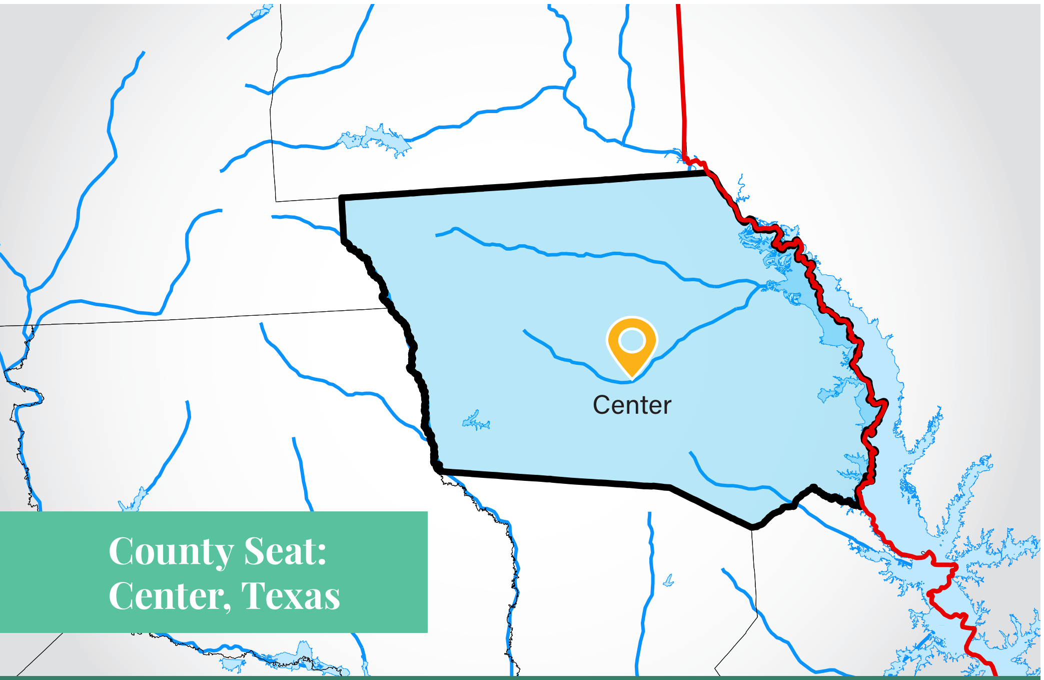


San Augustine County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Municipal	No Water Shortage Identified
Manufacturing	No Water Shortage Identified
Irrigation	No Water Shortage Identified
Steam Electric Power	No Demand Projected
Livestock	No Water Shortage Identified
Mining	No Water Shortage Identified

Shelby County

The East Texas Water Planning Area (Region I)



County Seat: Center, Texas

Shelby County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Center
- Choice WSC
- County-Other, Shelby
- East Lamar WSC
- Five Way WSC
- Flat Fork WSC
- Huxley
- Joaquin
- McClelland WSC
- Sand Hills WSC
- Tenaha
- Timpson

Your Water-Dependent Economy:

Agriculture
Hydrocarbon Production
Recreation

Your Water Sources:

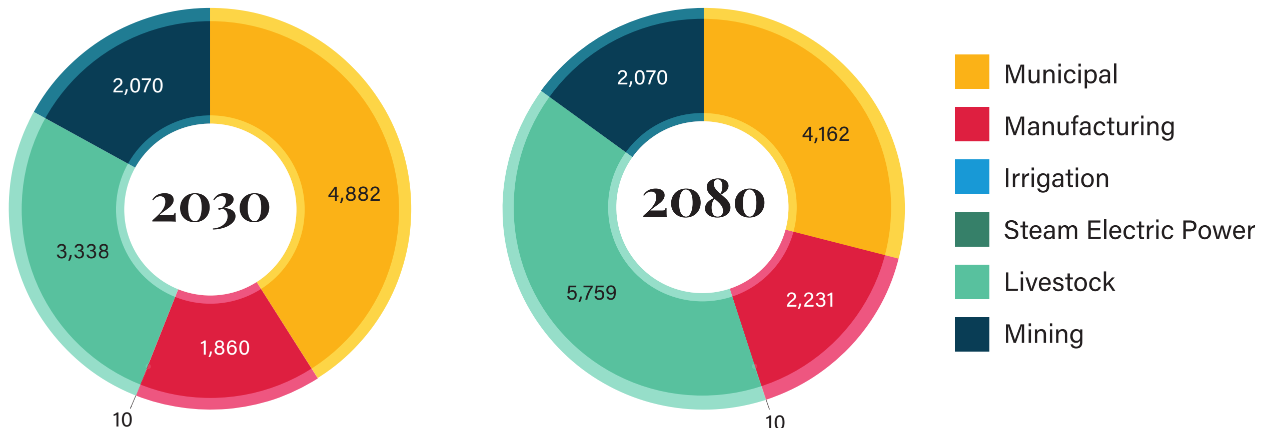
Direct Reuse
Groundwater Wells
Lake Center
Lake Timpson
Queen City Aquifer
Local Supplies
Pinkston Reservoir
Carrizo-Wilcox Aquifer
Neches River

Projected Growth

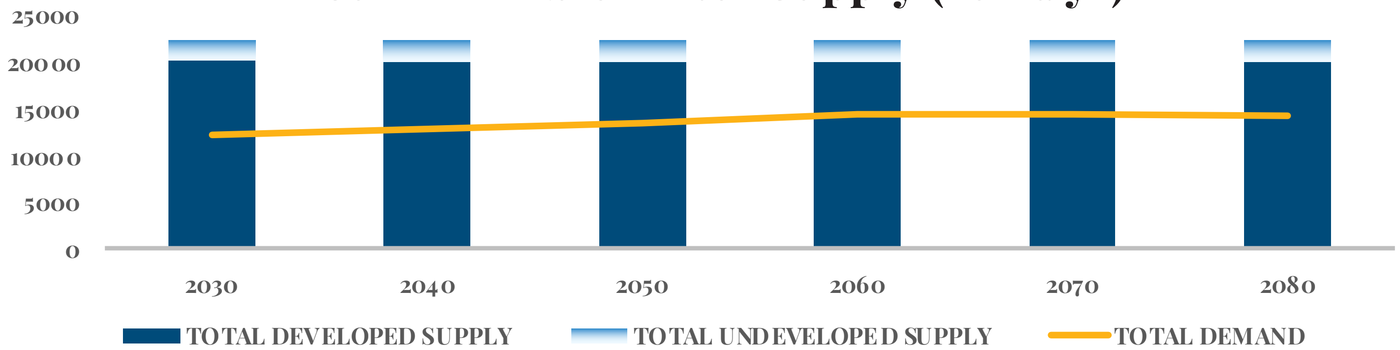
per TWDB Population Projections

2030	23,697
2040	23,320
2050	22,721
2060	22,141
2070	21,567
2080	20,999

Your County Water Demand (acre-feet)



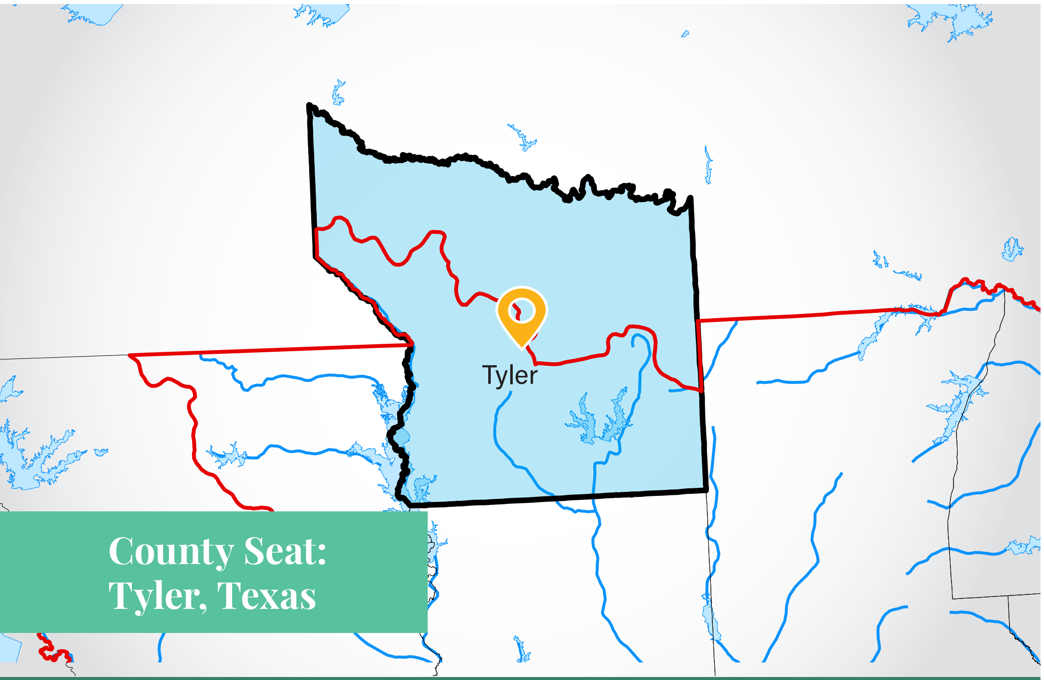
Your Available Water Supply (ac-ft/yr)



Shelby County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Municipal	No Water Shortage Identified, WMS - Municipal Conservation
Manufacturing	Water Shortage Identified, WMS - Purchase Additional Supply from Center
Irrigation	No Water Shortage Identified
Steam Electric Power	No Demand Projected
Livestock	No Water Shortage Identified
Mining	No Water Shortage Identified

Smith County



County Seat: Tyler, Texas

This county is split between more than one TWDB regional water planning area. The projections shown in these summary sheets represent data for the portion of the county that falls within the East Texas Regional Water Planning Area.

Smith County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Arp
- Bullard
- Carroll WSC
- County-Other, Smith
- Crystal Systems Texas
- Dean WSC
- Emerald Bay MUD
- Jackson WSC
- Lindale
- Lindale Rural WSC
- Southern Utilities
- Troup
- Tyler
- Walnut Grove WSC
- Whitehouse
- Wright City WSC

Your Water-Dependent Economy:

Education
Industry
Livestock
Medical

Your Water Sources:

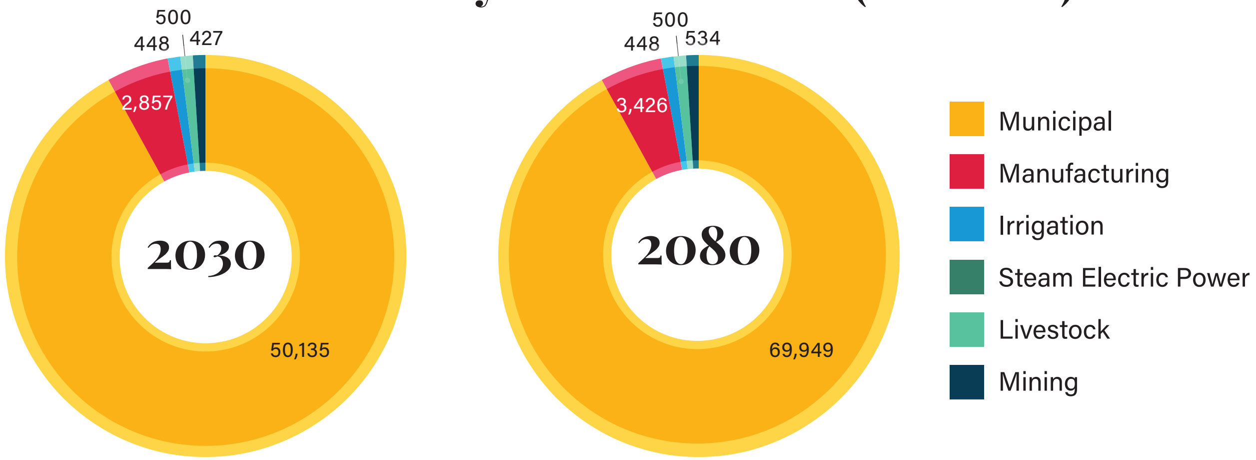
Groundwater Wells
Bellwood Lake
Lake Tyler/Tyler East
Local Supplies
Sparta Aquifer
Neches River
Carrizo-Wilcox Aquifer
Queen City Aquifer
Pelestine Lake

Projected Growth

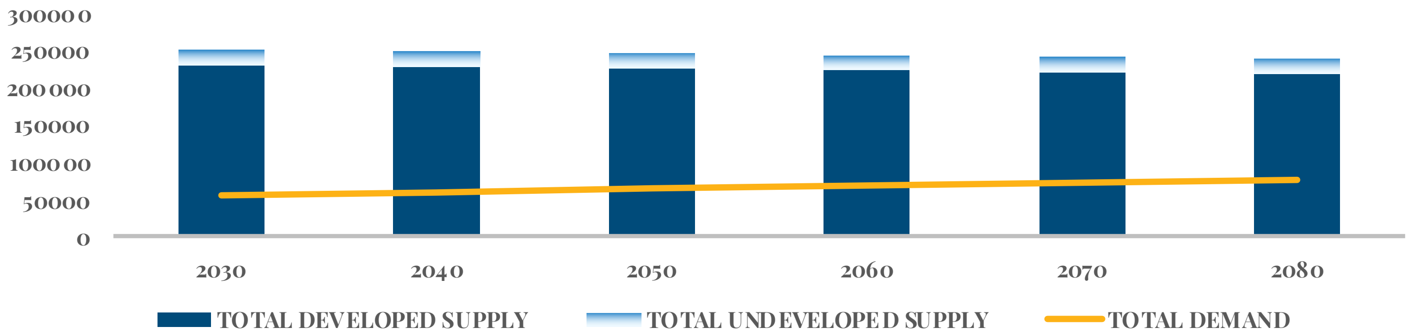
per TWDB Population Projections

2030	210,383
2040	229,453
2050	248,636
2060	259,642
2070	271,158
2080	283,249

Your County Water Demand (acre-feet)



Your Available Water Supply (ac-ft/yr)

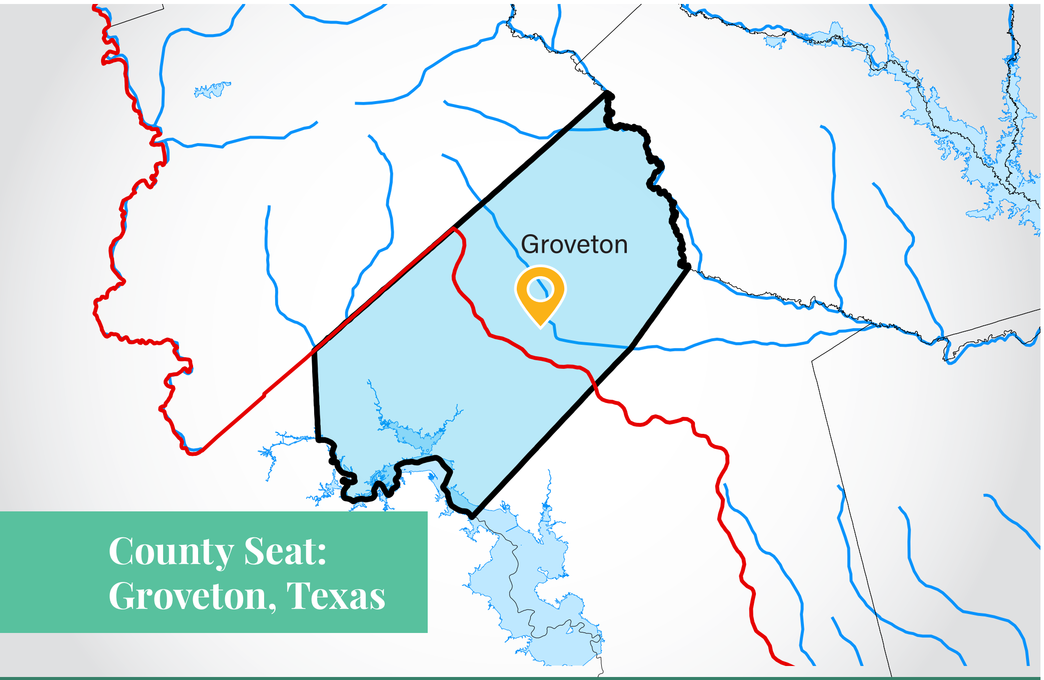


Smith County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
County-other, Smith	Purchase from Tyler, Municipal Conservation
Southern Utilities	WMS - Ammend Contract with Tyler, Municipal Conservation
Whitehouse	WMS - No Water Shortage Identified
Manufacturing	Water Shortage Identified, WMS - Purchase Additional Supply from Tyler
Irrigation	No Water Shortage Identified
Steam Electric Power	No Demand Projected
Livestock	No Water Shortage Identified
Mining	Water Shortage Identified, WMS - Purchase Additional Supply from Tyler

Trinity County

The East Texas Water Planning Area (Region I)



County Seat: Groveton, Texas

This county is split between more than one TWDB regional water planning area. The projections shown in these summary sheets represent data for the portion of the county that falls within the East Texas Regional Water Planning Area.

Trinity County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Centerville WSC
- County-Other, Trinity
- Groveton
- Pennington WSC

Your Water-Dependent Economy:

Agriculture
Livestock

Your Water Sources:

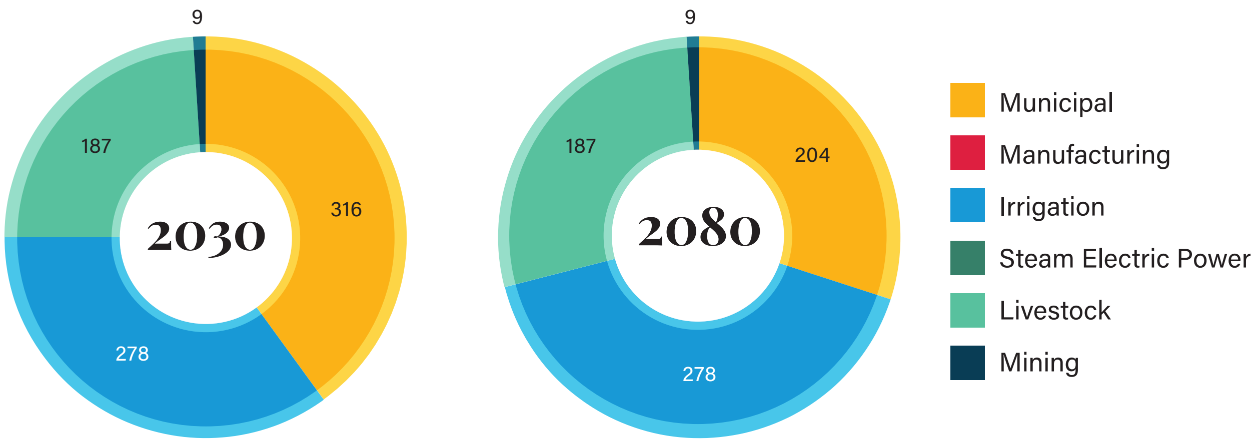
Groundwater Wells
Local Supplies
Neches River
Queen City Aquifer
Sparta Aquifer
Yegua-Jackson Aquifer
Carrizo-Wilcox Aquifer

Projected Growth

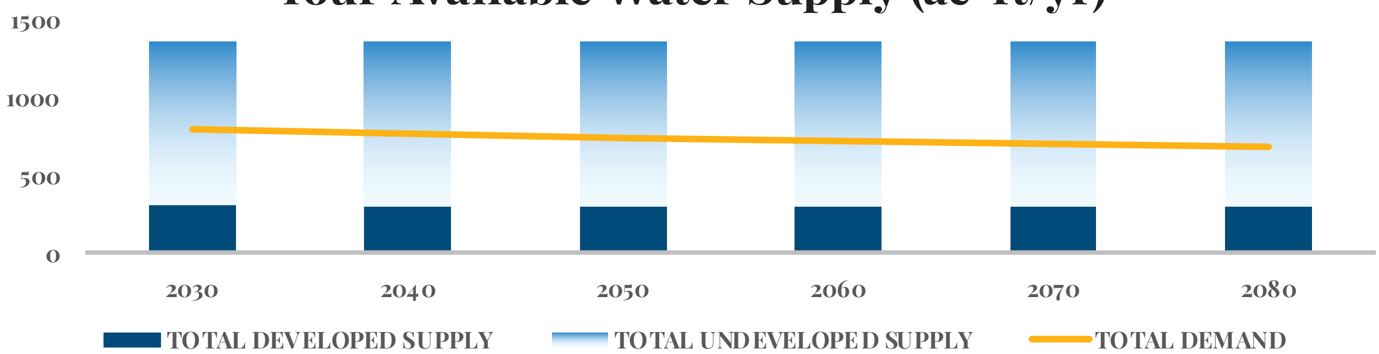
per TWDB Population Projections

2030	2,945
2040	2,757
2050	2,578
2060	2,460
2070	2,343
2080	2,227

Your County Water Demand (acre-feet)



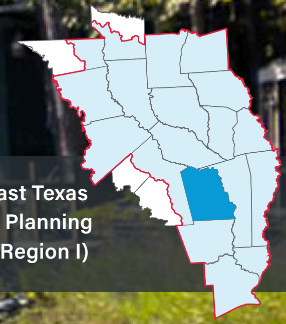
Your Available Water Supply (ac-ft/yr)



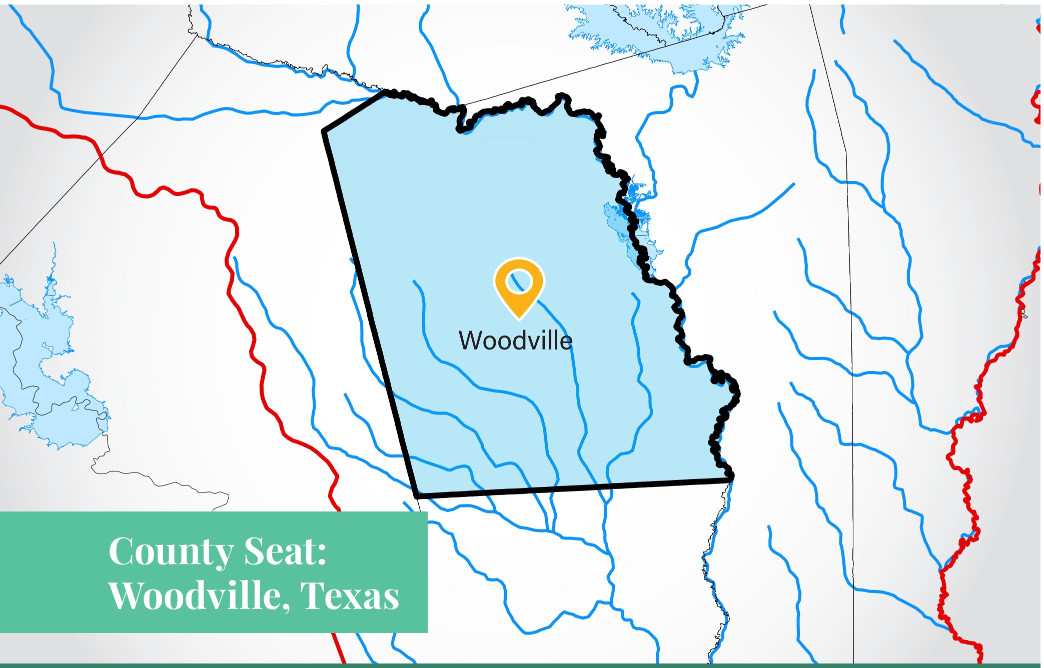
Trinity County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Municipal	No Water Shortage Identified, WMS - Municipal Conservation
Manufacturing	No Demand Projected
Irrigation	Water Shortage Identified, WMS - Additional Wells in Yegua Jackson Aquifer
Steam Electric Power	No Demand Projected
Livestock	No Water Shortage Identified
Mining	No Water Shortage Identified

Tyler County



The East Texas Water Planning Area (Region I)



County Seat: Woodville, Texas

Tyler County at a Glance

Chair:
John Martin

1st Vice Chair:
David Alders

Your Municipal Water Users:

- Chester WSC
- Colmesneil
- County-Other, Tyler
- Cypress Creek WSC
- Seneca WSC
- Tyler County SUD
- Warren WSC
- Woodville

Your Water-Dependent Economy:

Agriculture
Timber

Your Water Sources:

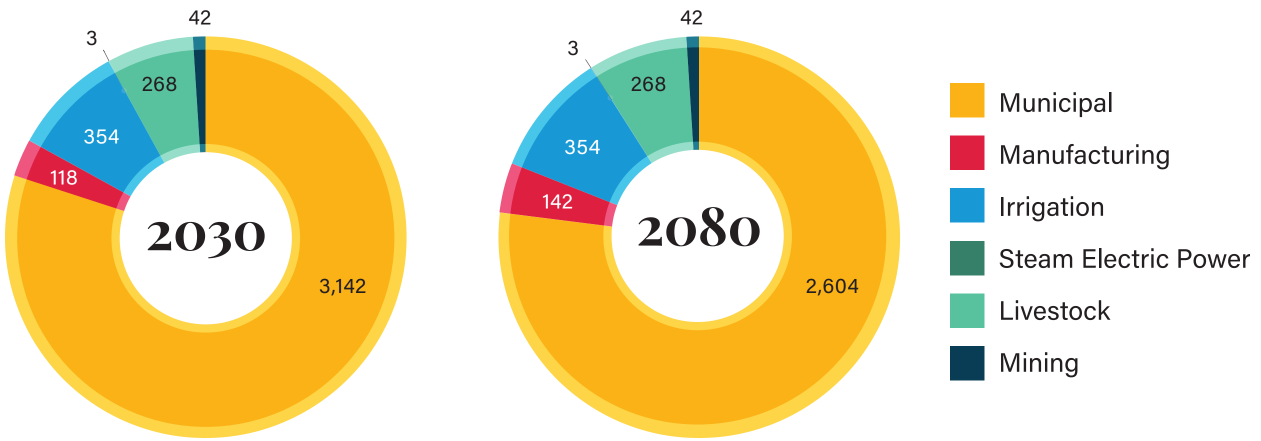
Gulf Coast Aquifer
Groundwater Wells
Neches Run-of-River Supplies
Local Supplies
Yegua-Jackson Aquifer

Projected Growth

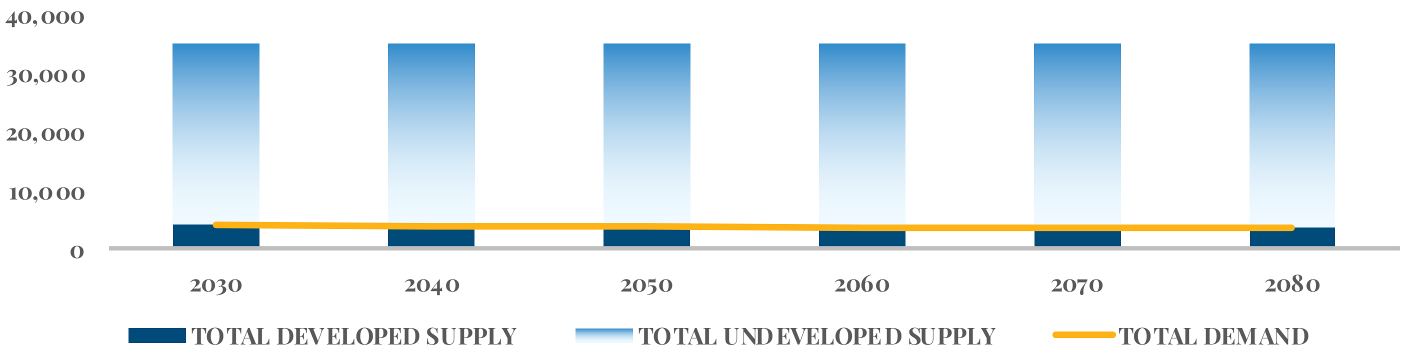
per TWDB Population Projections

2030	18,808
2040	17,694
2050	16,657
2060	15,861
2070	15,073
2080	14,293

Your County Water Demand (acre-feet)



Your Available Water Supply (ac-ft/yr)



Tyler County - Your Water User Groups with Identified Needs

Water User Group	Water Management Strategy
Municipal	No Water Shortage Identified, WMS - Municipal Conservation
Manufacturing	Water Shortage Identified, WMS - Additional Wells in Gulf Coast Aquifer
Irrigation	No Water Shortage Identified
Steam Electric Power	No Water Shortage Identified
Livestock	No Water Shortage Identified
Mining	No Water Shortage Identified

Chapter 1: Description of Region
2026 Initially Prepared Plan

Prepared for:
East Texas Regional Water Planning Group

February 2025

Chapter 1. Description of Region

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Appendix 1-A: Species of Special Concern in the East Texas Regional Water Planning Area

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LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AFY	acre-feet per year
BMP	best management practice
cfs	cubic feet per second
CWA	Clean Water Act
ETRWPA	East Texas Regional Water Planning Area
ETRWPG	East Texas Regional Water Planning Group
°F	Degrees Fahrenheit
ft	foot
ft/yr	foot per year
gcd	gallons per connection per day
GCD	Groundwater Conservation District
GMA	groundwater management area
GPCD	gallons per capita daily
LNG	liquefied natural gas
MSA	Metropolitan Statistical Areas
MUD	Municipal Utility District
MWA	Municipal Water Authority
MWP	Major Water Provider
NRCS	National Resources Conservation Service
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SRA	Sabine River Authority
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TCF	trillion cubic feet
TPWD	Texas Parks and Wildlife Department
TTWP	Trans-Texas Water Program
TWDB	Texas Water Development Board
USA	United States of America
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMS	Water Management Strategy
WUG	Water User Group
WWP	Wholesale Water Provider

Chapter 1. Description of Region

1 DESCRIPTION OF REGION

The East Texas Regional Water Planning Area (ETRWPA) is one of sixteen areas established by the 1997 Texas legislature Senate Bill 1 for the purpose of State water resource planning at a regional level on five-year planning cycles. The first regional water plan was adopted in 2001. Since that time, it was updated in 2006, 2011, 2016, and 2021. This plan, the 2026 Regional Water Plan (2026 Plan), is the result of the 6th cycle of regional water planning.

Pursuant to the formation of the ETRWPA, the East Texas Regional Water Planning Group (ETRWPG or RWPG), was formed and charged with the responsibility to evaluate the region's population projections, water demand projections, and existing water supplies for a 50-year planning horizon. The RWPG then identifies water shortages under drought of record conditions and recommends water management strategies. This planning is performed in accordance with regional and state water planning requirements of the Texas Water Development Board (TWDB).

This chapter provides details for the ETRWPA relevant to water resource planning, including: a physical description of the region, climatological details, population projections, economic activities, sources of water and water demand, and regional resources. A discussion of threats to the region's resources and water supply, a general discussion of water conservation and drought preparation in the region, and a listing of ongoing state and federal programs in the ETRWPA that impact water planning efforts in the region are also provided.

1.1 GENERAL INTRODUCTION

The ETRWPA consists of all or portions of 20 counties located in the Neches, Sabine, and Trinity River Basins, and the Neches-Trinity Coastal Basin. The region extends from the southeastern corner of the state for over 150 miles north and northwest as illustrated in Figure 1.1. The ETRWPA consists of approximately 10,329,800 acres of land and accounts for roughly six percent of total area of the State of Texas.

Figure 1.1 Location Map

Note: Shapefile provided by Texas Water Development Board.

By statute, the RWPG consists of members from at least 12 of the following statutorily required interests: public, counties, municipalities, industries, agriculture, environmental, small business, electric-generating utilities, river authorities, water districts, water utilities, and groundwater management areas. These voting, and several non-voting members, collectively represent the water supply interests of the entire region.

The City of Nacogdoches is the administrative contracting agency for the RWPG. The RWPG has retained the services of a team of water-supply consulting engineering firms to prepare the 2026 Plan including Plummer Associates, Inc. as the lead consultant, Freese & Nichols, Inc. as a subconsultant, and Advanced Groundwater Consultants as a subconsultant groundwater specialist. Table 1.1 provides a current list of the RWPG representatives involved in developing the 2026 Regional Water Plan.

Table 1.1 East Texas Regional Water Planning Group Members

Voting Members	
Category	**Name**
Agriculture	David Alders, Carrizo Creek Corporation
	Matthew Mettauer, *Mettauer Law*
Counties	Judge Chris Davis, *Cherokee County*
	Fred Jackson, Jefferson County
Electric Power	Michael Snyder, Entergy Services, LLC
Environmental	Dr. Matthew McBroom, Stephen F. Austin State University
Groundwater Management Areas	John McFarland, *Rusk County GCD*
	John Martin, Southeast Texas GCD
Industries	David Gorsich, Exxon Mobil Corporation
	Vacant
Municipalities	Kate Dietz, City of Tyler
	Vacant
Public	Terry D. Stelly
	Jenny Sanders
River Authorities	David Montagne, Sabine River Authority (SRA)
	Monty Shank, Upper Neches River MWA
	Kelley Holcomb, Angelina-Neches River Authority
	Scott Hall, Lower Neches Valley Authority
Small Business	Christopher L. Wiesinger
	Vacant
Water Districts	David Miller
Water Utilities	Robb Starr, Lumberton MUD Vacant
Non-Voting Members	
Lann Bookout, Texas Water Development Board	Stephen Lange, Texas Parks & Wildlife Department
Manuel Martinez, Texas Department of Agriculture	Trey Watson, Texas State Soil & Water Conservation Board
Kathy Sauceda, Texas Commission on Environmental Quality	Ronald Hebert, Texas Commission on Environmental Quality
Leroy Biggers, Texas Commission on Environmental Quality	

Table 1.1 East Texas Regional Water Planning Group Members (Cont.)

Committees	
Executive Committee	
Chair – John Martin Vice Chair – David Alders Secretary –Terry D. Stelly	At-Large – Matthew McBroom At-Large – Kelley Holcomb
Nominations Committee	**By-Laws Committee**
Chair – Monty Shank Member – Chris Davis Member – John McFarland Member – Fred Jackson Member – Chris Weisinger Ex-Officio – Kelley Holcomb	Chair – David Alders
Finance Committee	**Technical Committee**
Chair – Kelley Holcomb Member – John McFarland	Chair – Scott Hall Member – John Martin Member – Matthew McBroom

Notes:

1) Sourced from East Texas Regional Water Planning Group.
2) Municipal Water Authority (MWA)

1.1.1 Physical Description

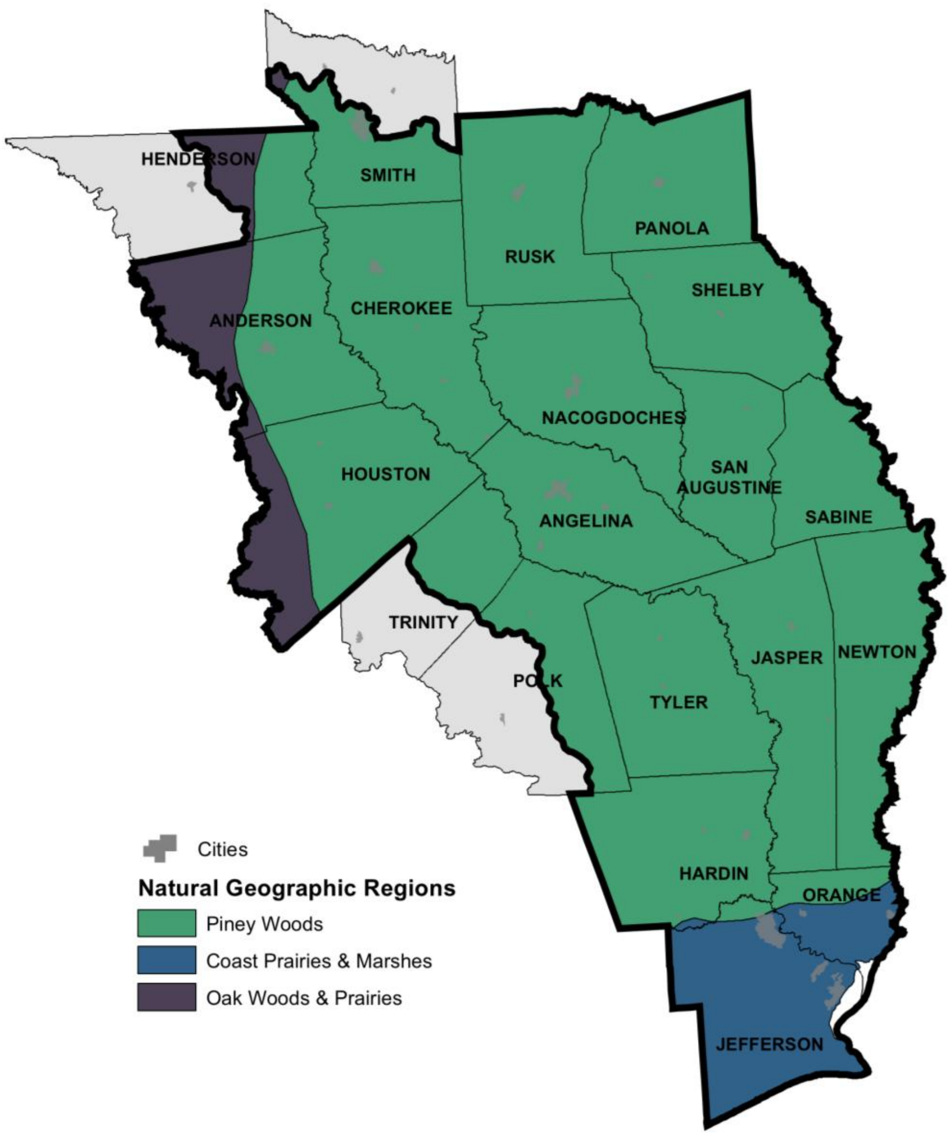
The ETRWPA is generally characterized by rolling to hilly surface features, except near the Gulf Coast. The elevation in the region varies from sea level at its southern boundary on the Gulf of Mexico to 763 ft mean sea level at Tater Hill Mountain in Henderson County at its far northwest corner. The region is further subdivided into natural geographic areas known as the Piney Woods, the Oak Woods and Prairies, and the Coastal Prairies, described as follows.

Piney Woods. The majority of the ETRWPA falls within the Piney Woods portion of the Texas Gulf Coastal Plain. Pine is the predominant timber of this region, although some hardwood timbers can be found as well, primarily in the valleys of rivers and creeks. Longleaf, shortleaf, and loblolly pine are native to the region and slash pine, an introduced species, is widely dispersed. Hardwoods include a variety of oaks, elm, hickory, magnolia, sweetgum, and blackgum. Lumber production is the principal industry of the area and practically all of Texas' commercial timber production comes from the Piney Woods region. The soils and climate are adaptable to the production of a variety of fruit and vegetable crops. Cattle ranching is widespread and generally accompanied by the development of pastures. Economic growth in the area has also been greatly influenced by the large oil field discoveries in Rusk and Smith counties in 1931. This area has a variety of clays, lignite coal, and other minerals that have potential for development.

Oak Woods and Prairies. Most of the northwestern portions of the ETRWPA (parts of Smith, Henderson, Anderson, and Houston counties) fall within the Oak Woods and Prairies portion of the Texas Gulf Coastal Plains. Principal trees of this area are hardwoods, including post oak, blackjack oak, and elm. Riparian areas often have pecan, walnut, and other trees with high water demands. Upland soils are sandy and sandy loam, while the bottomlands are sandy loam and clay. The Oak Woods and Prairies are somewhat spotty in character, with some insular areas of blackland soil and others that closely resemble those of the Piney Woods. The principal industry of the area is diversified farming and livestock raising. The Oak Woods and Prairies region also has lignite, commercial clays, and other minerals.

Coastal Prairies. The southern portion of the ETRWPA (largely Jefferson and Orange counties) is located within the segment of the Texas Gulf Coastal Plains known as the Coastal Prairies. In general, this area is covered with a heavy growth of grass, and the line of demarcation between the prairies and the Pine Belt forests is very distinct. Soil of the Coastal Prairies is predominantly heavy clay. Cattle ranching is the principal agricultural industry, although significant rice production is also present. The Coastal Prairie has seen a large degree of industrial development that continues today. The chief concentration of this development has been from the city of Orange and the areas between the cities of Beaumont and Houston; much of the development has been in petrochemical manufacturing.

Figure 1.2 depicts the boundaries of these areas within the ETRWPA. Additional description of the region is provided later in this chapter.



Note: Natural Geographic Regions shapefile obtained from the Texas Natural Resource Information System.

Figure 1.2 Natural Geographic Regions

1.1.2 Climate

Data from National Weather Service Stations compiled by the Texas State Climatologist indicate that the mean temperatures for the entire region varied from a minimum January temperature of 35 °F in the northern portion of Region I, including Henderson, Smith, Rusk, and Panola counties, to a maximum July temperature of 95 °F in Cherokee County and western portion of the Anderson and Houston Counties.[1] Similarly, the average growing season from 1981 to 2010 was 252 days in the ETRWPA.[2]

Precipitation generally increases from the northwest to southeast corners of the region, while evaporation increases in the opposite direction. Annual rainfall across the ETRWPA averaged 51.7 inches from 1991 through 2020, with the highest average rainfall (61.4 inches) being recorded in the southwest corner of Quadrant 714 and the lowest average rainfall (40.4 inches) being recorded in Quadrant 611. From 1991 to 2020 the average annual gross reservoir evaporation (the rate of evaporation from a reservoir) ranges from approximately 47 inches in the southeast to 61 inches in the northwest.[3]

Figure 1.3, Figure 1.4, and Figure 1.5 depict mean annual temperature, mean annual precipitation, and gross reservoir evaporation, respectively for the ETRWPA.

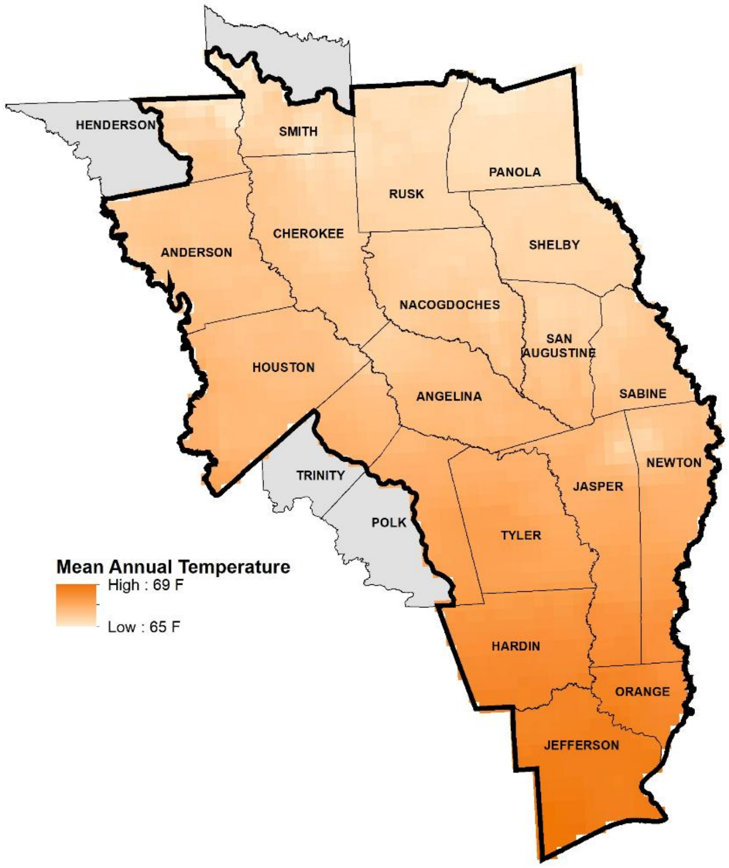


Figure 1.3 Mean Annual Temperature

Note: Sourced from PRISM Climate Group

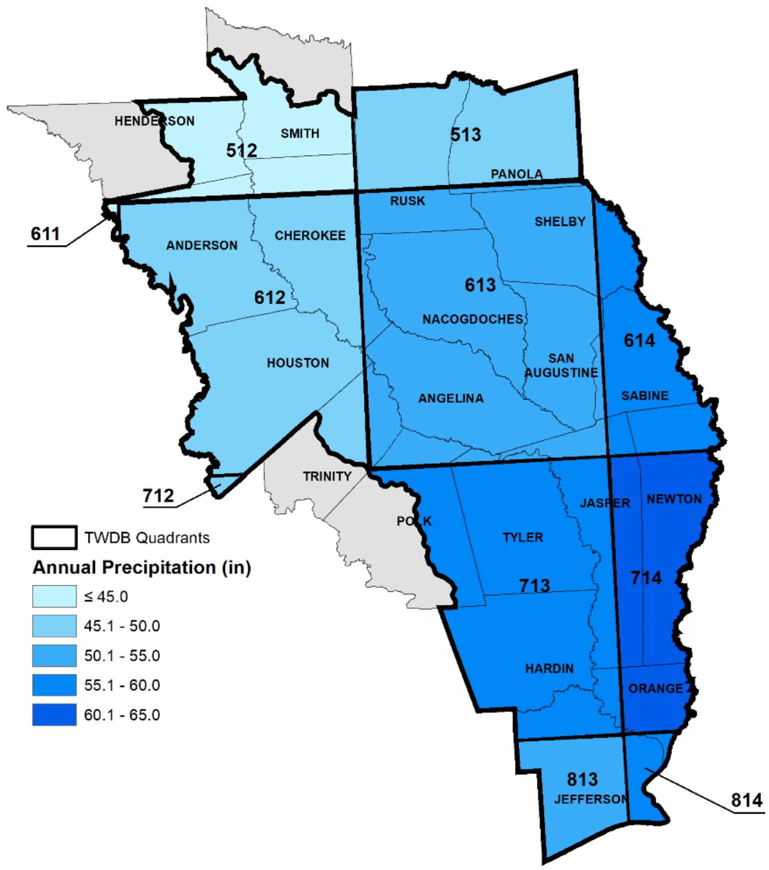


Figure 1.4 Mean Annual Precipitation

Note: Sourced from Texas Water Development Board

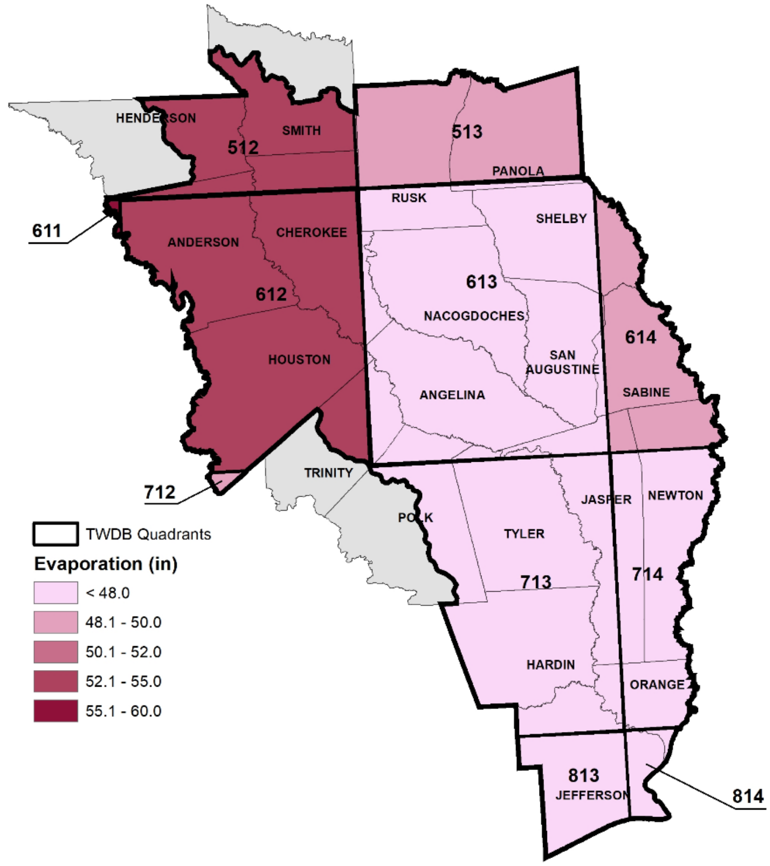


Figure 1.5 Gross Reservoir Evaporation

Note: Sourced from Texas Water Development Board

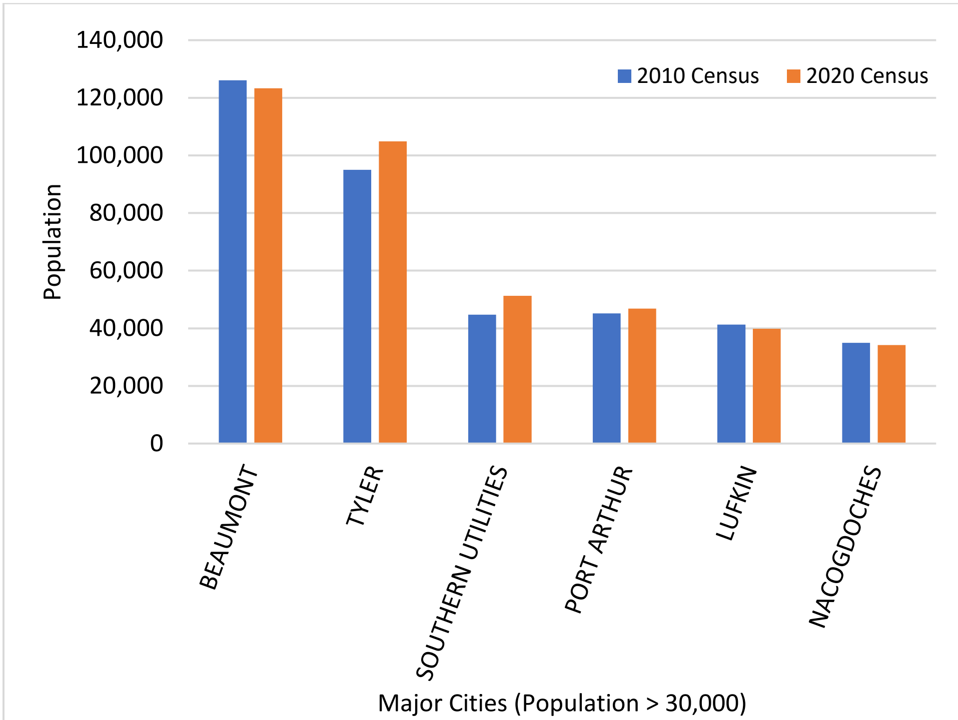
1.1.3 Population

The ETRWPA contains all or parts of four Metropolitan Statistical Areas (MSA) as defined by the Office of Management and Budget; an MSA is an urban area with a population of 50,000 or more.[4] The MSAs in the ETRWPA include:

- Beaumont-Port Arthur MSA (Jefferson, Orange, and Hardin counties).
- Most of the Tyler MSA (portion of Smith County in Neches basin).
- Most of the Southern Utilities Company MSA (Rusk and Gregg Counties).
- Part of the Longview MSA (Rusk County).

As of 2020, the combined population of the first three MSAs, with their primary population residing in Region I, accounts for approximately 30 percent of the total ETRWPA population, after adjusting for the regional split.

The population in the region increased approximately 3 percent from 2010 through 2020, to approximately 1.08 million people. Growth in the region is expected to continue at an average rate of approximately 6 percent per decade to approximately 1.17 million by 2080. The census data from 2010 and 2020 for the region's major cities are provided in Figure 1.6. Additional details on population projections developed by the TWDB are provided in Chapter 2 and Appendix ES-A, Report 01.



Notes:

1) The population shown herein represents the total population of each city and is not split by regional planning area.
2) Data sourced from U.S. Census Bureau

Figure 1.6 Historical Populations of Major Cities

1.1.4 Economic Activity

The overall economy of the region consists primarily of agriculture, agribusiness, mineral production, wholesale and retail trade, and manufacturing. Manufacturing includes the timber and petrochemical industries. Major water-using industries and irrigated crops in the ETRWPA are listed in Table 1.2.

Table 1.2 Economic Sectors Heavily Dependent on Water Resources

Use Category	Detail
Irrigation	Hay
	Rice
	Soybeans
	Vegetables
Livestock	Poultry
	Cattle
Manufacturing	Timber, Pulpwood, and Forest Fiber
	Chemical and Allied Products
	Petroleum Refining
Mining	Oil and Gas Production

Note: Sourced from East Texas Regional Water Planning Group

The Beaumont-Port Arthur MSA, at the southern end of the region, has an economy based primarily on petroleum refining and chemical plants including petrochemicals. Other industries include a steel mill and paper mills, correctional facilities, as well as other timber products industries in Hardin and Tyler counties.

Several seaports are located in the cities of Beaumont, Port Arthur, and Orange, plus several industrial docks, along with small amounts of shipyard activity. Agriculture in the area includes cattle, rice, and soybeans. Oil and gas production are significant.

Four campuses of the university system of the State of Texas are located in the area. Beaumont contains Lamar University and the adjacent Lamar Institute of Technology. Lamar State College-Port Arthur and Lamar State College-Orange are located in Port Arthur and Orange, respectively.

The majority of the Longview MSA is located just outside the region, north of Rusk County. It is centered in Longview in Gregg County. However, the area includes very diversified manufacturing located within the ETRWPA in Rusk County. Rusk County manufacturing includes brick manufacturing, power generation, steel fabrication, fiberglass specialties, and timber industry. Rusk County also has state correctional facilities. No major ETRWPA cities are located in this area.

The Tyler MSA, consisting of Smith County, lies partially within the northern end of the region. Tyler, the only major city in the area, lies almost entirely within the ETRWPA. Local manufacturing includes air conditioning/heating equipment, cast iron pipe, tires, and meatpacking, including poultry processing. Known as the "Rose Capital," Tyler has a thriving commercial rose industry as well. Tyler is home to Tyler Junior College and the University of Texas at Tyler, and the city is a growing hub for the health-care industry and retail in East Texas. Oil production is prevalent in the area.

Lufkin, Lumberton, and Nacogdoches, the other major cities in the ETRWPA, do not presently classify as MSAs. However, the populations in these areas are both projected to be over 40,000 in this cycle of population projections. These cities, located in adjacent counties, have many similarities including timber products industries, poultry processing, higher education, and health care service providers. Nacogdoches also has manufacturers of valves, transformers, sealing products, and motor homes. Stephen F. Austin State University is located in Nacogdoches.

Economic activity for the remainder of the region includes timber industry, including numerous timber processing mills. Natural gas and some oil productions are scattered throughout the region, and beef cattle production is prominent, being found in all counties in the region. Plant nurseries are common in the north part of the region. Poultry production and/or processing are prevalent in Anderson, Shelby, Nacogdoches, Angelina, San Augustine, Houston, Cherokee, Smith, Rusk, and Panola counties. There is diverse manufacturing in addition to timber industries. Commercial fishing is an important economic characteristic of Sabine Lake. Tourism, fishing, and hunting are important in many areas, especially on the large reservoirs in the center of the region, further to the south near Sabine Lake and the Gulf of Mexico, and in many forested areas including three National Forests, four State Forests, and the Big Thicket National Preserve.

Information from the Texas Workforce Commission indicates in 2022, unemployment rates in Region I varied from 3.4 percent in Anderson County to 7.0 percent in Sabine County. The averages annual pay per job by county in Region I varies significantly, from as high as $63,901 in Jefferson County to as low as $38,591 in Tyler County. In addition, other counties with higher average annual pay per job, ranked in descending order, include Houston, Orange, and Anderson counties, all exceeding $55,000; counties with lower average annual pay per job, ranked in descending order, include Cherokee, Henderson, Sabine, Tyler, and Newton, all below $45,000.[5]

Of the three workforce areas overlapping the region, the current average annual wages as of September 2023 were as follows: [5]

- East Texas (northern counties): $50,558
- Deep East Texas (middle counties): $38,792
- Southeast Texas (Beaumont-Port Arthur metropolitan area): $53,560

1.2 CURRENT WATER DEMANDS

The demand for water in the ETRWPA is expected to grow from 755,106 ac-ft per year in 2030 to 987,594 ac-ft per year in 2080. The water demands considered in the regional water planning process are categorized into six major user groups: municipal, manufacturing, irrigation, steam electric, livestock and mining. A more detailed description for each user group is found in Chapter 2.

Most demand in the region centers on larger cities or metropolitan areas. Over half of the current and projected water demand lies in Jefferson and Orange counties in southeast Texas. In these two areas, dominant water usages are manufacturing and irrigation, with a substantial portion located in Jefferson County. However, large volumes of water use can occur away from large cities too, as in the case of outlying industries and steam-electric power generating plants.

For purposes of the 2026 Plan, major demand centers have been selected according to varying criteria. A county was selected if its total water usage (without depending on a single industry) exceeded 40,000 ac-ft per year. In counties not selected, a single industry was selected if it had 20,000 ac-ft per year or more in 2020 and represented the majority of usage in the county. As summarized in Table 1.3, there are currently three major demand centers in the ETRWPA located in Jasper, Jefferson, and Smith counties.

Table 1.3 Major Demand Centers

County	Water User Group	2020 Historical Demand (ac-ft/yr)
Jasper	Manufacturing	50,999
Jefferson	Irrigation	69,250
	Manufacturing	122,131
	Municipal	49,072
Smith	Municipal	47,629

Note: Sourced from Texas Water Development Board.

1.3 SOURCES OF WATER

The ETRWPA primarily sources its supplies from groundwater and surface water. Springs within the region can also be an important source of water for some uses. Following is a summary of groundwater, springs, and surface water sources within the ETRWPA. Historical average pumping values for aquifers were obtained from the Historical Groundwater Pumpage Estimates report developed by the TWDB.[6]

1.3.1 Groundwater

The TWDB has identified two major aquifers and three minor aquifers in the region. The difference between the major and minor classification, as used by the TWDB, relates to the total quantity of water produced from an aquifer and not necessarily the total volume available.

The two major aquifers underlie the region are known as the Carrizo-Wilcox and the Gulf Coast aquifers. The three minor aquifers, the Queen City, Sparta, and Yegua-Jackson aquifers, supply lesser amounts of water to the region. Figure 1.7and Figure 1.8 show the locations of the major and minor aquifers, respectively.

The following generalized descriptions of the characteristics and quality of major and minor aquifers in the ETRWPA are based largely on the work of TWDB. Groundwater quality is affected by natural conditions as well as man-made contamination. According to the Texas Commission on Environmental Quality (TCEQ), "natural contamination probably affects the quality of more groundwater in the state than all other sources of contamination combined."[7] A more thorough discussion of groundwater availability is provided in Chapter 3.

Gulf Coast Aquifer. The Gulf Coast Aquifer is a major aquifer forming an irregularly shaped belt along the Gulf of Mexico from Florida to Mexico. In Texas, this aquifer provides water to all or parts of 54 counties, including 8 counties in the ETRWPA. It extends from the Rio Grande northeastward to the borders with Louisiana. The Gulf Coast Aquifer provides the sole source of groundwater in the seven southern counties of the region.

The Gulf Coast Aquifer contains various interconnected layers, some of which are aquicludes (impervious clay or rock layers). From bottom to top, the four main water-producing layers are the Catahoula, Jasper, Evangeline, and Chicot layers, with the Evangeline and Chicot being the main sources of groundwater in southeast Texas. Total pumpage from the Gulf Coast Aquifer in the region averaged approximately 72,789 ac-ft per year in years 2016 through 2020.

Water quality in the Gulf Coast Aquifer varies significantly, depending on location. Saltwater intrusion is a significant source of natural contamination because of the proximity of the Gulf of Mexico. Under natural conditions, in the absence of pumping, a layer of saltwater underlies the lighter freshwater layer with a well-defined interface between the two layers. At any given point, especially near the coast, deeper aquifers may be filled with saltwater, very shallow aquifers may contain all freshwater, and an intermediate aquifer may be contained in the interface between the two. In areas near the coast, dissolved salts concentrations are generally in excess of 1,000 parts per million (ppm) and can exceed 10,000 ppm. In areas of the aquifer further from the coast, dissolved salts concentrations can drop to less than 500 ppm.

Heavy pumpage has caused an updip migration, or saltwater intrusion, of poor-quality water into the aquifer beyond its natural limits. Saltwater conditions are a problem in Orange County in the heavily pumped areas around the City of Orange. The previously referenced TCEQ report also indicates high chloride concentrations in most of Jefferson County. Much of the migration is lateral, but some localized vertical coning occurs in wells that draw from levels above the interface between salt and freshwater. In coning, some saltwater is drawn up into the pumping well from below along with the freshwater at the intake level.

In some areas, natural contamination results from substances in the soil or in the aquifer media. Radioactivity is present in groundwater from natural causes, particularly in a belt across the ETRWPA including the area lacking major or minor aquifers designations. Some areas have nuisance substances in the groundwater such as iron, manganese, and sulfates affecting the taste or color of the water.

Man-made aquifer pollution may result from improper waste disposal, leaking underground tanks, wood preservation operations, pesticide use in agriculture, and improperly constructed wells.[7] There is no current evidence indicating water quality problems are directly associated with man-made pollution.

The Gulf Coast Aquifer generally contains good quality water except in portions of Jefferson and Orange counties. The Carrizo-Wilcox Aquifer generally has good water quality except for high dissolved solids in a band along its southern boundary. Iron is a widespread problem, and sulfates and chlorides are found in scattered locations throughout the aquifer. [7]

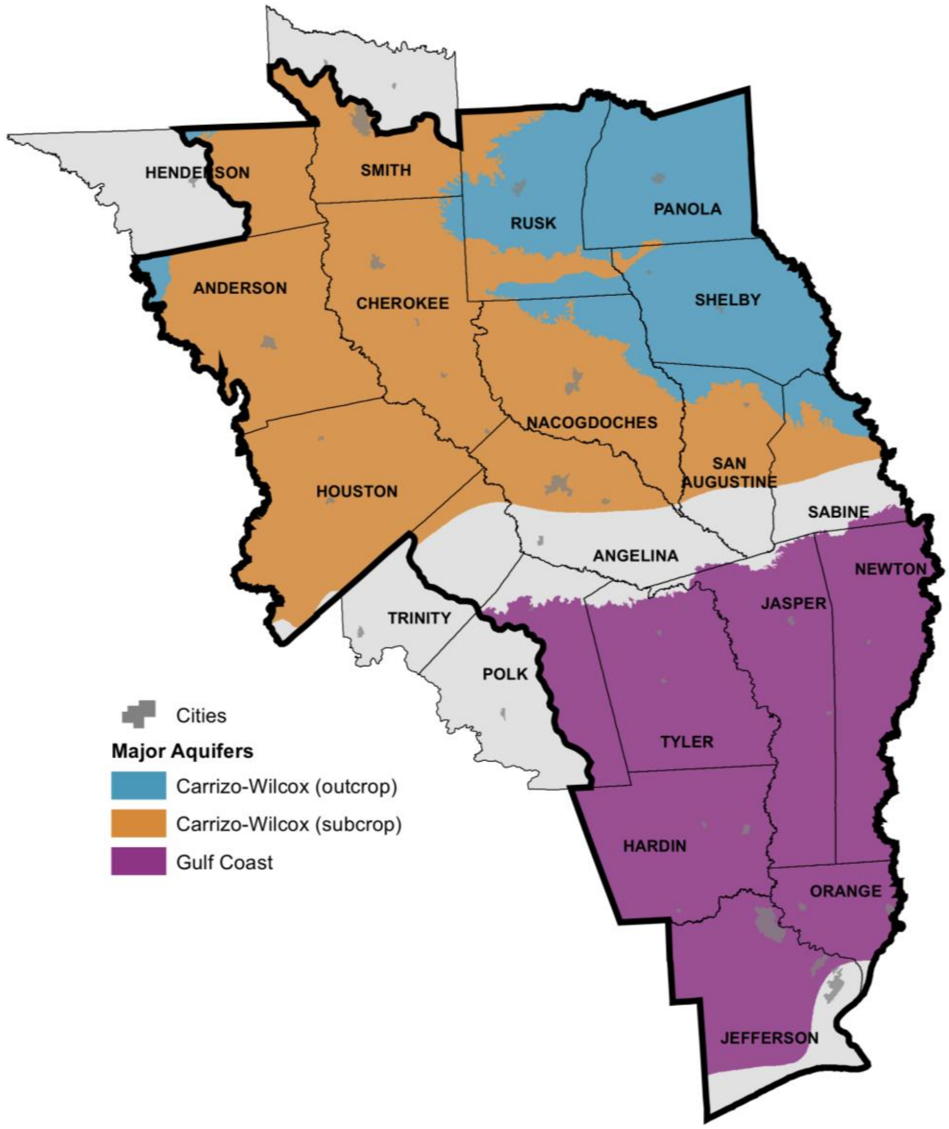


Figure 1.7 Major Aquifers

Note: Sourced from Texas Water Development Board

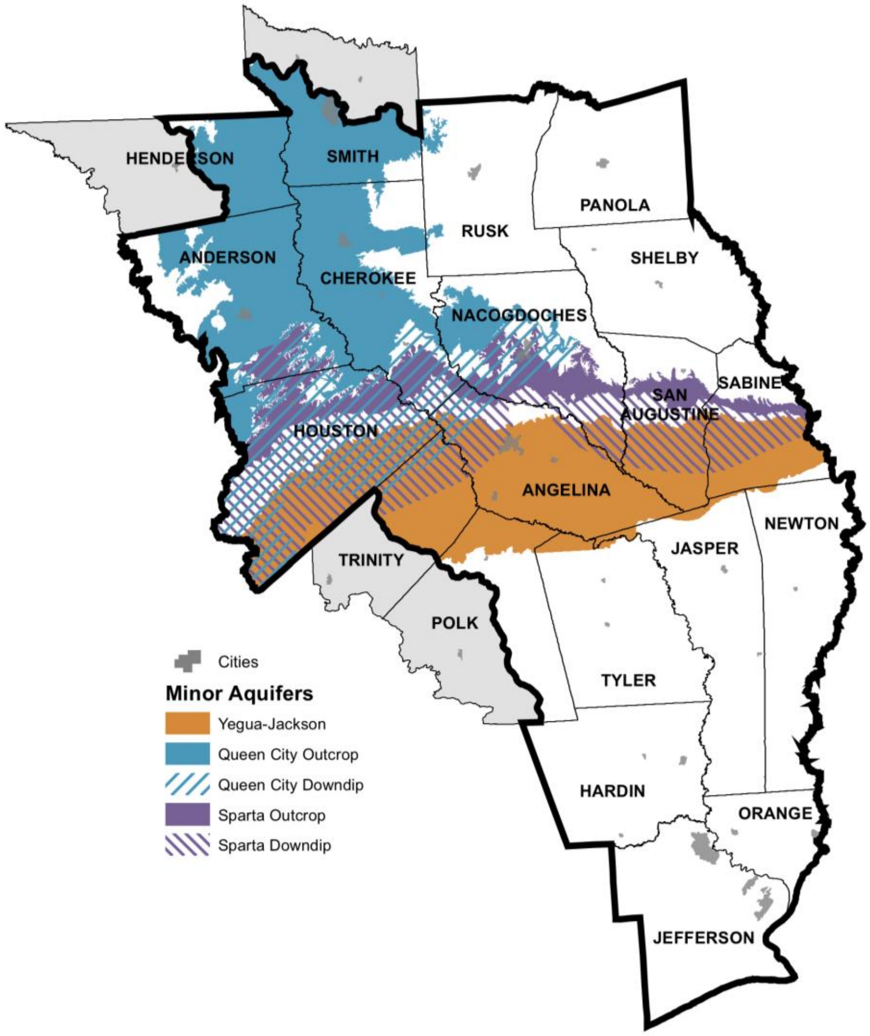


Figure 1.8 Minor Aquifers

Note: Sourced from Texas Water Development Board

Carrizo-Wilcox Aquifer. The Carrizo-Wilcox Aquifer is a major aquifer formed by the hydraulically connected Wilcox Group and the overlying Carrizo Formation of the Claiborne Group. This aquifer extends from the Rio Grande in south Texas northeastward into Arkansas and Louisiana, providing water to all or parts of 60 counties in Texas, including 13 in the ETRWPA. The aquifer in the ETRWPA occurs as a major trough caused by the Sabine Uplift near the Texas-Louisiana border. It is a major source of water supply for the region.

Total groundwater pumpage from the Carrizo-Wilcox Aquifer in the region averaged 74,343 ac-ft per year based on historical pumping for years 2016 through 2020. The largest urban areas dependent on groundwater from the Carrizo-Wilcox are located in central and northeast Texas and include the ETRWPA cities of Lufkin (Angelina County), Nacogdoches (Nacogdoches County), and Tyler (Smith County). Well yields of greater than 500 gallons per minute (gpm) are not uncommon.

In some wells, declines in the artesian portion of the Carrizo-Wilcox in this area have exceeded 300 feet.

However, evaluation of Carrizo-Wilcox wells scattered throughout the region that have been monitored since the 1960s indicates the average water level decline from the 1960s to the 1990s is greater than 50 feet and ranges from approximately 20 feet to greater than 250 feet. Significant water-level declines have occurred in the region around Tyler and the Lufkin-Nacogdoches area.

Large water level declines have also occurred in Smith, Anderson, and Leon counties in the confined portions of the aquifer. Generally, wells located in the northern part of the aquifer have relatively stable groundwater levels.[8]

Much of the pumpage from the Carrizo-Wilcox Aquifer has been for municipal supply, but industrial pumpage is also significant. However, pumpage from industries has generally declined since the 1980s. Total pumpage from the Carrizo in Angelina and Nacogdoches counties has decreased since the 1980s and therefore, water levels have stabilized in these areas. In some wells, water levels have increased, although the wells are still being utilized.

Water quality in the Carrizo-Wilcox Aquifer is generally good. Dissolved solids concentrations are typically less than 500 ppm in outcrop areas; but can be greater than 1,000 ppm in deeper zones. In addition, groundwater in deeper zones often contains iron and manganese at concentrations exceeding the secondary drinking water standards.

Sparta Aquifer. The Sparta Aquifer is a minor aquifer that extends in a narrow band across the state from the Frio River in South Texas northeastward to the Louisiana border in Sabine County. The Sparta Formation is part of the Claiborne Group deposited during the Tertiary Period and consists of sand and interbedded clay with more massive sand beds in the basal section.

Yields of individual wells in the Sparta Aquifer are generally low to moderate, although some high-capacity wells average 400 to 500 gpm. Because the more productive Carrizo Aquifer underlies the Sparta, most public water supply wells and other large production wells are completed in the Carrizo, thus limiting the total pumpage from the Sparta.

Total historical groundwater pumping from the Sparta Aquifer in the region averaged 1,844 ac-ft per year during 2016 through 2020. Relatively large amounts of usable quality groundwater are contained in the Sparta Aquifer. Historically, availability has been considered 5 percent of the average annual rainfall on the aquifer in the Neches and Sabine River basins.

The Sparta Aquifer produces water of excellent quality throughout most of its extent in the region; however, water quality deteriorates with depth in the downdip direction. Water quality can deteriorate at depths greater than 2,000 feet below ground surface. Dissolved salts concentrations in shallower zones average around 300 ppm; and can be around 800 ppm with depth. Iron concentrations are generally high.

Queen City Aquifer. Like the Sparta, the Queen City Aquifer extends in a band across most of Texas from the Frio River in South Texas northeastward into Louisiana. The Queen City Formation is composed mainly of sand, loosely cemented sandstone, and interbedded clays. Although large amounts of usable quality groundwater are contained in the Queen City Aquifer, yields are typically low. A few well yields exceed 400 gpm.

Total historical groundwater pumpage from the Queen City Aquifer in the region averaged 3,880 ac-ft per year during 2016 through 2020. Groundwater levels in most Queen City wells have remained relatively stable, with variations of less than 20 feet. However, the water level in a Wood County well declined approximately 100 feet between 1980 and 2016.

In the Neches, Sulphur, Sabine, and Cypress Creek basins, availability from the Queen City Aquifer based on recharge has been estimated at 5 percent of average annual precipitation. Because of the relatively low well yields, overdrafting of the Queen City Aquifer is generally not a problem.

Throughout most of its extent, the chemical quality of the Queen City Aquifer water is excellent; however, quality deteriorates with depth in the downdip direction. Dissolved salts concentrations in the Queen City Aquifer are generally between 300 and 750 ppm. Dissolved iron concentrations can be high, particularly in northeastern areas of the aquifer.

Yegua-Jackson. The Yegua-Jackson Aquifer extends in a narrow band from the Rio Grande to Louisiana. In the ETRWPA, the aquifer is located in the southern half of Sabine and San Augustine counties, the lower tip of Nacogdoches County, most of Angelina County, the southern portion of Houston County, those portions of Polk and Trinity counties located in the ETRWPA, and small northern portions of Tyler, Jasper, and Newton counties. The Yegua-Jackson Aquifer is a complex association of sand, silt, and clay deposited during the Tertiary Period.

Total historical groundwater pumpage from the Yegua-Jackson Aquifer in the region averaged 5,502 ac-ft per year during 2016 through 2020.

Water quality in the Yegua-Jackson Aquifer varies, with dissolved salts concentrations ranging between 50 and 1,000 ppm in most cases. Iron can be a problem, and the water from at least one location has been described as “sodium bicarbonate water.”

Groundwater Conservation Districts. Groundwater conservation districts (GCDs) were created by the legislature for the purpose expressed in Chapter 36 of the Texas Water Code as follows:

Sec. 36.0015. PURPOSE. In order to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater, and of groundwater reservoirs or their subdivisions, and to control subsidence caused by withdrawal of water from those groundwater reservoirs or their subdivisions, consistent with the objectives of Section 59, Article XVI, Texas Constitution, GCDs may be created as provided by this chapter. Groundwater conservation districts created as provided by this chapter are the state's preferred method of groundwater management through rules developed, adopted, and promulgated by a district in accordance with the provisions of this chapter.

More specifically, these districts are granted authority to regulate the spacing and/or production rate from water wells. In some cases, districts may regulate or prohibit exportation of groundwater from the district, provided the exportation did not begin before June 1, 1997. Districts may impose a fee for water exported from the district.

Districts are required to develop five-year groundwater management plans and to provide the plan (and any amendments) to applicable regional planning groups. Districts must establish permitting systems for new or modified wells and must keep on file copies of drilling logs.

Most counties in the ETRWPA are covered by a GCD. Following is a brief description of the county breakdown among GCDs.

Anderson, Henderson, and Cherokee Counties. The Neches and Trinity Valleys GCD, created in 2001 and headquartered at Jacksonville, covers Cherokee and Anderson counties, both in the ETRWPA, as well as Henderson County (which overlaps Regions C and the ETRWPA). *Angelina and Nacogdoches Counties.* Angelina and Nacogdoches counties are covered by the Pineywoods GCD, created in 2001 and headquartered in Lufkin. The GCD has regulations including a permitting system for water wells within its territory.

Jasper, Newton, Tyler, and Hardin Counties. The Southeast Texas GCD, headquartered in Kirbyville, regulates groundwater in these four counties and was created by the legislature in 2003.

Polk County. Polk County is covered by the Lower Trinity GCD that was created by the 79th Legislature in 2005.

Panola County. The Panola County GCD was created by the 80th Legislature, has been confirmed by local election in 2007, and has a management plan in place.

Rusk County. The Rusk County GCD, was created by the 78th legislature in 2003, confirmed by local election in 2004, and is headquartered in Henderson. The District has a groundwater management plan in place.

Houston, Jefferson, Orange, Sabine, San Augustine, Shelby, Smith, and Trinity counties are not covered by any confirmed or pending GCD.

Groundwater Management Areas. The TWDB has divided the state into sixteen groundwater management areas (GMAs) as required by the legislature. These areas were established on the basis of political and aquifer boundaries for the purpose of planning and regulation. (A GMA is only a designated geographic area, not an entity with board members, staff, or governing power.) GCDs within each GMA are required to share planning information and develop Desired Future Conditions.

The boundaries of the ETRWPA includes portions of GMAs 11 and 14. GMA 11 lies north of the northern lines of Polk, Tyler, Jasper, and Newton counties in Region I and generally covers the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers. GMA 14 encompasses the Gulf Coast Aquifer including Polk, Tyler, Jasper, and Newton counties and counties to the south toward the Texas coast.

The GCDs and GMAs in Region I are shown in Figure 1.9.

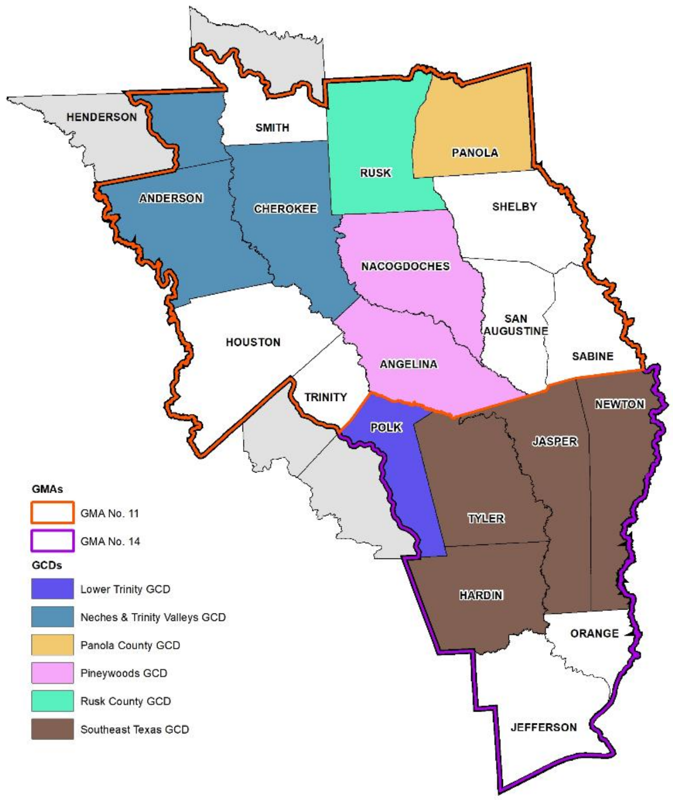


Figure 1.9 Groundwater Conservation Districts and Groundwater Management Areas

Note: Sourced from the Texas Water Development Board

1.3.2 Springs

Over 250 springs of various sizes are documented in the ETRWPA according to research by Gunnar M. Brune.[9] Most of the springs' discharge less than 10 gpm and are inconsequential for most water supply planning purposes. However, springs are an important source of water for local supplies and provide crucial water for wildlife and, in some cases, livestock.

Based on discharge measurements collected mainly in the 1970s, 28 springs in the region discharge between 20 and 200 gpm, and there are 7 springs that discharge between 200 and 2,000 gpm. It should be noted Brune's research did not cover Anderson, Angelina, Henderson, Houston, or Trinity counties. In addition, Brune did not document any springs with flow greater than 20 gpm in Jefferson, Orange, or Panola County. U.S. Geological Survey (USGS) information was reviewed and only two springs with flows greater than 20 gpm--Black Ankle Springs in San Augustine and King's Spring in Polk County--were identified. Figure 1.10 shows the springs in the ETRWPA using USGS information.

Brune reported a flow of 5,700 gpm in the spring-fed Indian Creek in Jasper County, about five miles northwest of Jasper. This water was used at a Texas Parks and Wildlife Department (TPWD) fish hatchery.

Other notable springs are Spring Lake Springs in Smith County (570 gpm in 1979), Bailey Springs in Shelby County (620 gpm in 1976), Caney Creek Springs in Houston County (760 gpm in 1965), Hays Branch Springs in Houston County (810 gpm in 1965), and Elkhart Creek Springs in Houston County (1,500 gpm in 1965).

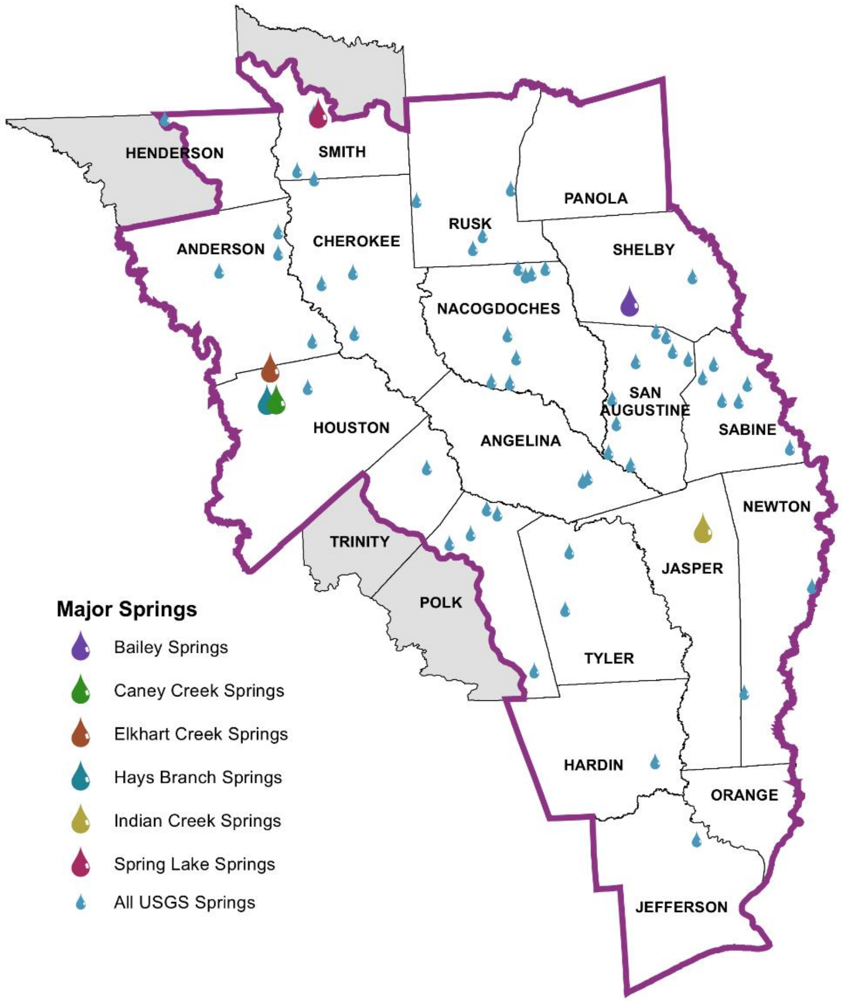


Figure 1.10 U.S. Geographical Survey Identified Springs

Note: Sourced from U.S. Geographical Survey

1.3.3 Surface Water

Surface water includes water obtained directly from streams, rivers, or reservoirs. Surface water sources within the ETRWPA include portions of three major river basins, and one coastal basin. Most of the region falls within the Neches River Basin. In fact, the majority of the Neches River Basin is located in the ETRWPA. The region also includes much of the Texas portion of the Sabine River Basin; portions of the Trinity River Basin in two counties; and a portion of the Neches-Trinity Coastal Basin in Jefferson County. Approximately one square mile of the Cypress Creek Basin lies in the northeastern portion of Panola County. Figure 1.11 indicates the locations of the major river basins within the ETRWPA. Additional descriptions of the Neches, Sabine, and Trinity River Basins follow. The current water supplies associated with each basin are described in detail in Chapter 3.

Neches River. The Neches River Basin originates in Van Zandt County, Texas, and flows for approximately 416 miles to Sabine Lake. In its course, the river passes through or forms a boundary for 14 counties in Texas. These include the ETRWPA counties of Smith, Henderson, Cherokee, Anderson, Houston, Angelina, Trinity, Polk, Tyler, Jasper, Hardin, Orange, and Jefferson.

The drainage area for the entire basin is approximately 10,000 square miles. Approximately 9,585 square miles of the basin are located within the ETRWPA. Approximately one-third of the basin area is comprised of the Angelina River Basin. Significant tributaries to the Neches River Basin include Pine Island Bayou and Village Creek. The Neches River Basin contributes nearly six million acre-feet of water to Sabine Lake annually.

Sabine River. The Sabine River originates in Hunt County, Texas, in Region C. It flows for approximately 550 miles in a generally southeast direction to Sabine Lake. The river passes through or forms a boundary for five counties in the ETRWPA: Panola, Shelby, Sabine, Newton, and Orange counties. Most of the river's course within the ETRWPA forms the boundary between Texas and Louisiana. The Sabine River Basin covers approximately 9,750 square miles, of which approximately 76 percent is in Texas. The remainder of the basin is located in Louisiana. Approximately 3,930 square miles of the basin are located within the ETRWPA. Based on a 64-year average, the Sabine River Basin contributes approximately 8.83 million acre-feet of water to Sabine Lake annually[10].

Neches-Trinity Basin. The coastal plain between the Neches River and Trinity River forms the Neches-Trinity Coastal Basin. The area is mostly located in Jefferson County (in the ETRWPA) and Chambers County (in Region H). Maximum elevation in the basin is approximately 50 feet, although most of the basin is less than 25 feet in elevation. Total basin drainage area is approximately 1,692 square miles. Approximately 858 square miles of the basin are located within the ETRWPA. In Jefferson County, the basin drains primarily to the Gulf Coast and to Sabine Lake.

Trinity River. The Trinity River is the longest river that flows entirely within Texas, and while a major water body in the State, only a small portion is located in the ETRWPA. The Trinity River has reaches that meet the legal definition of navigable waters, but it is not currently used for this purpose due to a cost-benefit analysis performed by the U.S. Army Corps of Engineers in the 1970s. The Trinity River basin falls almost entirely within the political boundary of the Trinity River Authority, a wholesale water provider in Regions C and H. In the ETRWPA, it forms a western boundary for Anderson and Houston counties. Approximately 1,420 square miles of the Trinity River basin are located within the ETRWPA.

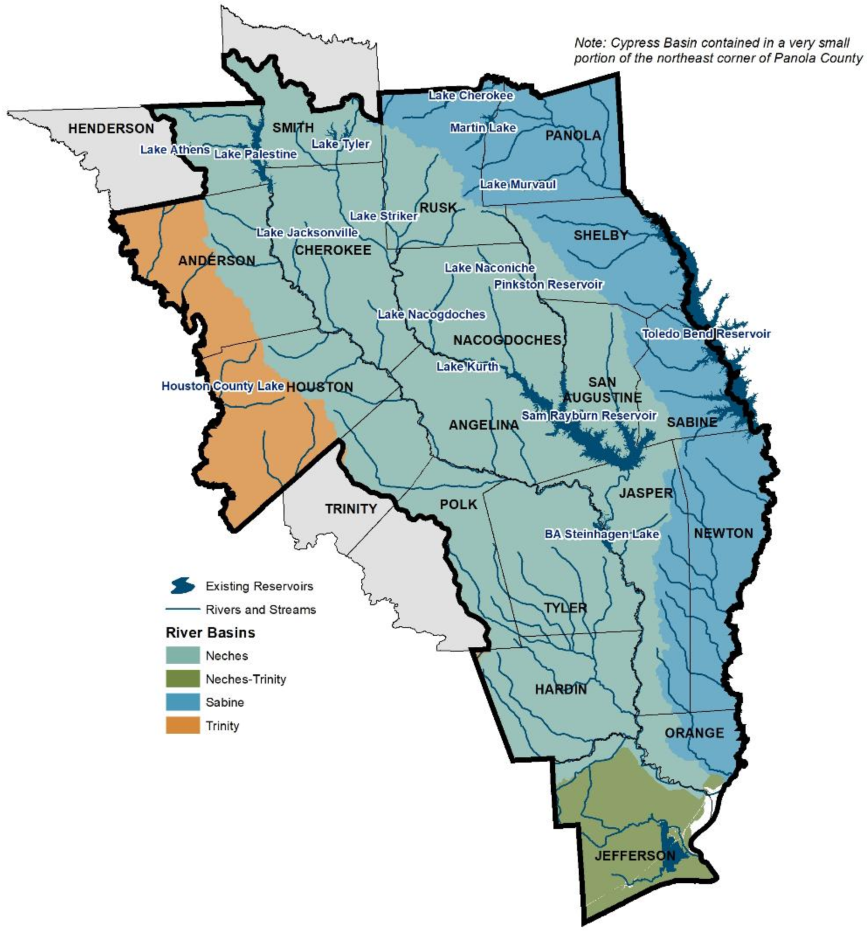


Figure 1.11 Surface Water Sources

Note: Sourced from Texas Water Development Board & U.S. Census Bureau

Reservoirs. In the ETRWPA, most surface water is provided by one of fourteen existing water supply reservoirs. Locations of major reservoirs in the region are shown on Figure 1.11. Details regarding these reservoirs are provided in Chapter 3.

Surface water quality in the region varies between water bodies but is generally considered to be very good for water supply purposes. Stream and lake segments with water quality impairments, as identified by the TCEQ, are discussed in Section 1.10 of this chapter. Although none of the segments in the region show issues as drinking water sources, aquatic life, fish consumption, and recreational uses are sometimes not supported in these water bodies.

Fish consumption is the subject of Texas Department of State Health Services advisories in a number of segments, mostly in reservoirs as a result of mercury found in certain species of fish. The mercury concentration in the water is negligible and does not present problems for recreation or water supply.

Even though the water in the reservoirs and streams is usable as a drinking water source, surface water generally requires more extensive treatment than groundwater. This additional treatment for surface water generally includes sedimentation, filtration, and disinfection. Other more advanced treatment methods for surface water are uncommon in the ETRWPA.

Tidal Sources of Surface Water. Saltwater intrusion can be a major concern in the tidal reaches of streams. Saltwater, being denser than freshwater, tends to settle on the bottom of the channel. The horizontal and vertical extent of the saltwater layer varies according to several factors including freshwater inflow and tidal influence.

In the ETRWPA, saltwater has become a significant concern for Sabine Lake and the lower reaches of the Neches and Sabine Rivers, since a ship channel between the Gulf of Mexico and Sabine Lake (i.e., the Sabine-Neches Waterway) was dredged around the beginning of the twentieth century. Saltwater intrusion, exacerbated by dredging of the Sabine-Neches Waterway, has disqualified the lower segments of the Sabine and Neches Rivers from use as drinking water supplies without addition of advanced treatment to remove salts. There are still some industrial uses, including cooling, that may be available.

At times of low flow in the rivers, the 0.5 parts per thousand (ppt) isohaline (the dividing line between “freshwater” and “saltwater”) moves upstream; conversely, at times of high flow in the rivers, the 0.5 ppt isohaline moves downstream. Upstream saltwater encroachment can adversely affect freshwater habitat and the suitability of water quality for water supply purposes.

In line with the recommendations of the 1997 State Water Plan, the Neches River Saltwater Barrier has been constructed at a location north of Beaumont below the confluence of the Neches River and Pine Island Bayou. The project, completed in 2003, prevents saltwater from reaching the freshwater intakes of Lower Neches River cities, industries, and farms during periods of low flow. The project is a gated structure, allowing adjustment to prevent saltwater intrusion while maintaining flows. It is also equipped with a gated navigation channel to enable the passage of watercraft around the barrier.

Pollution from industrial discharges was historically a major concern in the tidal areas of the lower Neches and Sabine Rivers. However, largely due to strengthened environmental regulation and to increased environmental awareness, industries in the region have made significant improvements to the quality of their effluent discharges. Over the past 70 years, the Academy of Natural Sciences' biological surveys in the lower Neches River have documented this progress, highlighting improved water quality and enhanced ecosystem health.[11]

1.3.4 Reuse

Reuse of effluent from wastewater treatment plants (i.e., water reuse) is another water source for the region, but the current use of reuse supplies in the ETRWPA is small compared to groundwater and surface water supplies. The TWDB maintained a record of water supplies by county on its website, and the 2020 reuse supplies in all the Region I counites (including the portions of shared counties from other regions) were estimated to be 2,469 acre-feet per year (AFY). Currently, this reused water supply is only used for non-potable applications to meet portions of the municipal, manufacturing, and irrigation demand in Region I. Additional discussion of water reuse in the ETRWPA is found in Chapter 3.

1.3.5 Threats and Constraints on Water Supply

Water supplies in the ETRWPA may be threatened by conditions both within and outside of the region. Some significant potential threats and constraints are discussed following. A more detailed discussion of potential threats to water supplies may be found in Chapter 3.

Invasive Species. The introduction of invasive and/or harmful species (including zebra mussels and giant salvinia) to area lakes and surface waters poses a potential threat to water supplies throughout the state of Texas. There are currently no zebra-infested lakes in ETRWPA, but the spread of zebra mussels is a potential threat. There are several lakes in the ETRWPA known to have giant salvinia, which can impact water quality of the lakes. Continued monitoring and management by water suppliers in the ETRWPA will be necessary in the coming decades. In addition to zebra mussels and giant salvinia, the East Texas Pineywoods region faces threats from various invasive species like Giant Reed, Common Water Hyacinth, Japanese Honeysuckle, Japanese Climbing Fern, Kudzu, Giant salvinia, Golden Bamboo, Chinese Tallow Tree, Chinese Wisteria, Mimosa, and Chinaberry tree.

Saltwater Intrusion. The ETRWPA extends to the Texas coast along the Gulf of Mexico. Water supplies along this area work together to maintain a balance of freshwater, brackish water and seawater. Overdevelopment of groundwater along the coast and/or reduced freshwater inflows due to drought use can disrupt this balance, resulting in saltwater intrusion of the freshwater supplies. LNVA installed a saltwater barrier on the Neches River to limit saltwater intrusion upstream. In addition, the Sabine-Neches Navigation District operates saltwater barriers at the Taylor Bayou facility, which controls saltwater intrusion in the Taylor and Hildebrandt Bayous of southeast Texas. These barriers help maintain the appropriate mix of saltwater and freshwater, benefiting local agriculture, including rice fields. Monitoring of both surface water and groundwater sources is needed to minimize impacts to the region's water supplies.

Interstate Allocation. The allocation of water in the Sabine River Basin between Texas and Louisiana is a vital factor in any water study involving the Texas portion of the basin. As noted earlier, the river forms the state line for the downstream half of its length after heading in Texas far from the state line. Almost the entire basin upstream from the state line is in Texas. However, Texas does not have completely unrestricted access to the water in the basin because of allocation restrictions with Louisiana.

The Sabine River Compact, executed in 1953, provides for allotment of the water between Texas and Louisiana.[12] This agreement was not only ratified by the two state legislatures but also approved by Congress.

Texas has unrestricted access to the water in the upper reach of the river except for the requirement of a minimum flow of 36 cubic feet per second (cfs) at the junction between the river and the state line. Texas may construct reservoirs in the upper reach and use their water either there or in the downstream reach without loss of ownership.

Any reservoir constructed on the downstream reach must be approved by both states. The ownership, operating cost, and water yield are proportional to the portions of the construction cost paid by the two states. To date, Toledo Bend is the only reservoir constructed in the lower reach. In the case of Toledo Bend, the states split the cost equally and have equal ownership of the lake and its yield.

Any unappropriated water in the lower reach (not contained in or released from a reservoir) is divided equally between the two states. Since Toledo Bend extends to a point, upstream from the junction of the river and the state line, the only water in this category is the water entering the river downstream from the dam.

The water in any reservoir on a tributary to the downstream reach can be used in the state where it is located, but usage comes out of the state's share of the water in the river.

Inter-region Diversions. The City of Dallas (Region C) has contractual rights to 114,337 acre-feet of water from Lake Palestine in the Neches basin. The City is currently developing the facilities to transport and treat the water but anticipates the required construction to be completed before 2030. A long-range potential strategy to transfer water from Toledo Bend Reservoir to reservoirs located in Region C is under consideration as an alternate strategy in the 2021 Regional Water Plan (RWP) for Region C. There is a recommended, long-range strategy to transfer water from the Toledo Bend Reservoir to entities in Region H documented in the 2021 Region H RWP planned to come online in 2050. In the 2021 East Texas RWP, there is a potential strategy planned to come online in 2040 to transfer water from the Neches basin to the Trinity basin to irrigation customers in Region H and new industries as they emerge along the IH-10 corridor.

1.4 WATER USER GROUPS AND MAJOR WATER PROVIDERS

Water User Groups. The first four rounds of regional water planning have used city populations to calculate water usage in gallons per capita daily (GPCD); however, consistent with the last round of regional water planning, 31 Texas Administrative Code (TAC) §357.34 includes a new utility-based definition for WUGs as follows which uses utility service area populations to calculate GPCD:

Water User Group (WUG) – Identified user or group of users for which Water Demands and Existing Water Supplies have been identified and analyzed and plans developed to meet Water Needs. These include:

- *Privately-owned utilities that provide an average of more than 100 acre-feet per year for municipal use for all owned water systems;*
- *Water systems serving institutions or facilities owned by the state or federal government that provide more than 100 acre-feet per year for municipal use;*
- *All other Retail Public Utilities not covered in subparagraphs (A) and (B) of this paragraph that provide more than 100 acre-feet per year for municipal use;*
- *Collective Reporting Units, or groups of Retail Public Utilities that have a common association and are requested for inclusion by the RWPG;*
- *Municipal and domestic water use, referred to as County-Other, not included in subparagraphs (A) - (D) of this paragraph; and*
- *Non-municipal water use, including manufacturing, irrigation, steam electric power generation, mining, and livestock watering for each county or portion of a county in an RWPA.*

WUGs in the 2026 Plan fall into one of six water use categories: Municipal; Manufacturing; Mining; Steam Electric Power; Livestock; and Irrigation. The ETRWPA has 209 municipal WUGs and 86 non-municipal WUGs. Water demands and supplies associated with each WUG are described in detail in Chapters 2 and 3, respectively.

Major Water Providers. WUGs either have direct access to water supplies or they purchase wholesale water from a Wholesale Water Provider (WWP). In this round of planning, the definition for a WWP was updated to the following:

Wholesale Water Provider (WWP) – Any person or entity, including river authorities and irrigation districts, that delivers or sells water wholesale (treated or raw) to WUGs or other WWPs or that the RWPG expects or recommends to deliver or sell water wholesale to WUGs or other WWPs during the period covered by the plan. The RWPGs shall identify the WWPs within each region to be evaluated for plan development.

In previous regional water plans, all demand and water supply data were presented in the plan summarized by WUGs and WWPs. However, in addition to the change in WWP designation outlined above, the designation of a Major Water Provider (MWP) was added to the regional water planning process intended to be a subset of WUGs and/or WWPs in the ETRWPA as identified by the RWPG to be of particular significance to the region's water supply. Throughout this plan, entities are discussed with data summarized by WUG, WWP, or MWP as required by recent rule changes.

Major Water Provider (MWP) – A water user group or a wholesale water provider of particular significance to the region's water supply as determined by the regional water planning group. This may include public or private entities that provide water for any water use category.

The RWPG discussed the designations for WWPs and MWPs in the ETRWPA and determined that all WWPs included in the 2021 Plan shall receive the designation of WWP and MWP in the 2026 Plan and include:

- Angelina and Neches River Authority
- Angelina-Nacogdoches Water Control & Improvement District No. 1
- Athens Municipal Water Authority
- City of Beaumont
- City of Carthage
- City of Center
- City of Jacksonville
- City of Lufkin
- City of Nacogdoches
- City of Port Arthur
- City of Tyler
- Houston County Water Control & Improvement District No. 1
- Lower Neches Valley Authority
- Panola County Freshwater Supply District No. 1
- Sabine River Authority of Texas
- Upper Neches River Municipal Water Authority

1.5 AGRICULTURAL AND NATURAL RESOURCES

For the purposes of this discussion, the ETRWPA's agricultural resources are defined as prime farmland. Natural resources within the ETRWPA include timber, wetlands, estuaries, endangered or threatened species, ecologically significant streams, springs, and state or federal parkland and preserves. Other natural resources include oil, natural gas, sand and gravel, lignite, salt, and clay. Various major natural resources are described in the following subsections.

1.5.1 Prime Farmland

Prime farmland is defined by the National Resources Conservation Service (NRCS) as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses."[13] As part of the National Resources Inventory, the NRCS has identified prime farmland throughout the country.

Figure 1.12 shows the distribution of prime farmland in the ETRWPA. Each color in this figure represents the percentage of prime farmland of any type. There are four categories of prime farmland in the NRCS State Soil Geographic Database for Texas: prime farmland, prime farmland if drained, prime farmland if protected from flooding or not frequently flooded during the growing season, and prime farmland where irrigated. Most counties in the region have significant prime farmland areas.

Table 1.4 shows the U.S. Department of Agriculture (USDA) 2017 agriculture statistics for the counties in the ETRWPA (portions of Henderson, Smith, Polk, and Trinity counties are located in other Regions).[14]

Chapter 1. Description of Region

The following general statements may be made regarding the region:

- From 2012 to 2017, the total acres of farmland decreased by 6.3 percent while the total acres of crop land decreased by 5.9 percent.
- In any one year, approximately 20 percent of farmland is crop land.
- In any one year, approximately 63 percent of crop land is harvested.
- Excluding Jefferson County, approximately 3 percent of crop land is irrigated. In Jefferson County, approximately 18 percent of crop land is irrigated.
- Poultry production generates the largest agricultural product sales in Nacogdoches, Panola, San Augustine, and Shelby counties.
- Cattle and calf production generate the largest agricultural product sales in Henderson, Houston, and Smith counties.

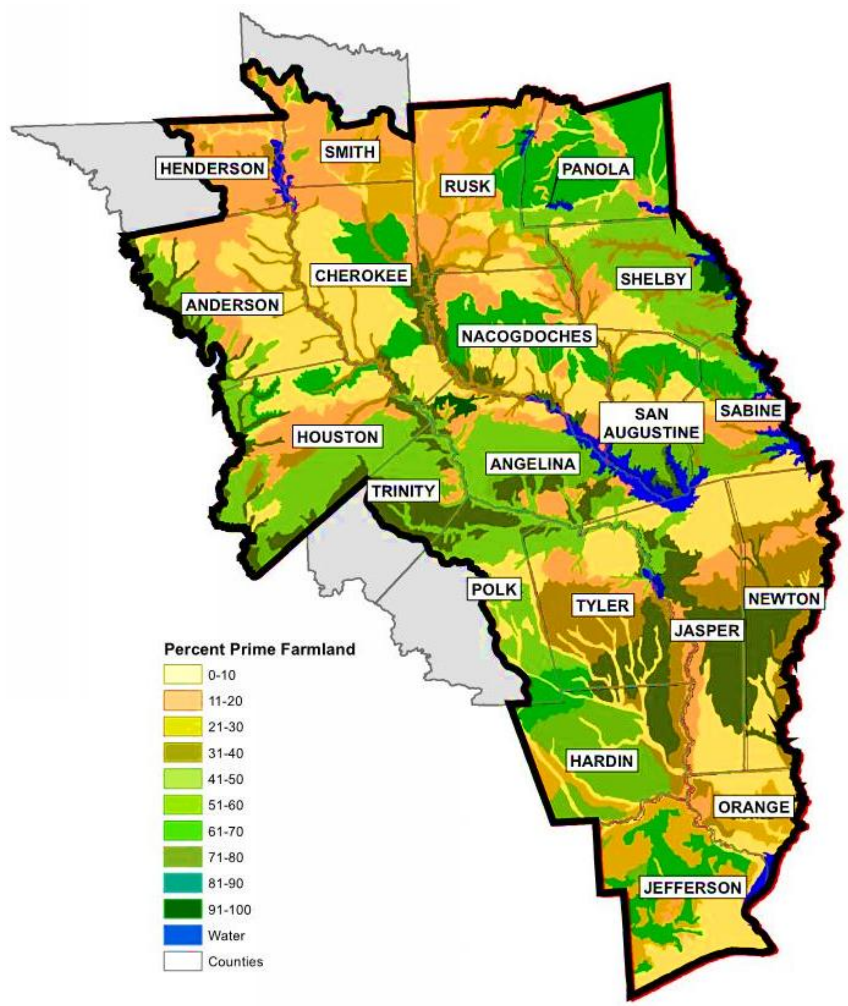


Figure 1.12 Percent Prime Farmland

Note: Sourced from Texas Water Development Board 2011 Regional Water Plan

Table 1.4 U.S. Department of Agriculture 2017 Agricultural Statistics

Category	Anderson	Angelina	Cherokee	Hardin	Henderson
Farms	1,754	1,028	1,587	661	1,988
Total Farmland (acres)	400,571	103,947	275,568	65,087	310,355
Crop Land (acres)	63,774	21,632	58,303	13,124	86,645
Harvested Crop Land (acres)	52,601	15,104	43,860	8,606	58,826
Irrigated Crop Land (acres)	3,089	453	978	1,081	1,614
Market Value Crops ($1,000)	15,551	2,594	66,491	2,366	11,645
Market Value Livestock ($1,000)	77,392	58,815	49,201	2,328	28,538
Total Market Value ($1,000)	92,943	61,409	115,692	4,694	40,183
Livestock and Poultry:					
Cattle and Calves Inventory	65,048	19,274	19,274	8,005	59,076
Hogs and Pigs Inventory	(D)	147	118	582	652
Sheep and Lambs Inventory	412	291	322	302	555
Layers and Pullets Inventory	3,494	2,597	2,992	3,446	6,051
Broilers and Meat-Type Chickens Sold	6,198,444	14,977,816	6,373,832	(D)	74
Crops Harvested (acres):					
Corn for Grain or Seed	2,416	0	0	5	18
Cotton	(D)	0	0	0	0
Rice	0	0	0	(D)	0
Sorghum for Grain or Seed	0	0	0	0	0
Soybeans for beans	0	0	0	(D)	(D)
Wheat for Grain	0	0	0	0	(D)

Category	Houston	Jasper	Jefferson	Nacogdoches	Newton
Farms	1,422	896	729	1,123	430
Total Farmland (acres)	394,543	91,437	358,934	264,750	58,793
Crop Land (acres)	70,772	13,375	137,267	29,502	5,484
Harvested Crop Land (acres)	44,044	10,743	38,047	20,450	4,105
Irrigated Crop Land (acres)	3,522	305	24,885	313	57
Market Value Crops ($1,000)	6,802	4,007	17,688	3,156	485
Market Value Livestock ($1,000)	57,716	5,132	14,629	367,586	1,102
Total Market Value ($1,000)	64,518	9,139	32,317	370,742	1,587
Livestock and Poultry:					
Cattle and Calves Inventory	68,987	14,268	37,189	34,172	4,212
Hogs and Pigs Inventory	4,762	259	511	48	177
Sheep and Lambs Inventory	1,781	372	340	198	266
Layers and Pullets Inventory	(D)	4,123	3,957	279,527	1,855
Broilers and Meat-Type Chickens Sold	7,160,115	(D)	66	84,656,731	51
Crops Harvested (acres):					
Corn for Grain or Seed	(D)	17	0	(D)	29
Cotton	(D)	0	0	0	0
Rice	0	0	20,698	0	0
Sorghum for Grain or Seed	0	0	(D)	0	0
Soybeans for beans	0	0	0	0	0
Wheat for Grain	0	0	(D)	(D)	0

Table 1.4 USDA 2017 Agricultural Statistics (Cont.)

Category	Orange	Panola	Polk	Rusk	Sabine
Farms	663	978	742	1,441	200
Total Farmland (acres)	52,912	205,961	125,133	242,767	38,304
Crop Land (acres)	4,685	39,766	22,586	46,094	5,553
Harvested Crop Land (acres)	2,861	27,156	15,207	29,841	3,332
Irrigated Crop Land (acres)	342	781	281	530	56
Market Value Crops ($1,000)	1,489	4,626	2,291	5,956	450
Market Value Livestock ($1,000)	3,478	96,094	4,540	94,201	17,265
Total Market Value ($1,000)	4,967	100,720	6,831	100,157	17,715
Livestock and Poultry:					
Cattle and Calves Inventory	9,839	31,045	13,135	40,801	11,525
Hogs and Pigs Inventory	450	581	103	370	87
Sheep and Lambs Inventory	366	270	61	272	-
Layers and Pullets Inventory	8,630	1,388	1,885	25,945	359
Broilers and Meat-Type Chickens Sold	1,810	24,393,040	(D)	21,637,138	(D)
Crops Harvested (acres):					
Corn for Grain or Seed	6	(D)	14	26	(D)
Cotton	0	0	0	0	0
Rice	0	0	0	0	0
Sorghum for Grain or Seed	0	0	0	0	0
Soybeans for beans	0	(D)	0	0	0
Wheat for Grain	0	0	106	0	0

Category	San Augustine	Shelby	Smith	Trinity	Tyler
Farms	293	995	2,928	601	778
Total Farmland (acres)	61,806	179,084	271,765	98,887	91,143
Crop Land (acres)	9,196	28,551	64,308	20,051	18,847
Harvested Crop Land (acres)	7,177	20,457	49,260	13,138	13,398
Irrigated Crop Land (acres)	40	383	1,932	266	794
Market Value Crops ($1,000)	1,296	2,837	36,759	2,108	9,643
Market Value Livestock ($1,000)	55,380	464,720	16,846	6,120	5,243
Total Market Value ($1,000)	56,676	467,557	53,605	8,228	14,886
Livestock and Poultry:					
Cattle and Calves Inventory	9,853	43,354	43,874	19,464	14,052
Hogs and Pigs Inventory	153	193	559	627	351
Sheep and Lambs Inventory	39	329	1,255	27	381
Layers and Pullets Inventory	125,933	1,238,783	12,602	2,372	4,061
Broilers and Meat-Type Chickens Sold	13,552,362	103,631,416	959	(D)	295
Crops Harvested (acres):					
Corn for Grain or Seed	13	(D)	18	(D)	0
Cotton	0	0	0	0	0
Rice	0	0	0	0	0
Sorghum for Grain or Seed	0	(D)	0	0	0
Soybeans for beans	0	(D)	0	0	0
Wheat for Grain	(D)	0	(D)	0	0

Table 1.4 USDA 2017 Agricultural Statistics (Cont.)

TOTALS FOR ALL COUNTIES:		SPECIAL FOR JEFFERSON COUNTY:	
Total Farmland (acres)	3,691,747	Irrigated / Total Crop Land (%)	18.13%
Crop Land (acres)	759,515		
Crop Land / Total Farmland (%)	20.57%	**COUNTIES OTHER THAN JEFFERSON:**	
Harvested Crop Land (acres)	478,213	Irrigated Crop Land (acres)	16,817
Harvested / Total Crop Land (%)	62.96%	Irrigated / Total Crop Land (%)	2.70%
Irrigated Crop Land (acres)	41,702	(D) – Withheld to avoid disclosing data for individual farms	
Irrigated / Total Crop Land (%)	5.49%		

Notes:

1) As of August 2023, USDA has not released any updated statistics.
2) Sourced from the U.S. Department of Agriculture, National Agricultural Statistics Service

1.5.2 Forest Products and Timberland Ecosystem Services

Some of the primary wood products produced from the timberlands in the ETRWPA include solid wood (sawtimber and chip-n-saw), engineered products (plywood, oriented strandboard, particleboard, cross-laminated panels and timbers), fiber products (paper and fiberboard), and woody biomass (wood pellets, bioenergy, and mulch). According to the Texas A&M Forest Service, there are over 60 million acres of forestland in Texas but only about 23 percent of that is productive timberland. About 85 percent of this productive timberland is in East Texas.[15] The Texas A&M Forest Service indicates there is an estimated 11.8 million acres of timberland within the East Texas region which includes 43 counties and overlays 20 counties within Region I. These 11.8 million acres of timberland represents 53 percent of the total area in the East Texas region.[16]

In spite of rapid urbanization, particularly in southeast Texas, overall forest acreage has slightly increased in the region due to conversion of marginal agricultural lands to forest over the past couple of decades. In terms of economic value, timber is the seventh most valuable agricultural commodity in Texas. In 2021, the forest industry contributed $21.4 billion to the Texas economy employing over 68,917 people with a payroll of $4.3 billion.[16] Including direct, indirect, and induced impacts, the forest sector had a total economic impact of $41.6 billion in industry output and supported more than 172,730 jobs with a payroll of $10.5 billion. The forest-based industry was one of the top 10 manufacturing sectors in the state. This resource is being sustainably managed, with overall growth rates exceeding removals since the 1980s and pine growth being about 30 percent above removals. Compared to 2019, the 2021 Texas forest sector total industry output and employment increased 13 percent and 3 percent, respectively.

Other economic and environmental benefits to the ETRWPA provided by timberlands and forests include water quality protection, fish and wildlife management, carbon sequestration, and recreational opportunities. For water quality protection, Texas has a nationally recognized forestry best management practices (BMPs) program for water quality management from forest operations. These voluntary forestry water quality BMPs have about a 94 percent compliance rate and have been shown to be very effective in minimizing potential water quality degradation from forest management activities like clearcutting and forest regeneration.[17] About 92 percent of the forestland in East Texas is privately owned but numerous national and state parks and forests exist including the Angelina National Forest, Big Thicket National Preserve, Davy Crockett National Forest, and Sabine National Forest among others. These areas have an abundance of scenic pine and hardwood forests with numerous public hiking trails, paddling trails, and campgrounds. Figure 1.13 shows the ETRWPA compared to the Texas A&M Forest Service's East Texas region.

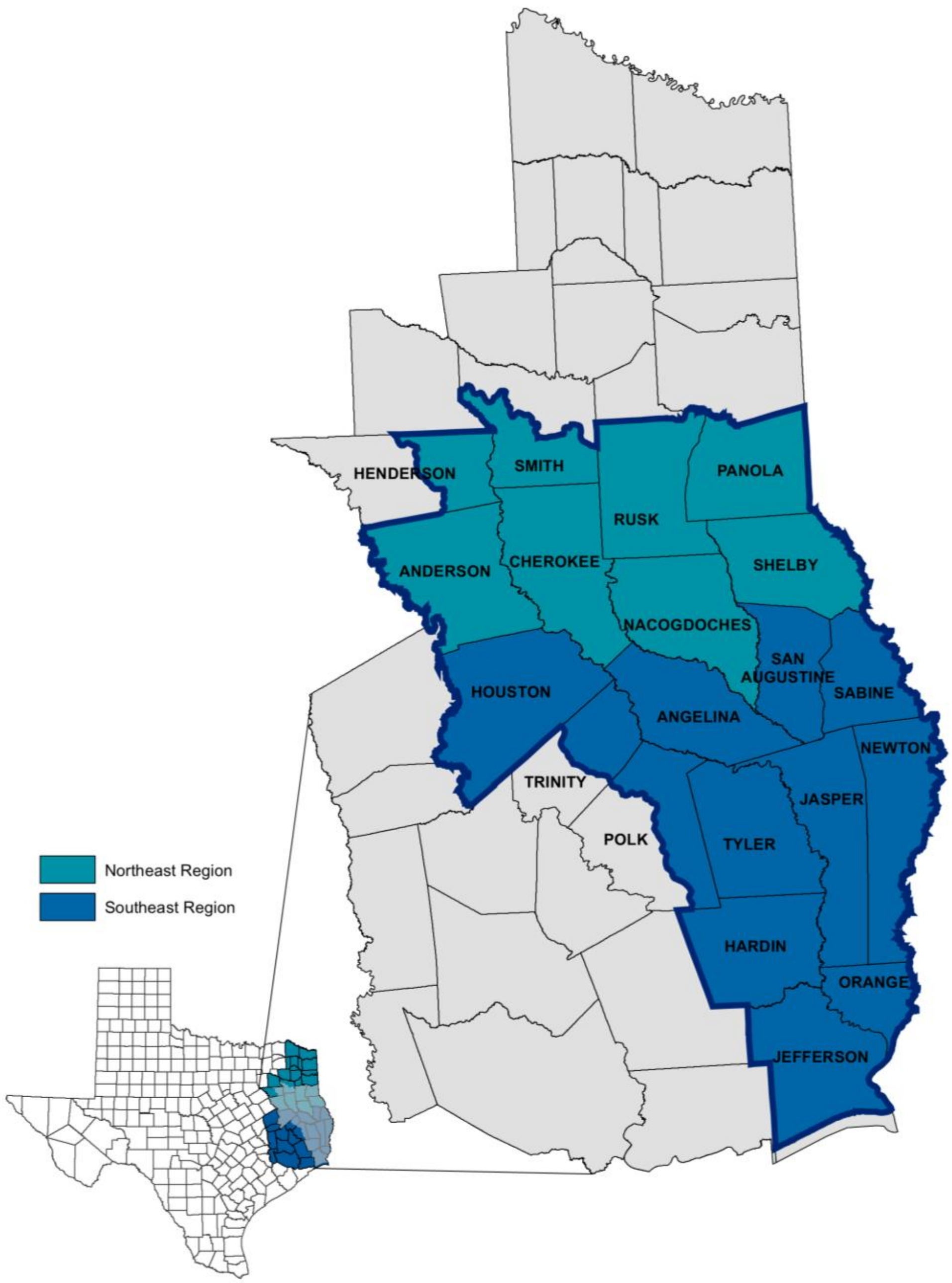


Figure 1.13 Texas A&M Forest Service Northeast and Southeast Regions

Note: Sourced from Texas A&M Forest Service, 2015

1.5.3 Wetlands

Wetlands are areas characterized by a degree of flooding or soil saturation, hydric soils, and plants adapted to growing in water or hydric soils.[18] Wetlands are beneficial in several ways; they provide flood attenuation, bank stabilization, water-quality maintenance, fish and wildlife habitat, and opportunities for hunting, fishing, and other recreational activities.[18] There are significant wetland resources in the region, especially near rivers, lakes, and reservoirs.

Texas wetland types and characteristics are summarized in Table 1.5. Most Texas wetlands are palustrine bottomland hardwood forests and swamps, and most of the State's palustrine wetlands are located in the flood plains of East Texas rivers.[18] Table 1.6 shows the bottomland hardwood acreage associated with the four major rivers in the region.

In the coastal part of the region, palustrine wetlands such as swamps and fresh marshes occupy flood plains and line the shores of tidal freshwater reaches of sluggish coastal rivers. Much of the palustrine wetland area in Jefferson County is farmed for rice growing. Figure 1.14 shows the density of palustrine wetlands in the coastal part of the region. In the U.S. Fish and Wildlife Service (USFWS) study area, palustrine emergent wetlands were most prevalent in Jefferson County, palustrine forested wetlands were most prevalent in Newton, Jasper, Orange, and Hardin counties, and palustrine scrub-shrub was most prevalent in Newton, Jasper, Orange, and Hardin counties. Some concentrations of palustrine shrub wetlands were also found in Jefferson County. Ponds, Freshwater Lakes, Freshwater Forested/Shrub Wetlands, and Freshwater Emergent Wetlands also appear in other counties of the ETRWPA; however, only the coastal area of the ETRWPA is presented in Figure 1.14 because the wetlands in this area are more concentrated and diverse.

Estuarine wetlands such as salt marshes and tidal flats are the next most prevalent type of wetland areas. Estuarine wetlands are very common in the area around Sabine Lake,[19] particularly those dominated by emergent vegetation.

Three other kinds of wetlands cover a smaller area in the region but are ecologically significant:[19] lacustrine, riverine, and marine wetlands.[19] See Table 1.5 above for a detailed description of these types of wetlands.

The TPWD, in a study of natural resources in Smith, Cherokee, Rusk, Nacogdoches, and Angelina counties found the most extensive wetlands in the study area were water oak-willow oak-and blackgum forests along the Neches, Angelina, and Sabine Rivers. In the same study, TPWD noted the presence of a significant bald cypress-water tupelo swamp along the Neches River in Angelina County.[20] The TPWD identified specific stream segments in the region that they classify as being priority bottomland hardwood habitat.[20]

Table 1.5 Texas Wetland Types and Characteristics

Wetland Classifications	Definition	Vegetation / Habitat Types
Palustrine	Freshwater vegetated wetlands and intermittently or permanently flooded open-water bodies of less than 20 acres in which water is less than 6.6 feet deep, and salinity due to ocean-derived salts always is always less than 0.5 parts per thousand (ppt).	Predominantly trees; shrubs; emergent, rooted herbaceous plants; or submersed/floating plants.
Estuarine	Deep-water tidal habitats and adjacent tidal wetlands in low-wave-energy environments where the salinity of the water is greater than 0.5 ppt and is variable due to evaporation and mixing of freshwater and seawater.	Emergent plants; intertidal unvegetated mud or sand flats and bars; estuarine shrubs; subtidal open water bays (deep water habitat).
Lacustrine	Wetlands and deep-water habitats with all of the following characteristics: situated in a topographical depression or in a dammed river channel; lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% areal coverage; total area exceeds 20 acres unless water depth at the deepest point exceeds 6.6 feet or active wave-formed or bedrock shoreline makes up all or part of the boundary; ocean-derived salinity is always less than 0.5 ppt.	Nonpersistent emergent plants, submersed plants, and floating plants.
Riverine	All freshwater wetlands and deep-water habitats contained within a channel, with two exceptions: wetlands dominated by trees, shrubs, persistent, emergent mosses, or lichens, and habitats with salinity greater than 0.5 ppt.	Nonpersistent emergent plants, submersed plants, and floating plants.
Marine	Tidal wetlands that are exposed to waves and currents of the Gulf of Mexico and to water having salinity greater than 30 ppt.	Intertidal beaches, subtidal open water (deep water habitat).

Note: Sourced from U.S. Geological Survey[21]

Table 1.6 1980 Geographical Distribution of Bottomland Hardwood Associated with Selected Rivers

River	Area (acres)	Amount Located in ETRWPA
Trinity River	305,000	Small portion
Neches River	257,000	Almost all
Sabine River	255,000	Approximately half of the Texas portion of the Sabine River Basin is in ETRWPA.
Angelina River	88,000	All

Note: Sourced from Texas Parks and Wildlife Department

Section 404 of the Clean Water Act (CWA), administered by the U.S. Army Corps of Engineers (USACE), mandates that, when impacts to wetlands are unavoidable, the impacts to wetlands must be mitigated by replacing the impacted wetland with a similar type of wetland. Compensatory mitigation is required for unavoidable adverse impacts to the aquatic ecosystem that cannot reasonably be avoided or further minimized in order to replace those aquatic ecosystem functions that would be lost or impaired as a result of a USACE-authorized activity. Mitigation banking, as defined by the National Mitigation Banking Association, is the restoration, creation, enhancement, or preservation of a wetland, stream, or other habitat area undertaken expressly for the purpose of compensating for unavoidable resource losses in advance of development actions, when such compensation cannot be achieved at the development site or not be as environmentally beneficial. The USACE districts and mitigation banks located within the ETRWPA are presented in Figure 1.15. Within the boundary of Region I, mitigation banks are listed on the USACE's RIBITS site, with ten of those in the Fort Worth District and the other five in the Galveston District. Table 1.7 contains mitigation banks information.

Table 1.7 Mitigation Banks within Region I

Mitigation Bank	District	County	Acres
Big Woods on the Trinity	Fort Worth	Anderson	423.70
Butler Creek	Fort Worth	Smith	142.00
Flat Creek	Fort Worth	Henderson	583.00
Graham Creek - SWF	Fort Worth/Galveston	Angelina	479.60
Lost Creek Brake	Galveston	Newton	476.20
Martin Creek	Fort Worth	Rusk	183.00
Mud Creek	Fort Worth	Cherokee/Nacogdoches	959.20
Murvaul Creek	Fort Worth	Panola	584.60
Patroon Bayou	Fort Worth	Sabine	474.80
Pineywoods	Fort Worth/Galveston	Angelina/Jasper/Polk/Tyler	19,079.00
Rattlesnake	Fort Worth	Houston/Leon	517.00
Sabine Lake	Galveston	Jefferson	127.27
Scoober Creek	Fort Worth	Rusk	349.00
West Mud Creek	Fort Worth	Smith	45.44
Wet Unlimited/Bigfoot Swamp	Fort Worth	Panola	124.41

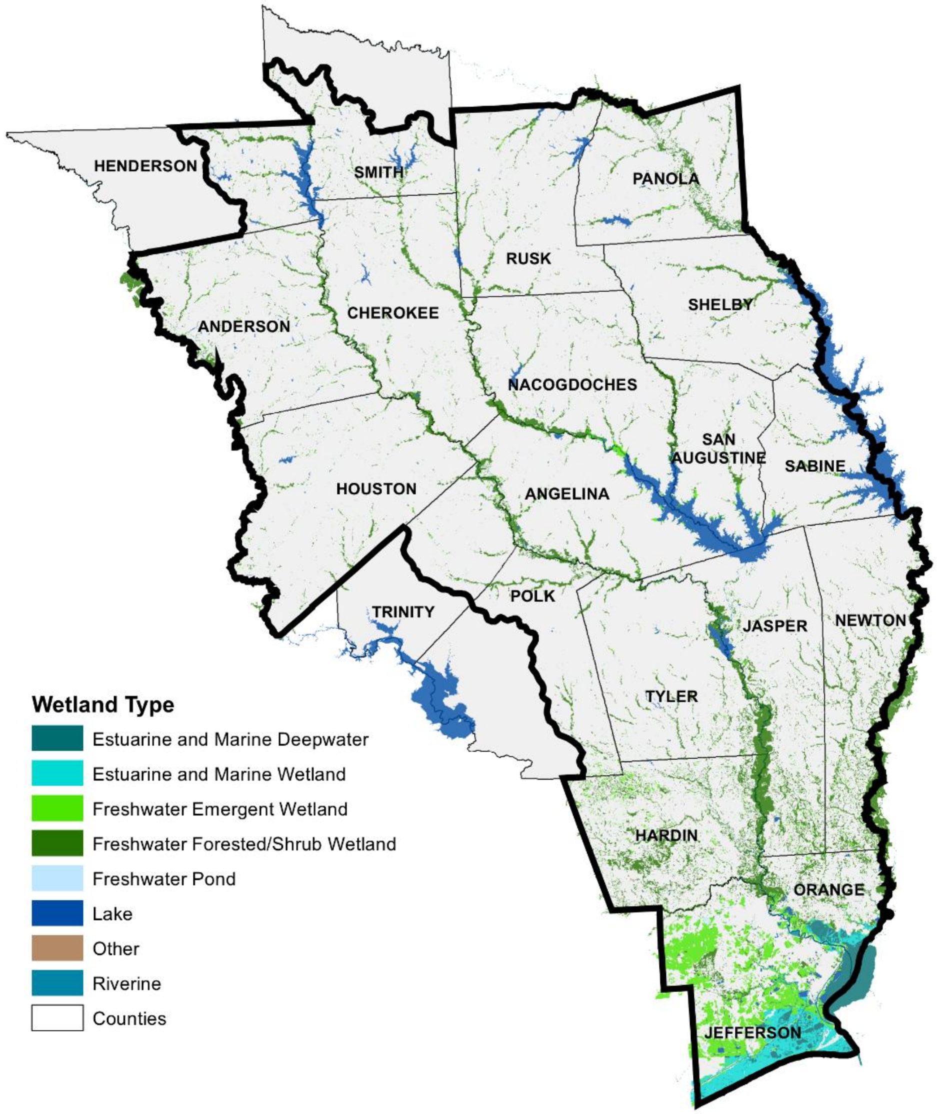
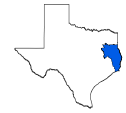


Figure 1.14 Wetland Area

Note: Sourced from U.S. Fish & Wildlife Service



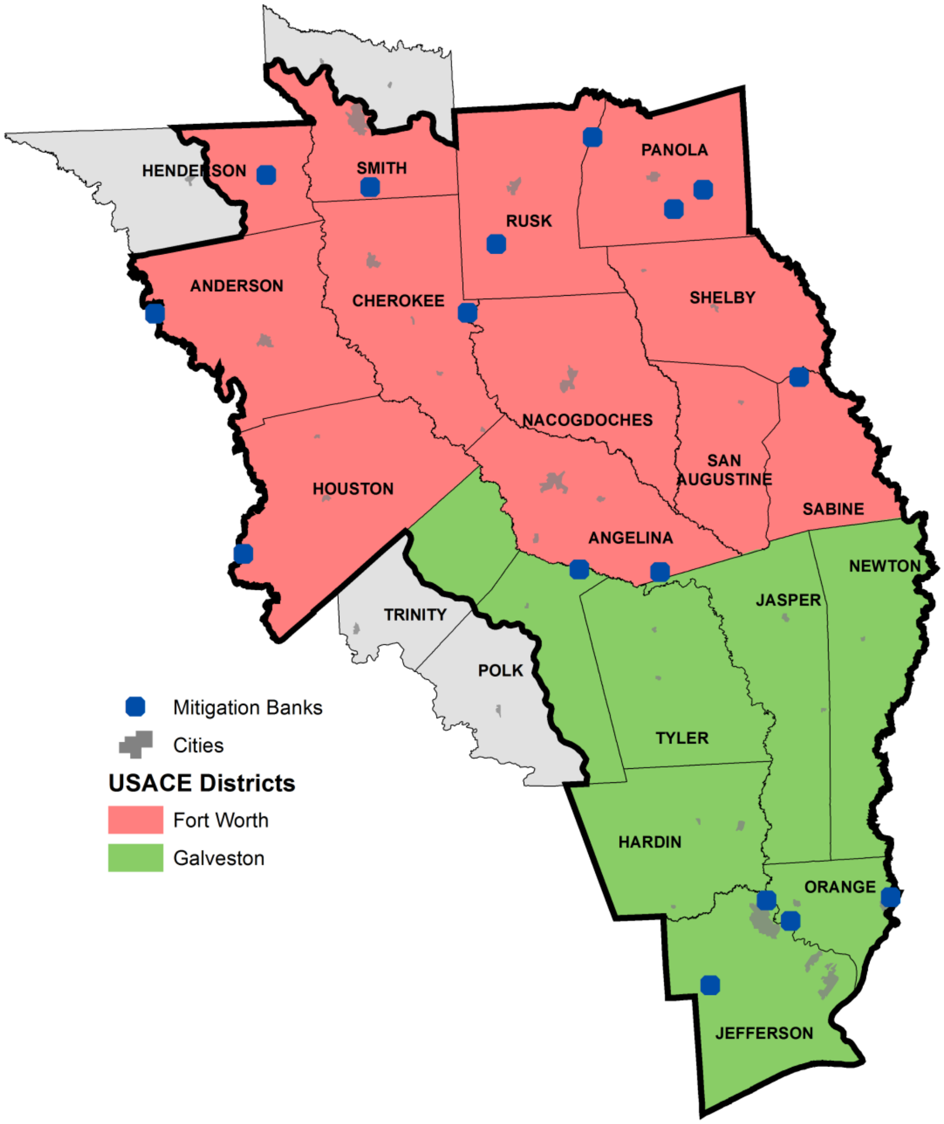


Figure 1.15 Mitigation Banks

Note: Sourced from U.S. Army Corps of Engineers[22]

1.5.4 Estuaries

The Sabine-Neches Estuary includes Sabine Lake, the Sabine-Neches and Port Arthur Canals, and Sabine Pass. The Sabine-Neches Estuary covers about 100 square miles. The Neches and Sabine River Basins and part of the Neches-Trinity Coastal Basin contribute freshwater flow to the estuary.[23] The Sabine-Neches Estuary within the ETRWPA is depicted on Figure 1.16.

In the estuary, freshwater from the Sabine and the Neches Rivers meets saltwater from the Gulf of Mexico. Although the estuary is influenced by the tide, it is protected from the full force of Gulf wave action and storms due to its inland location. The Sabine-Neches Estuary is important for fish, shellfish, and wildlife habitat and for sport and commercial fishing.

Sabine Lake is a natural water body located on the Texas-Louisiana border in southeast Texas, approximately seven miles from the Gulf of Mexico. According to SRA, the surface area for the main body of the lake is approximately 54,300 acres. The lake supports an extensive coastal wetland (i.e., salt marsh) system around much of the perimeter. The lake's small volume coupled with large freshwater inflows from the Sabine and Neches Rivers result in a turnover rate of around 50 times per year.

Sabine Lake is hydraulically connected to the Gulf of Mexico via Sabine Pass, a seven-mile-long tidal inlet between the Gulf and the southern end of the lake. Historically, Sabine Pass was a narrow, shallow waterway. However, in the latter part of the 19th century, a ship channel (generally known today as the Sabine-Neches Waterway) was dredged in the pass and lake to enable deep-water navigation to inland ports. Over ensuing years, the Sabine-Neches Waterway has been expanded in length, depth, and width, and extended up into the Neches and Sabine Rivers.

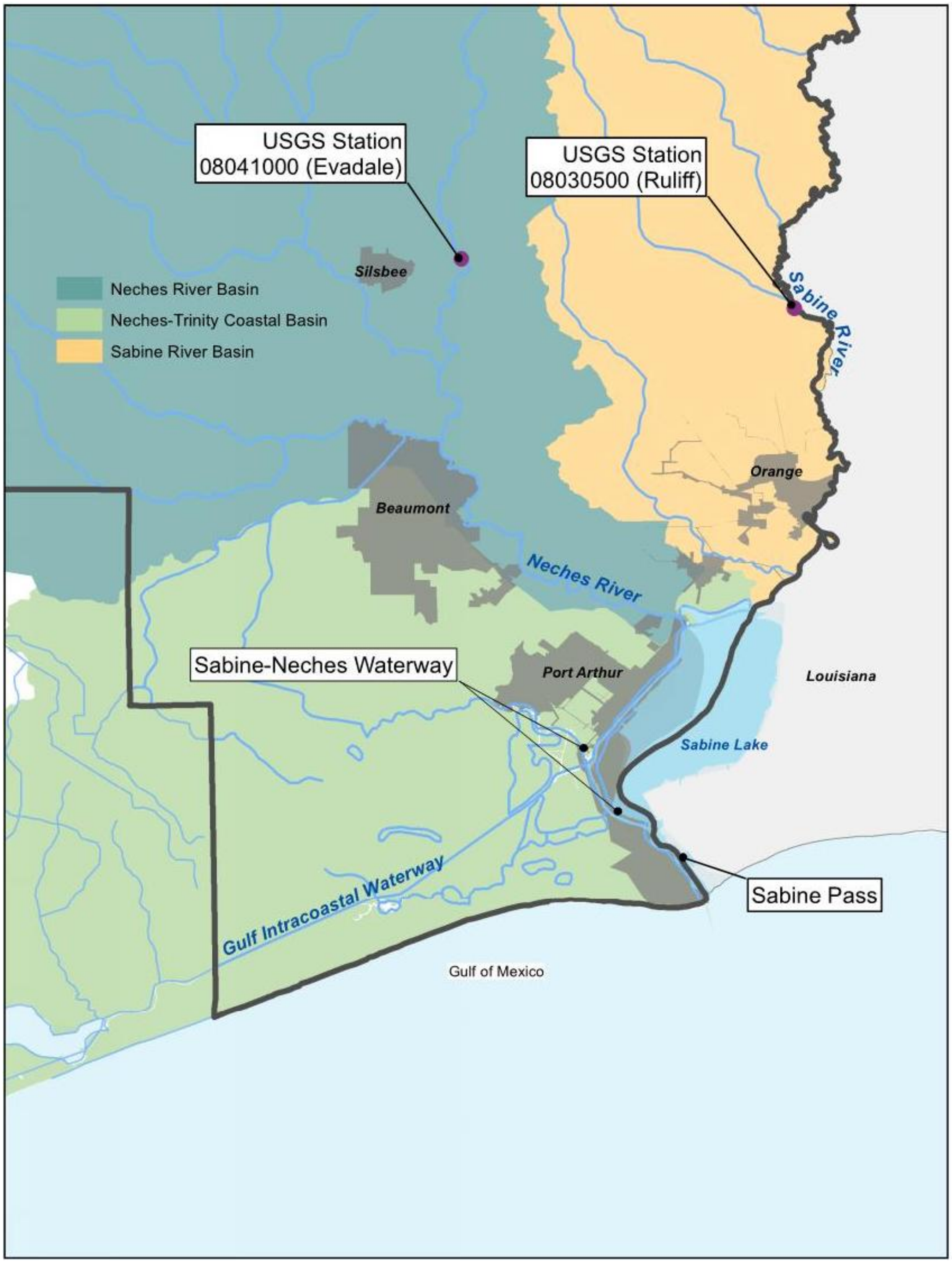


Figure 1.16 Sabine Lake Estuary and Vicinity

Note: Sourced from Texas Commission on Environmental Quality

The Sabine-Neches Waterway is the second-longest inland waterway on the U.S. Gulf Coast and home to two U.S. strategic seaports – the Port of Beaumont and the Port of Port Arthur. Today, the Sabine-Neches Waterway extends from the Gulf of Mexico to Port Arthur on the western shore of Sabine Lake; to Beaumont upstream on the Neches River; and to Orange, upstream on the Sabine River. The waterway is some 400 feet wide and 40 feet deep. In 2014, the U.S. House of Representatives passed the Water Resources Reform and Development Act, H.R. 3080, authorizing 34 water projects including the widening of the Sabine-Neches Waterway. Construction on this latest deepening and widening project began in 2019 and will take almost ten years to complete. The expansion will deepen the channel to 48 feet and widen it to as much as 700 feet.

1.5.5 Rare, Threatened and Endangered Species

As of September 1, 2023, the TPWD identified threatened and endangered species of the region (See Appendix 1-A). Included are 10 species of birds, eight mammals, eight reptiles/amphibians, six fish, seven mollusks, and seven vascular plants. These species are listed as rare, threatened, or endangered at the state level or have limited range within the state. The TPWD maintains a list of species of special concern in the Texas Natural Diversity Database.

A USFWS IPaC review was conducted on October 3, 2023 and identified threatened and endangered species of the region. Included are five species of birds, three mammals, nine reptiles/amphibians, three clams, and nine plants. The IPaC also listed critical habitat or proposed critical habitat for the following species: Louisiana Pigtoe (*Pleurobema riddellii*), Louisiana Pinesnake (*Pituophis ruthveni*), Neches River Rose-mallow (*Hibiscus dasycalyx*), Texas Fawnsfoot (*Truncilla macrodon*), Texas Goldencress (*Leavenworthia texana*), and the Texas Heelsplitter (*Potamilus amphichaenus*). IPaC's are considered valid for 90 days beginning when the list was obtained, after 90 days a request for an updated list is recommended.

1.5.6 Ecologically Significant River and Stream Segments

In each river basin in Texas, the TPWD has identified stream segments that it classifies as being ecologically unique.[24] Stream segments have been placed on this list because they have met criteria based on factors related to biological function, hydrologic function, presence of riparian conservation areas, high water quality/exceptional aquatic life/high aesthetic value, and threatened or endangered species/unique communities. Table 1.8 lists stream segments within the ETRWPA, meeting one or more of the criteria. Figure 1.17 shows geographically where the stream segments are located. An additional discussion of ecological significant stream segments in the ETRWPA is found in Chapter 8.

1.5.7 State and Federal Parks, Management Areas, and Preserves

The state and federal governments own and operate several parks, management areas, and preserves in the Region. Table 1.9 summarizes these facilities.

Table 1.8 Texas Parks and Wildlife Department Ecologically Significant Segments in East Texas

River or Stream Segment	Biological Function	Hydrologic Function	Riparian Conservation Area	High Water Quality/ Aesthetic Value	Endangered Species/ Unique Communities	Total Number of Criteria Met
Alabama Creek			•			1
Alazan Bayou	•		•		•	3
Upper Angelina River	•		•		•	3
Lower Angelina River	•		•		•	3
Attoyac Bayou					•	1
Austin Branch			•			1
Beech Creek			•	•		2
Big Cypress Creek				•		1
Big Hill Bayou	•		•			2
Big Sandy Creek	•		•	•	•	4
Bowles Creek			•			1
Camp Creek			•		•	2
Catfish Creek			•	•	•	3
Cochino Bayou			•			1
Hackberry Creek			•		•	2
Hager Creek			•			1
Hickory Creek			•			1
Hillebrandt Bayou			•			1
Irons Bayou				•		1
Little Pine Island Bayou			•			1
Lynch Creek			•		•	2
Menard Creek			•			1
Mud Creek	•				•	2
Upper Neches River	•		•	•	•	4
Lower Neches River	•		•	•	•	4
Pine Island Bayou			•			1
Piney Creek			•	•	•	3
Upper Sabine River	•			•	•	3
Middle Sabine River	•			•		2
Lower Sabine River	•		•			2
Salt Bayou	•		•			2
San Pedro Creek			•			1
Sandy Creek (Trinity Co.)			•		•	2
Sandy Creek (Shelby Co.)					•	1
Taylor Bayou			•			2
Texas Bayou			•			1

Trinity River	•		•		•	3
Trout Creek			•			1
Turkey Creek			•			1
Village Creek	•		•	•	•	4
White Oak Creek				•		1

Note: Sourced from Texas Parks and Wildlife Department

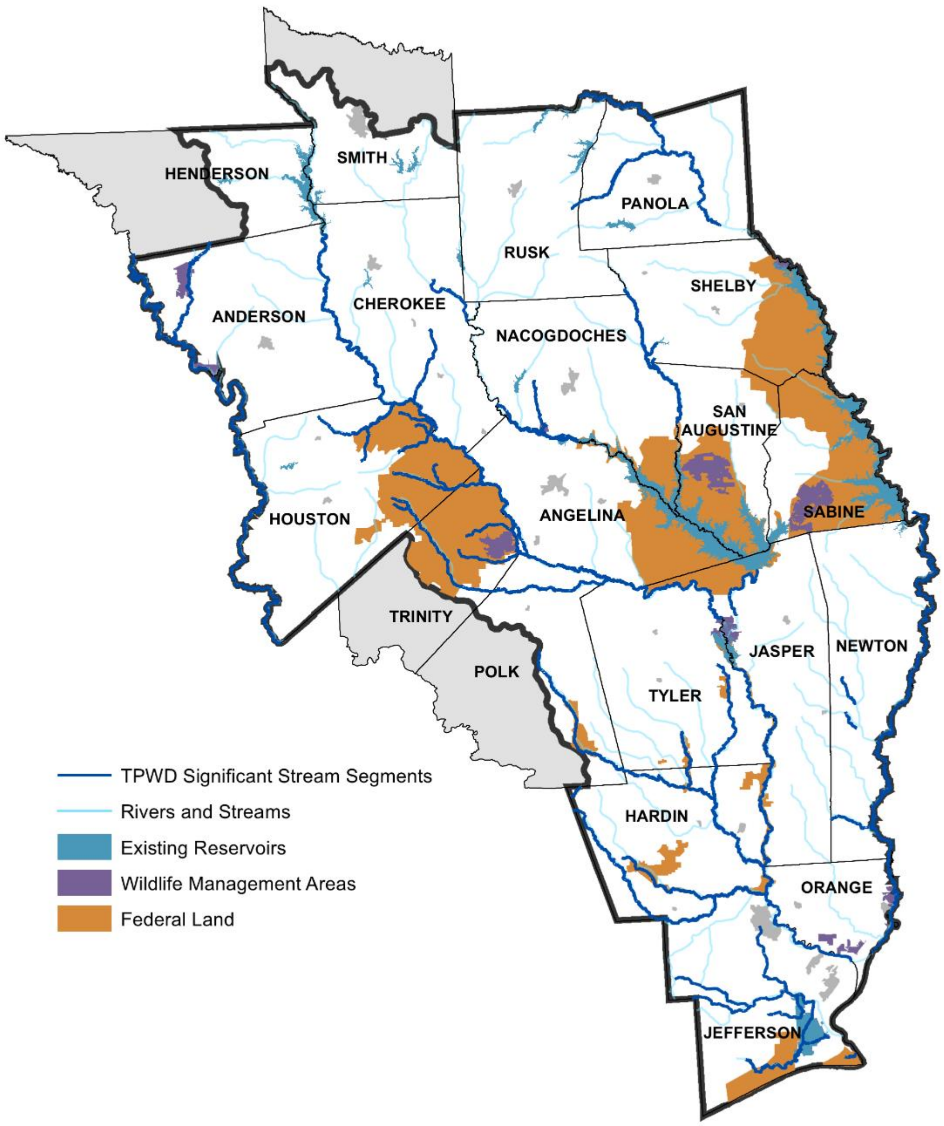


Figure 1.17 Ecologically Significant Stream Segments

Note: Sourced from Texas Parks and Wildlife Department

Table 1.9 State and Federal Parks, Management Areas, and Preserves

Owner/Operator	Name	County
Texas Parks and Wildlife Department	Martin Creek Lake State Park	Rusk
	Rusk/Palestine State Park	Cherokee and Anderson
	Mission Tejas State Park	Houston
	Martin Dies Jr. State Park	Jasper and Tyler
	Village Creek State Park	Hardin
	Sea Rim State Park	Jefferson
	Gus Engeling Wildlife Management Area	Anderson
	Big Lake Bottom Wildlife Management Area	Anderson
	North Toledo Bend Wildlife Management Area	Shelby
	Bannister Wildlife Management Area	San Augustine
	Moore Plantation Wildlife Management Area	Sabine and Jasper
	Angelina Neches/Dam B. Wildlife Management Area	Jasper and Tyler
	Lower Neches Wildlife Management Area	Orange
	Tony Houseman Wildlife Management Area	Orange
	J.D. Murphree Wildlife Management Area	Jefferson
	Alabama Creek Wildlife Management Area	Trinity
	Alazan Bayou Wildlife Management Area	Nacogdoches
	East Texas Conservation Center	Jasper
Texas Forest Service	E.O. Siecke State Forest	Newton
	Masterson State Forest	Jasper
	John Henry Kirby Memorial State Forest	Tyler
	I.D. Fairchild State Forest	Cherokee
Texas State Historical Commission	Caddo Mounds State Historical Park	Cherokee
	Mission Dolores State Historic Site	San Augustine
	Sabine Pass Battleground State Historical Site	Jefferson
U.S. Army Corps of Engineers	Sam Rayburn Reservoir	
	Town Bluff Dam, B.A. Steinhagen Lake	
U.S. Fish and Wildlife Service	Neches National Wildlife Refuge	Anderson, Cherokee
	Texas Point National Wildlife Refuge	Jefferson
	McFaddin National Wildlife Refuge	Jefferson
National Forest Service	Angelina National Forest	San Augustine, Angelina, Jasper, and Nacogdoches
	Davy Crockett National Forest	Houston and Trinity
	Sabine National Forest	Sabine, Shelby, San Augustine, Newton, and Jasper
National Park Service	Big Thicket National Preserve	Polk, Tyler, Jasper, Hardin, Jefferson, and Orange

Note: Sourced from Texas Parks and Wildlife Department, Texas A&M Forest Service, Texas Historical Commission, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Services, and the National Park Service

1.5.8 Archeological Resources

The east Texas area, including the ETRWPA, is rich in cultural, historical, and archeological resources. Its abundant water, timber, and other natural resources made it ideal for native American settlement. The eastern portion of Texas was explored and settled early by European cultures. The ETRWPA, from Sabine

Pass to the northern extent of the region has been a significant center of Texas historical development over the past two centuries.

Texas Historical Commission maintains the Texas Historic Sites Atlas, a database containing historic county courthouses, National Register properties, historical markers, museums, sawmills, and neighborhood surveys.[25] This database contains a very large amount of data. The Texas Historical Commission does not release information on archeological sites to the general public.

The most prominent archeological site in the ETRWPA is Caddo Mounds State Historic Site, a 94-acre park in Cherokee County west of Alto. This area was the home of Mound Builders of Caddo origin who lived in the region for 500 years beginning about 800 A.D. The site offers exhibits and interpretive trails through its reconstructed sites of Caddo dwellings and ceremonial areas, including two temple mounds, a burial mound, and a village area.[26]

An important historical route that traverses the northern portion of the ETRWPA is the El Camino Real de los Tejas. The origin of the route begins in 1690 when Spanish soldiers and priests crossed the Rio Grande and embarked towards the Neches River, establishing two missions. After years of establishing and abandoning settlements, conflicts with the native peoples of Texas and Louisiana, and dealing with French, Spanish, and Mexican governments, the route eventually reached eastern Texas and northwestern Louisiana totaling 2,500 miles. It served as a trade route between settlements as well as a way to link Mexico City with Los Adaes (east Texas).

Within the boundary of the ETRWPA lies one of the few recognized tribes in Texas, The Alabama-Coushatta Tribe. Their reservation contains 10,200 acres in the Big Thicket between the Neches and Sabine Rivers. The tribe settled in the region around 1780 after relocating from Alabama. The tribe has a long history of supporting revolutionaries, first aiding Mexicans by fighting against Spain in the Mexican War of Independence in 1813, then by guiding and providing provisions to Texas fighters while they fought again the Mexican government in the Texas War of Independence in 1836. Today the tribe has more than 1,300 individuals enrolled.

1.5.9 Mineral Resources

Mineral resources include petroleum production and coal mining operations. Various types of mineral resources in the ETRWPA are described below.

Petroleum Production. Oil and natural gas fields are significant natural resources in portions of the region. With the exception of Angelina County, producing oil wells may be found in each county in the region. A portion of the region is located within the Haynesville/Bossier Shale Formation. The Haynesville/Bossier Shale Formation is a hydrocarbon-producing geological formation capable of producing large amounts of gas. There are high densities of producing oil wells in Anderson, Hardin, and Rusk counties and high densities of natural gas wells in Nacogdoches, Panola, and Rusk, counties, with lesser densities in the other counties in the region. The Region I counties which are impacted by the Haynesville/Bossier Shale Formation include Angelina, Nacogdoches, Panola, Rusk, Sabine, San Augustine, and Shelby.

Figure 1.18 and Figure 1.19 depict oil and gas resources in the ETRWPA.[27]

Starting around 2008, the East Texas petroleum industry was revitalized when multi-stage hydraulic fracturing (fracking) and horizontal drilling of the Haynesville/Bossier Shale became technologically and economically feasible. According to the USGS's 2016 assessment, this natural gas field is estimated to contain in excess of 304 trillion cubic feet (TCF) of natural gas, making it among the largest gas reserves in the lower 48 states.[28] This is an increase of 240 TCF over USGS's 2011 estimate of 61 TCF. An additional 4 billion barrels of oil are estimated to be in the strata associated with this formation.[28] In Region I, Angelina, Nacogdoches, Panola, Rusk, Sabine, San Augustine, and Shelby counties overlie the Haynesville/Bossier Shale. Conventional oil and gas reserves underlie the other counties in the region, with significant well densities in Nacogdoches, Anderson, Cherokee, and Rusk counties. With recent increases in pipelines, refinery capacity, and liquefied natural gas (LNG) export terminals along the Gulf Coast, demands for East Texas oil and gas are predicted to continue to increase over the coming decades.

Concerns have arisen about the large volumes of water used by the petroleum industry, especially during fracking, and the potential degradation of surface and ground water quality in Region I from oil and gas drilling and production. In terms of water use, the total volume of water used during fracking is less than 1 percent of the total water used in Texas.[29] Furthermore, due to the great depths separating drinking water aquifers and shales undergoing fracking and the improvements in drilling technology, it is unlikely fracking will degrade Region I's groundwater resources. The movement of fracking fluids into drinking water aquifers has not been observed in Texas.[30] Surface spills and nonpoint stormwater discharges can result in impacts to surface waters when appropriate BMPs are not implemented.[31] However, effective stormwater and spill management practices have been shown to significantly reduce potential impacts from oil and gas development to water resources (McBroom et al., 2012).[32]

Lignite Coal Fields. Figure 1.20 shows lignite coal resources located in the region.[33] The Wilcox Group of potential deep basin lignite (200-2,000 feet in depth) underlies significant portions of Henderson, Smith, Cherokee, Rusk, and Nacogdoches counties. The Jackson-Yegua Group of potential deep basin lignite underlies significant portions of Houston, Trinity, Polk, Angelina, Nacogdoches, San Augustine, and Sabine counties. Finally, bituminous coal underlies a small portion of Polk County in the region.

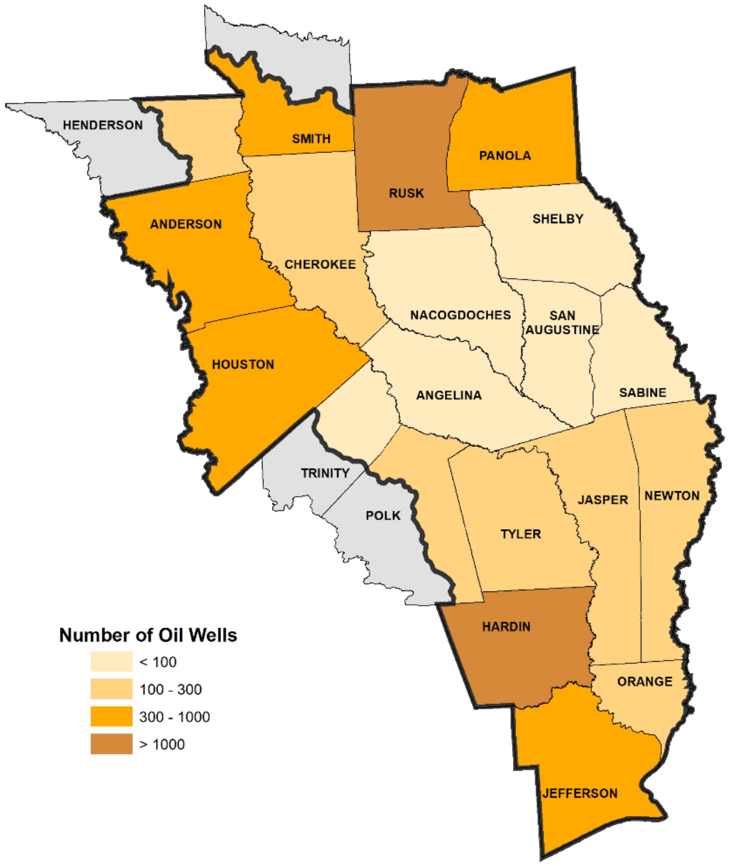


Figure 1.18 Top Producing Oil Wells

Note: Sourced from the Railroad Commission of Texas, September 2023

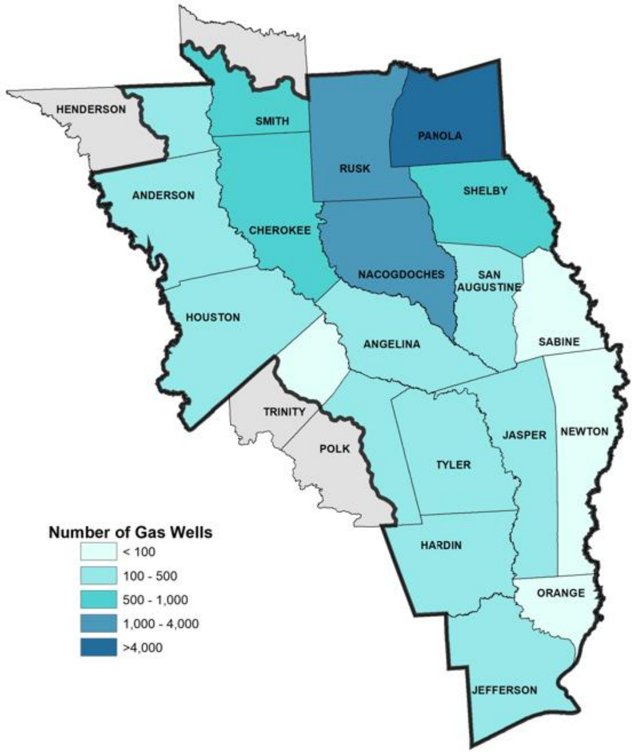


Figure 1.19 Top Producing Gas Wells

Note: Sourced from Railroad Commission of Texas, September 2023

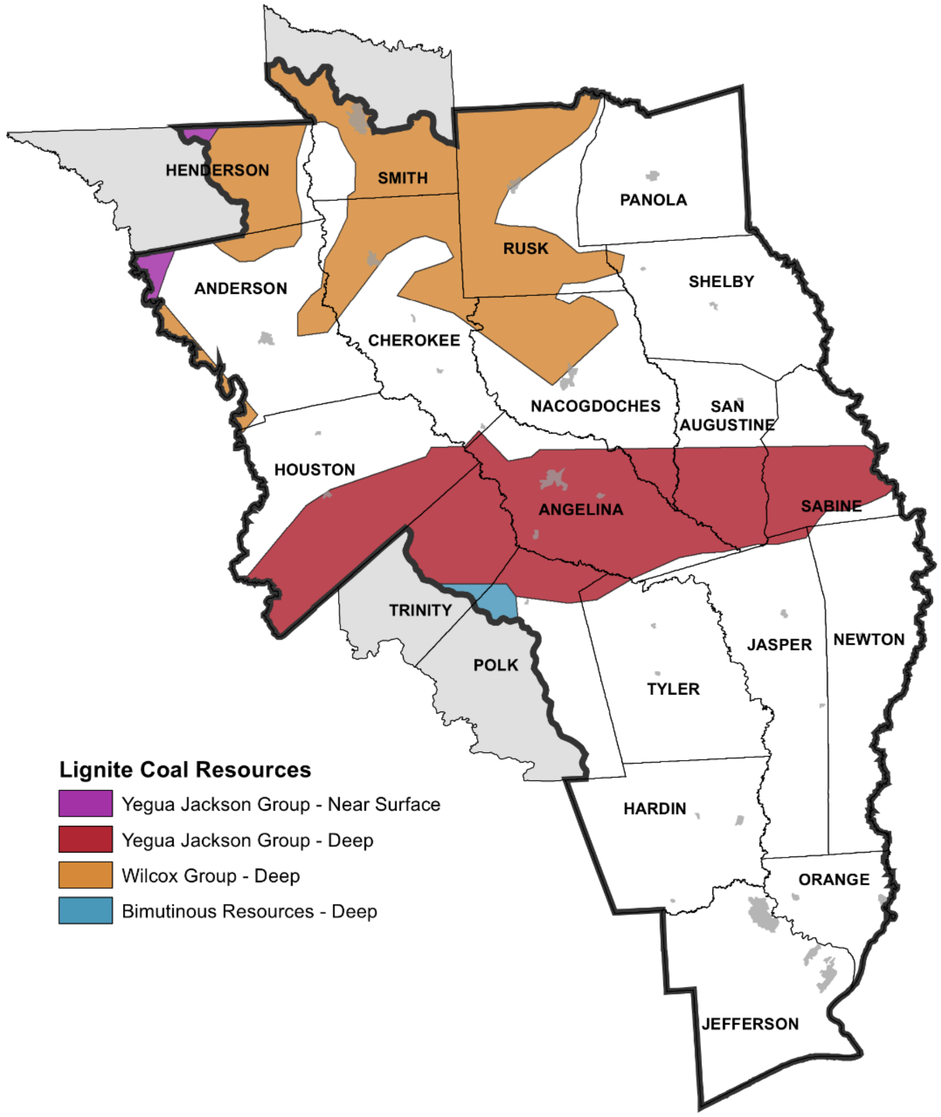


Figure 1.20 Lignite Coal Resources

Note: Sourced from Texas Almanac

1.6 THREATS TO WATER QUALITY

Water is a fundamental resource within the ETRWPA, essential for maintaining the health of its natural ecosystems. Inadequate water quantity and quality pose significant threats to these resources. This section outlines key challenges to water quality within the ETRWPA.

1.6.1 Surface Water Quality

The first major U.S. Law to address water pollution was the Federal Water Pollution Control Act of 1948. This law was amended in 1972, in what became known as the Clean Water Act (CWA). The preamble of the CWA states that the objective of the Act is to "restore and maintain the chemical, physical, and biological integrity of the Nations waters." The 1972 amendments to the act included the following sweeping new changes to the approach to water pollution control:

- Established the structure for the regulation of pollutant discharges to Waters of the United States.
- Gave authority to the United States Environmental Protection Agency to implement control programs (i.e., permitting requirements) for discharges of pollutants from point sources.
- Funded construction of wastewater treatment facilities.
- Recognized the need for planning to address concerns about pollution from non-point sources.
- Established a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands.

The CWA is a cornerstone of the water planning process in the United States and central to the regional planning process.

Water quality in the region is generally very good. The TCEQ monitors surface water quality and documents quality through its water quality inventory. Concerns about water quality impacts to aquatic life, contact recreation, or fish consumption are documented by the TCEQ.

Texas Clean Rivers Program was created in 1991 by the Texas Legislature to provide a network for monitoring water quality in the State's surface water bodies. The program is administered by the TCEQ; and the TCEQ partners with river authorities to improve the quality of surface water within each river basin in the State. The TCEQ and river authorities conduct water quality monitoring and assessment of streams, rivers, and lakes within their jurisdiction, and coordinate stakeholder participation in the process. The regional water authorities within the ETRWPA that have contracts with the TCEQ to participate as a Texas Clean Rivers Program partner include the Angelina Neches River Authority, Lower Neches Valley Authority, and Sabine River Authority of Texas.

1.7 THREATS TO AGRICULTURAL AND NATURAL RESOURCES

Water is essential to the ETRWPA's natural resources. A lack of water of adequate quality can present a significant threat to such resources. Some of the most significant potential threats in the ETRWPA are described below.

1.7.1 Drawdown of Aquifers

Overpumping of aquifers can pose a risk to household water use and livestock watering in localized rural areas. If water levels decline, the cost of pumping water increases, and water quality may change. In some cases, wells that are completed in the outcrop may go dry or wells constructed in a way that restricts the lowering of pumps may not be usable. These wells may need to be redrilled to deeper portions of the aquifer or abandoned altogether. Significant water level declines have been reported in localized areas in both the Carrizo-Wilcox and Gulf Coast aquifers,[34] the major aquifers in the region. Groundwater conservation districts work to ensure that the risk of excessive drawdown is minimized.

Overpumping of aquifers also poses a threat to estuarine wetlands. Between 1955 and 1992, approximately 19,900 acres of estuarine intertidal emergent wetlands were lost in Texas as a result of submergence (drowning) and erosion, probably due to faulting and land subsidence resulting from the withdrawal of underground water and oil and gas.[19] These losses occurred primarily between Freeport and Port Arthur. The risk of land subsidence is smaller for inland areas than for coastal areas due to the difference in compaction characteristics of the aquifers. In addition, groundwater conservation districts work to ensure that subsidence risks are minimized.

Overpumping of aquifers in coastal regions can lead to saltwater intrusion, where saltwater is drawn updip into the aquifer or moves vertically into freshwater portions of the aquifer and degrades the aquifer water quality. Saltwater intrusion into the Gulf Coast Aquifer has occurred previously in central and southern Orange County and Jefferson County.[34]

1.7.2 Insufficient Instream/Environmental Flows

Flow quantities and frequencies in rivers and streams are necessary to maintain the fish and wildlife habitat in the region. Insufficient flow quantities and patterns could pose a threat to fish and wildlife habitat. Additional discussion of environmental flows is provided in Chapter 3.

1.7.3 Inundation Due to Reservoir Development

Reservoir development causes unavoidable losses to wildlife resources. In 1990, the TPWD and USFWS developed preliminary data on the acreage of land and species impacted by 44 proposed reservoirs in Texas that appeared to be the most likely to be constructed. The project included in this report that affects the ETRWPA is Columbia (formerly called Eastex). Table 1.10 shows the impacts of potential reservoir development on the surrounding land and on protected species. For a complete list of potential reservoirs, refer to Chapter 8, Table 8.4.

The USFWS has defined the following site priorities used to preserve bottomland hardwood forests and forested riparian vegetation:

- Priority 1 - excellent quality bottomlands of high value to waterfowl;
- Priority 2 - good quality bottomlands with moderate waterfowl benefits;
- Priority 3 - excellent quality bottomlands with minor waterfowl benefits because of small size, lack of management potential, or other factors;
- Priority 4 - moderate quality bottomlands with minor waterfowl benefits;
- Priority 5 - sites proposed for elimination from further study because of low quality and/or no waterfowl benefits; and Priority 6- sites recommended for future study.

The proposed Rockland Reservoir would impact the bottomland hardwood site known as the “Middle Neches River,” which USFWS has identified as a Priority 1 preservation area. In addition, three USFWS Priority 2 bottomland hardwood preservation areas would be impacted: Neches River South, Piney Creek, and Russell Creek.

The USFWS has identified two preservation areas by construction of the Tennessee Colony Reservoir. The first is an area known as “Boone Fields,” located adjacent to the Trinity River between Saline Branch Creek and Catfish Creek, which contains upland forest and some bottomlands. The USFWS has classified this site as a Priority 5 preservation site. The reservoir would also affect a hardwood bottom in Region C known as “Tehuacana Creek.” The USFWS has also classified this site as a Priority 5 preservation site. The USFWS defines Priority 5 as “sites proposed for elimination from further study because of low quality and/or no waterfowl benefits.”[35]

Table 1.10 Potential Impacts of Development on Land Reservoir Area and Protected Species

Potential Impacts		Potential Reservoir Site			
		Columbia[36]	Rockland	Bon Wier	Tennessee Colony
Inundated Land (acres)	Mixed bottomland hardwood forest (2)	5,351	27,300	14,600	34,800
	Swamp/Flooded Hardwood Forest (2)	NA	NA	2,300	NA
	Pine-hardwood forest (3)	2,247	50,800	10,400	NA
	Post Oak-Water Oak-Elm Forest (3)	NA	NA	NA	19,200
	Grassland (4)	2,616	NA	NA	9,600
	Other	409	21,400	7,800	21,500
	TOTAL	**10,623**	**99,500**	**35,100**	**85,100**
Endangered Species Potentially Impacted	Interior least tern		•		
	Red-cockaded woodpecker	•	•	•	•
	Whooping crane				•
Threatened Species Potentially Impacted	Alligator snapping turtle	•	•	•	•
	American swallow-tailed kite	•	•	•	•
	Bachman's sparrow	•	•	•	•
	Bald Eagle	•	•	•	•
	Black bear	•	•	•	•
	Blue sucker		•	•	
	Creek chubsucker	•	•	•	
	Louisiana pigtoe	•	•	•	•
	Louisiana pine snake	•	•	•	•
	Northern scarlet snake	•	•	•	•
	Paddlefish	•	•	•	•
	Rafinesque's big-eared bat	•	•	•	
	Reddish egret		•	•	
	Sandbank pocketbook	•	•	•	•
	Southern hickorynut	•	•	•	•
	Texas heelsplitter	•	•	•	•
	Texas horned lizard	•	•	•	•
	Texas pigtoe	•	•	•	•
	Timber rattlesnake	•	•	•	•
	White-faced ibis	•	•	•	•
	Wood stork	•	•	•	•

Note: Sourced from U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and Texas Parks and Wildlife Department

Construction of the Tennessee Colony Reservoir would inundate approximately 13,800 acres of bottomland, which comprise the Richland Creek Wildlife Management Area in Region C. The TPWD acquired this area as mitigation for wildlife losses associated with the construction of Richland-Chambers Dam and Reservoir in Region C.[37] The Wildlife Management Area is located in Freestone County on the west side of the Trinity River within the boundaries of the proposed Tennessee Colony Reservoir.

The U.S. Army Corps of Engineers designed the Tennessee Colony Reservoir in 1979, but the project encountered numerous concerns about conflicts with development of lignite in the area and with existing communities and water supply lakes. The project has been deferred pending removal of the lignite.

1.8 CONSIDERATION OF EXISTING WATER PLANNING EFFORTS

The ETRWPA published its first round of regional water planning in 2001. This plan was updated according to legislative and TWDB requirements in 2006, 2011, 2016 and again in 2021. The 2026 Plan makes up the 5th update to the regional water plan during this 6th cycle of regional water planning. Over the course of these planning efforts, other ongoing planning efforts, as well as existing water resource programs, have been an integral part of the process. Coordination efforts with TWDB Regions C, D, and H (all adjacent to the ETRWPA) have occurred for consistency across plans. In addition, water plans specific to WUGs and WWPs were considered in the evaluation of Water Management Strategies (WMSs) included in Chapter 5B. Following is a summary of planning efforts and existing programs that have been considered and utilized by the RWPG.

1.8.1 State, Regional, and Local Water Management Planning

Water planning in the ETRWPA incorporates a combination of published plans summarizing water planning efforts, past and present. The 1990 Texas Water Plan, a state-level planning effort, determined there was a geographic disparity in water availability. As a result of finding, the Trans-Texas Water Program (TTWP) was created. The TTWP developed sound regional WMSs for areas of southeast, south-central, and west-central Texas. It considered issues associated with the rapid growth of the Houston, San Antonio, Austin, and Corpus Christi areas and the possibility of moving water from the water-rich areas of southeast Texas (essentially the ETRWPA now) to these more urbanized demand centers. In 1998, the Phase II Report of the TTWP determined that southeast Texas could play an important role in meeting expected regional demands by exporting water to central Texas. The report looked at a 50-year planning horizon and identified 13 WMSs that could be implemented to satisfy long-range demands in the study area. Among the conclusions of the TTWP were the following:

- Southeast Texas (essentially the ETRWPA) possessed adequate surface and groundwater resources to supply its own demands and support meeting demands of other areas of south-central and west-central Texas.
- Water conservation, wastewater reclamation, and systems operations can extend the period of adequate supply and delay the need for new resources development in the Houston metropolitan area.
- The Neches Saltwater Barrier would create additional supply from existing resources.
- Contractual transfers of existing supplies can result in additional reduced conveyance requirements.
- Interbasin transfer of water will be needed to meet future water requirements of both the southeast and central Texas areas.
- Desalination is not an appropriate economic or environmental strategy for use in the southeast area.

Besides the TTWP, Senate Bill 1 (SB1) in 1997 introduced a regional approach to water planning. This law was a response to severe drought conditions and marked a departure from previous methods, emphasizing collaborative, area-specific strategies for water management. The creation of regional water planning groups, including Region I (ETRWPA), was a direct outcome of SB1, reflecting a shift towards more localized and effective water resource management across Texas.

Since 1997, the area known as the ETRWPA has relied largely on the regional water planning process for development of long-range water plans. However, there are several ongoing efforts within the region aimed at planning for future water needs. These efforts have been recognized by the RWPG and their results incorporated into the regional planning process.

Local planning efforts within the region have included water conservation plans developed by water user groups and wholesale water providers. Chapter 6 includes further discussion of these plans. Groundwater conservation districts within the region have prepared groundwater management plans and water conservation plans aimed at providing a degree of long-range planning for groundwater resources under their jurisdiction. Groundwater conservation districts are identified in Section 1.3.1 of Chapter 1.

1.8.2 Comprehensive Sabine Watershed Management Plan

This report was completed in December 1999. It was prepared for the SRA of Texas in conjunction with the TWDB, Contract # 97-483-214; Freese and Nichols, Inc., Brown and Root, Inc., and LBG-Guyton Associates (now WSP USA). This plan was developed over a period from 1996 through 1999 as an update to a 1985 master plan for the basin. The plan points out the two distinct geographic regions of the basin, upstream and downstream from the upstream end of Toledo Bend Reservoir in Panola County.

TWDB consensus planning population and water use projections showed water use in the Upper Basin to increase from 197,000 to 457,000 ac-ft per year from 1990 to 2050. Lower Basin use was shown to increase from 79,000 to 164,000 ac-ft per year from 1990 to 2050. No new water supplies for the Lower Basin were recommended. A total of 93,000 ac-ft per year of new supplies were recommended for the Upper Basin, including a proposed Prairie Creek Reservoir.

1.8.3 Trinity River Basin Master Plan

This study was originally adopted by the Trinity River Authority of Texas in 1958 and has been updated various times since then, most recently in August 2023. Nearly 81 percent of the Trinity River Basin falls into Regions C or H while less than 8 percent of this basin is located within the ETRWPA.

Reservoirs are primary water sources in the Trinity River basin, with 32 identified by TWDB, providing significant economic, recreational, and water supply benefits. Groundwater, governed differently than surface water, is managed by Groundwater Conservation Districts to promote efficient use and prevent wastage. Reuse has steadily grown into an important component of water supplies in the Trinity basin.

The TCEQ 2020 Texas Integrated Report (assessment date range 12/1/2011 to 11/30/2018) and the Trinity River Authority Clean Rivers Program 2020 Basin Summary Report (date range 12/1/2003 to 11/30/2018) indicate water quality in the Trinity River Basin is generally of high quality. The major issues prevalent within the basin are listings for bacteria, concerns for chlorophyll-a and nutrients, low dissolved oxygen in smaller tributaries, and fish consumption advisories.

1.8.4 Regional and State Flood Plans

In 2019, the Texas Legislature and Governor Abbott enhanced the TWDB's role in flood planning. The TWDB now manages a new state and regional flood planning process aligned with river basins. This involves 15 Regional Flood Planning Groups (RFPGs) which have submitted regional flood plans, now approved by the TWDB for integration into a statewide flood plan. A crucial aspect of this process is assessing how floodwater projects can augment water supplies, reflecting Texas's water management approach aimed at optimizing resources and benefits in both flood management and water resource planning.

1.8.5 Consideration of Other Publicly Available Plans

The RWPG provided significant outreach to various municipal, agricultural, and manufacturing water users in the current round of planning to ensure existing plans for water conservation, water resource planning, drought contingency, and other planning tools were appropriately considered in the 2026 Plan. Municipal WUGs and wholesale water providers were specifically queried regarding the existence of planning documents. Existing Plans have been requested of industries as well.

1.9 DROUGHT OF RECORD

In regional water planning, the availability of water supplies is determined for drought of record conditions. The drought of the 1950s is widely considered to be the drought of record, but on regional or sub-regional bases, other periods of time may have been more severe. Chapter 7 presents the current drought of record for each major reservoir in the ETRWPA and evaluates more recent droughts of record in the region. The drought of record varies across different geographic locations in the ETRPWA. As described in Chapter 7, there have been four primary droughts of record in the East Texas Region:

- The drought of the 1950s in the western and central portions of the region.
- The drought beginning in about 1962 and spanning the mid-1960s for eastern and north central portions of the region.
- The drought period in the late 1960s to early 1970s in the north central portion of the region.
- The drought of the early 2010s in the north central portion of the region.

1.10 CURRENT DROUGHT PREPARATIONS

Drought contingency and water conservation planning represent important components of the water planning process. Water conservation includes measures that may be taken to reduce water consumption under all conditions and at all times. While water conservation does not generally eliminate the need for future water supply sources, it can result in the ability to delay development of costly strategies. Water conservation improves the effective use of existing sources. Drought management is designed to preserve existing water supplies during extreme dry periods. Drought management strategies are, therefore, temporary measures intended to result in significantly reduced water use in a short period of time. Drought contingency and water conservation are discussed further in Chapters 7 and 5C, respectively.

1.11 WATER LOSS AND WATER AUDITS

The 78th Texas Legislature passed legislation in 2005 requiring retail public utilities that provide potable water to perform a water audit, computing the utility's most recent annual water loss every five years. Since then, the TWDB established new requirements for water audit reporting; these requirements are summarized as follows:

- Retail water suppliers with an active financial obligation with the TWDB are required to submit a water loss audit annually.
- Retail water suppliers with more than 3,300 connections are required to submit a water loss audit annually.
- All public utilities are required to submit a water loss audit once every five years.

Statewide water loss audit summaries for public utility audits submitted for 2019 through 2021 were performed. Appendix 1-B contains the 2019 through 2021 water loss audit data reported by ETRWPA utilities and a summary of the average water loss audit data by planning region. Based on data from responding utilities, the ETRWPA demonstrates an average non-revenue water of 55 gallons per connection per day (gcd) (the state average from 2019 to 2021 for non-revenue water is 55 gcd), where 47 gcd was attributed to real loss and 8 gcd to apparent loss. Apparent loss includes unauthorized consumption, meter inaccuracies, and data discrepancies.

The RWPG used the water loss audits to determine the potential water savings from water loss mitigation strategies for municipal WUGs. More detail regarding these strategies and their development is provided in Chapters 5A, 5B, and 5C.

1.12 THREATS ADDRESSED OR AFFECTED BY WATER MANAGEMENT STRATEGIES

Water management strategies were evaluated for impacts as addressed in Chapter 5B of this Plan. The evaluation was based on a numeric evaluation from most desirable (1) to least desirable (5). The major potential impact was determined to be the crossing of wetlands during the construction process. The long-term impact after construction was expected to be minimal. The results of this study were considered and incorporated as appropriate into the development of WMSs in Chapter 5B. For discussion on drawdown on aquifers, insufficient instream/environmental flows, and inundation due to reservoir development, see Section 1.7 of this chapter.

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Chapter 2: Current and Projected Population and Water Demand
2026 Initially Prepared Plan

Prepared for:
East Texas Regional Water Planning Group

February 2025

Chapter 2. Current and Projected Population and Water Demand

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LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ac-ft/yr	acre-feet per year
DB27	Regional Water Planning Database
EIA	Energy Information Administration
ETRWPA	East Texas Regional Water Planning Area
ETRWPG	East Texas Regional Water Planning Group
FWSD	Fresh Water Supply District
GPCD	Gallons Per Capita Per Day
LNVA	Lower Neches Valley Authority
MUD	Municipal Utility District
MWD	Municipal Water District
MWP	Major Water Provider
NTMWD	North Texas Municipal Water District
POA	Property Owner Associations
RWP	Regional Water Plan
SUD	Special Utility District
TDC	Texas Demographic Center
TDCJ	Texas Department of Criminal Justice
TPWD	Texas Parks and Wildlife
TWDB	Texas Water Development Board
WCID	Water Control and Improvements District
WMS	Water Management Strategy
WSC	Water Supply Corporation
WUG	Water User Group
WWP	Wholesale Water Provider

Chapter 2. Current and Projected Population and Water Demand

2 CURRENT AND PROJECTED POPULATION AND WATER DEMAND

Water demand projections, which consist of municipal and non-municipal demand, are a key component of water planning within the East Texas Regional Water Planning Area (ETRWPA). This chapter documents the methodologies and results of those demand projections. Municipal demand is estimated in part, based on population projections for the region. Non-municipal demand encompasses manufacturing, irrigation, steam-electric power, livestock, and mining water use categories. The ETRWPA includes 208 municipal water user groups (WUGs) and 100 non-municipal WUGs from 20 counties, totaling 308 WUGs. Of the 208 municipal WUGs, 187 are primarily located in Region I, with the remainder in adjacent regions. This chapter also covers water sales between water user groups (WUGs) and demand projections for Major Water Providers (MWPs).

2.1 METHODOLOGY FOR UPDATING DEMANDS

For the 2026 Regional Water Plan (2026 Plan), the Texas Water Development Board (TWDB) provided initial population and demand projections (i.e., draft projections) for water users in the region. The East Texas Regional Water Planning Group (ETRWPG) forwarded those projections to the respective entities within the ETRWPA for review. After reviewing the comments received from these entities, the projections were revised and adopted by the ETRWPG and the TWDB.

Municipal water demand projections were determined for each municipal WUG using population projections, baseline per capita use (gallons per capita per day – GPCD), and projected plumbing code savings. Population projections were based on county-level projections from the Texas Demographic Center (TDC), which used migration rates between the 2010 and 2020 decennial Census to project potential future growth. TWDB provided the ETRWPG two sets of WUG-level population projections, based on varying migration scenarios, to consider using for the ETRWPA: 1.0 migration (full net migration rates from 2010 to 2020) and 0.5 migration (half of the net migration rates from 2010 to 2020). As a conservative estimate for planning, the ETRWPG selected varying population migration scenarios at the county-level based on whichever migration scenario had a greater projection. The selected population migration scenario for each county were then applied to the respective WUGs within those counties, as shown in Appendix 2-A. -Baseline GPCDs for individual WUGs were determined based on an evaluation of historical, annual GPCDs that reflected water use during a characteristically dry year. Projected GPCDs accounted for projected reductions in demands associated with water conservation achieved through eventual compliance with plumbing codes. Plumbing code savings projections for individual WUGs were developed by TWDB. On a regional basis, these plumbing code savings are projected to reduce municipal water use by 2.9 percent (over 6,800 acre-feet per year (ac-ft/yr)) by 2080. Additional details are available in Chapter 5C and Appendix 5C-A.

Demands for non-municipal use categories were developed by TWDB with input from representatives of these areas. The TWDB provided initial projections of demand for the non-municipal use categories. These draft projections were evaluated by the ETRWPG through a detailed reviewed of historical usage data, the methodologies used to develop the projections, and comparisons between the 2026 and 2021 Plan projections.

The following changes were made to the TWDB's initial municipal demand projections and are included in the 2026 Plan:

- Selected different population migration scenarios for each county;
- Adjusted baseline GPCDs to reflect more recently available water use data.
- Redistribution of population and demand projections between Angelina Water Supply Corporation (WSC) and County-Other Areas within Angelina County.

- Increases in population and demand projections for Lumberton Municipal Utility District (MUD) and North Hardin WSC within Hardin County and decreases in population and demand projection within Hardin County-Other to offset the requested changes in population in Nordin WSC.
- Redistribution of population and demand projections between Mauriceville MUD and County-Other Areas within Jasper, Newton, and Orange Counties.
- Redistribution of population and demand projections between Huxley and County-Other Areas within Shelby County.
- Increases in population and demand projections for Tyler and decreases in population and demand projection within Smith County-Other to offset a portion of the requested increases in Tyler within Smith County.

Correspondence related to these changes is provided in Appendix 2-B. A summary of historical population, net water use estimates, and historical GPCD estimates by county are presented in Appendix 2-C. A summary of population projections and water demands by county and basin are presented as TWDB Regional Water Planning Database (DB27) reports in Appendix ES-A, Report 01.

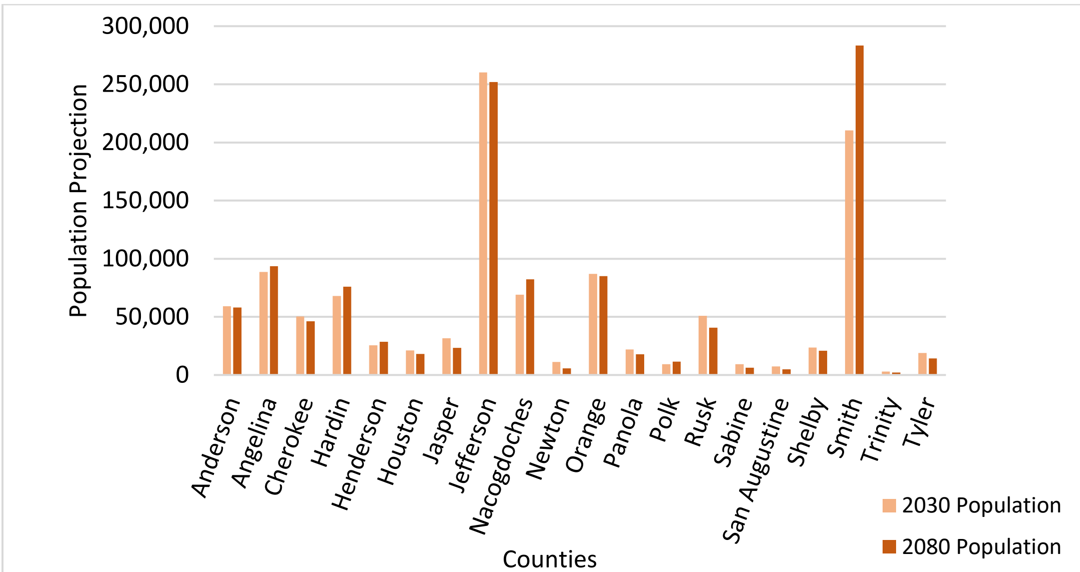
The following changes were made to the TWDB's initial non-municipal demand projections and are included in the 2026 Plan:

- **Manufacturing Demands**: Projected demand was adjusted to include the estimated water use for new manufacturing facilities in a recalculated baseline demand projection for Angelina, Newton, Orange, and Smith counties. For Jefferson County, an alternate projection is recommended based on feedback from Major Water Providers and analysis of trends in increased manufacturing water use over the last decade. No changes are proposed for all other counties in Region I.
- **Irrigation Demands**: Projected demand was adjusted to account for the greater demand of the TWDB draft 2026 RWP irrigation projections (2015-2019 average historical use) or the average historical use during the dry period from 2010-2014.
- **Steam-Electric Power Demands**: Projected demand was adjusted to include a new Steam-Electric power generating facility in Orange County.
- **Livestock Demands**: Projected demand was adjusted to reflect the maximum historical livestock use, by county, between 2015-2019, rather than the average use during that same period. Additionally, it is recommended to factor in Texas Parks and Wildlife (TPWD) contracts with the LNVA for 10,000 ac-ft/yr in both Jasper and Nacogdoches counties for all decades into the livestock demand projections.
- **Mining Demands**: No change was recommended by the ETRWPG.

Following this section is a discussion of population growth and municipal water demand presented by county. In addition, discussion of anticipated water demands for the various non-municipal categories of water use is provided.

2.2 POPULATION GROWTH PROJECTIONS

The population in the ETRWPA is projected to increase from 1,126,375 in 2030 to 1,170,658 in 2080. The major centers of population (i.e., Angelina, Jefferson, Orange and Smith counties) comprise approximately 60 percent of the population throughout the entire planning period. The projection of population growth from 2030 to 2080 by county is presented on Figure 2.1. The expected annual change in population for each county, using average annual growth during the planning period, is presented on Figure 2.2. The largest change in percentage growth is expected in Nacogdoches, Polk, and Smith counties. The distribution of population by county and individual entity is provided in Table 2.1. A municipal WUG is defined as a privately-owned utility, state or federal water system, or retail public utility that provides more than 100 ac-ft/yr; municipal water use not meeting this criterion is aggregated into a category referred to as "county-other" by county. The WUGs identified in Figure 2.1 meet these definitions; however, where a demand less than the 100 ac-ft/yr threshold is shown, the WUG is split between counties within the region or split between regions within the State.



Note: Population projections are adopted by the TWDB.

Figure 2.1 Population Projections for the East Texas Regional Water Planning Area by County (2030-2080)

As shown in Figure 2.1, the population projections for several counties within Region I are expected to decrease. However, the Region I RWPG has concerns with these projections, believing they are underestimated. The TWDB provided these projections based on county-level data from the TDC, using migration rates between the 2010 and 2020 Census. According to the U.S. Census Bureau, the 2020 Census had undercounts in six states including Texas and overcounts in eight states. It is estimated that the Texas population was undercounted by 1.92 percent, which may have contributed to discrepancies in population projection.[1]

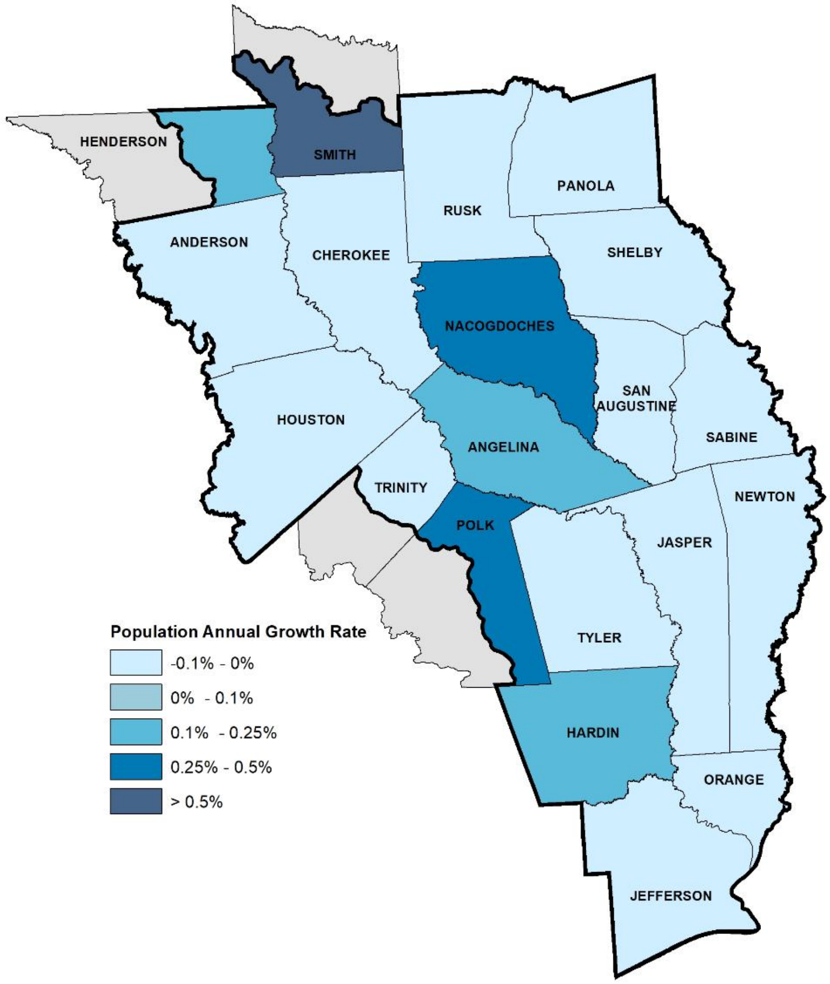


Figure 2.2 Population Annual Growth Rate

Table 2.1 Population Projections for the East Texas Regional Water Planning Area by County

County/WUG	Population Projection					
	2030	2040	2050	2060	2070	2080
ANDERSON						
Four Pines WSC	3,351	3,351	3,319	3,287	3,256	3,223
Berryville	15	15	15	15	15	14
Slocum WSC	2,823	2,819	2,782	2,747	2,711	2,677
Neches WSC	1,226	1,224	1,208	1,193	1,177	1,162
County-Other, Anderson	4,595	4,423	4,283	4,038	3,766	3,476
Norwood WSC	977	976	964	952	940	927
Elkhart	1,796	1,795	1,774	1,752	1,732	1,711
TDCJ Coffield Michael	5,755	5,755	5,755	5,755	5,755	5,755
Brushy Creek WSC (c)	2,812	2,808	2,771	2,736	2,701	2,666
Frankston	1,001	1,000	987	974	962	949
Palestine	17,658	17,639	17,423	17,213	17,004	16,793
Walston Springs WSC	3,173	3,441	3,732	4,047	4,389	4,760
The Consolidated WSC	2,809	2,852	2,896	2,940	2,985	3,031
Anderson County Cedar Creek WSC	706	705	696	686	677	669
B B S WSC (c)	1,064	1,061	1,048	1,035	1,021	1,008
B C Y WSC	1,645	1,642	1,620	1,600	1,580	1,559
Frankston Rural WSC	1,563	1,561	1,540	1,521	1,502	1,482
Pleasant Springs WSC	900	899	887	876	866	854
TDCJ Beto Gurney and Powledge Units	4,311	4,311	4,311	4,311	4,311	4,311
Tucker WSC	967	966	953	941	929	917
ANDERSON COUNTY TOTAL	**59,147**	**59,243**	**58,964**	**58,619**	**58,279**	**57,944**
ANGELINA						
Angelina WSC	3,845	3,913	3,941	3,979	4,017	4,052
Redland WSC	2,596	2,640	2,660	2,685	2,711	2,736
M and M WSC	3,205	3,262	3,284	3,317	3,348	3,379
Four Way SUD	5,220	5,309	5,348	5,399	5,452	5,501
Central WCID of Angelina County	6,016	6,124	6,181	6,242	6,303	6,364
Upper Jasper County Water Authority	249	248	248	248	248	248
Lufkin	40,845	41,558	41,880	42,290	42,694	43,097
Diboll	4,546	4,630	4,680	4,728	4,776	4,823
County-Other, Angelina	4,984	5,072	5,124	5,175	5,226	5,277
Hudson WSC	10,407	10,587	10,667	10,771	10,873	10,975
Huntington	2,117	2,154	2,172	2,193	2,214	2,235
Zavalla	688	699	705	711	717	725
Pollok-Redtown WSC	1,786	1,816	1,830	1,848	1,866	1,884
Woodlawn WSC	2,130	2,167	2,182	2,205	2,226	2,246
ANGELINA COUNTY TOTAL	**88,634**	**90,179**	**90,902**	**91,791**	**92,671**	**93,542**

Table 2.1 Population Projections for the East Texas Regional Water Planning Area by County (Cont.)

County/WUG	Population Projection					
	2030	2040	2050	2060	2070	2080
CHEROKEE						
Jacksonville	13,352	13,218	12,975	12,705	12,435	12,165
Alto	940	930	914	892	873	852
Alto Rural WSC	4,021	4,398	4,813	5,275	5,786	6,353
Bullard	375	371	365	356	349	340
Gum Creek WSC	1,106	1,095	1,073	1,050	1,025	1,001
Rusk Rural WSC	3,378	3,353	3,301	3,240	3,182	3,126
Craft Turney WSC	4,720	4,671	4,580	4,478	4,377	4,274
County-Other, Cherokee	3,903	3,340	2,644	1,874	1,046	153
North Cherokee WSC	3,995	3,952	3,875	3,789	3,704	3,616
Walnut Grove WSC	81	81	79	78	76	74
New Summerfield	910	900	883	863	844	824
West Jacksonville WSC	1,605	1,588	1,556	1,523	1,487	1,453
Afton Grove WSC	1,439	1,477	1,518	1,562	1,608	1,657
Wells	793	838	886	937	993	1,054
Rusk	5,226	5,252	5,265	5,272	5,291	5,322
Troup	59	58	57	56	55	53
Southern Utilities (c)	3,372	3,336	3,271	3,198	3,126	3,053
Wright City WSC	325	320	314	308	300	294
Blackjack WSC	515	509	499	488	477	465
Pollok-Redtown WSC	75	74	74	72	70	68
South Rusk County WSC	27	28	26	27	23	23
CHEROKEE COUNTY TOTAL	**50,217**	**49,789**	**48,968**	**48,043**	**47,127**	**46,220**
HARDIN						
Lake Livingston WSC	146	146	144	140	137	134
County-Other, Hardin	9,607	8,776	7,756	6,439	5,101	3,732
Kountze	2,141	2,129	2,103	2,057	2,010	1,965
Silsbee	7,825	8,260	8,719	9,203	9,714	10,253
Wildwood POA	625	620	612	598	584	570
Lumberton MUD	33,189	40,689	47,439	46,337	45,245	44,174
Sour Lake	1,580	1,570	1,549	1,514	1,478	1,444
West Hardin WSC (c)	3,736	3,712	3,664	3,579	3,496	3,414
North Hardin WSC	8,016	8,228	8,445	8,668	8,896	9,131
Hardin County WCID 1	985	1,003	1,021	1,039	1,058	1,077
HARDIN COUNTY TOTAL	**67,850**	**75,133**	**81,452**	**79,574**	**77,719**	**75,894**

Table 2.1 Population Projections for the East Texas Regional Water Planning Area by County (Cont.)

County/WUG	Population Projection					
	2030	2040	2050	2060	2070	2080
HENDERSON						
Berryville	727	697	752	757	762	766
Brownsboro	1,285	1,395	1,377	1,419	1,461	1,503
Brushy Creek WSC (c)	30	31	30	30	30	30
Frankston	35	39	38	40	41	43
County-Other, Henderson	9,030	8,469	7,638	6,482	4,988	3,076
Bethel Ash WSC (c)	2,752	2,773	2,885	2,932	2,978	3,022
Leagueville WSC	2,230	2,374	2,374	2,438	2,502	2,566
Chandler	4,095	5,045	6,216	7,658	9,435	11,624
Athens	210	213	211	211	211	211
Murchison	576	567	600	607	613	619
Virginia Hill WSC (c)	1,693	1,752	1,788	1,827	1,865	1,903
R P M WSC	415	458	446	461	476	491
Edom WSC	262	284	280	289	297	306
Moore Station WSC	2,134	2,307	2,283	2,352	2,421	2,489
HENDERSON COUNTY TOTAL	**25,474**	**26,404**	**26,918**	**27,503**	**28,080**	**28,649**
HOUSTON						
Grapeland	1,336	1,363	1,401	1,417	1,433	1,450
Lovelady	483	463	443	433	425	417
County-Other, Houston	2,689	1,931	1,362	835	396	6
Crockett	6,099	5,743	5,184	5,032	4,827	4,583
TDCJ Eastham Unit	2,464	2,464	2,464	2,464	2,464	2,464
The Consolidated WSC	7,723	8,034	8,364	8,541	8,692	8,837
Pennington WSC (c)	427	387	329	310	285	260
HOUSTON COUNTY TOTAL	**21,221**	**20,385**	**19,547**	**19,032**	**18,522**	**18,017**
JASPER						
Jasper	7,339	6,997	6,577	6,198	5,821	5,452
Jasper County WCID 1	1,968	1,960	1,969	1,996	2,052	2,146
Kirbyville	2,015	2,009	2,018	2,048	2,106	2,205
Rural WSC	1,074	1,019	953	893	833	774
Upper Jasper County Water Authority	3,590	3,411	3,188	2,990	2,793	2,596
County-Other, Jasper	11,288	10,484	9,474	8,506	7,479	6,355
Brookeland FWSD	289	274	256	239	224	207
Mauriceville SUD	148	152	149	143	135	127
Rayburn Country MUD	825	783	732	687	641	596
South Jasper County WSC	2,180	2,069	1,934	1,814	1,693	1,573
South Kirbyville Rural WSC	901	932	972	1,023	1,092	1,186
JASPER COUNTY TOTAL	**31,617**	**30,090**	**28,222**	**26,537**	**24,869**	**23,217**

Table 2.1 Population Projections for the East Texas Regional Water Planning Area by County (Cont.)

County/WUG	Population Projection					
	2030	2040	2050	2060	2070	2080
JEFFERSON						
Port Arthur	47,614	48,091	47,961	47,383	46,812	46,249
Beaumont	126,810	130,315	133,916	132,179	130,458	128,755
China	980	990	988	976	964	952
Jefferson County WCID 10	3,939	3,978	3,968	3,919	3,872	3,825
County-Other, Jefferson	13,678	11,655	7,478	6,824	6,184	5,529
Meeker MWD	2,598	2,624	2,616	2,585	2,553	2,524
Bevil Oaks	1,039	1,049	1,047	1,035	1,021	1,009
Nederland	19,417	19,612	19,557	19,321	19,088	18,859
Federal Correctional Complex Beaumont	4,514	4,514	4,514	4,514	4,514	4,514
Groves	16,971	16,971	16,971	16,971	16,971	16,971
Port Neches	13,887	14,027	13,988	13,819	13,652	13,487
Trinity Bay Conservation District	208	210	209	211	204	204
West Jefferson County MWD	8,182	8,232	8,306	8,407	8,511	8,618
Nome	513	519	516	511	504	498
JEFFERSON COUNTY TOTAL	**260,350**	**262,787**	**262,035**	**258,655**	**255,308**	**251,994**
NACOGDOCHES						
Nacogdoches	36,389	37,462	38,422	39,870	41,314	42,756
Appleby WSC	3,646	3,766	3,876	4,060	4,242	4,421
Garrison	862	889	911	948	985	1,020
Lilly Grove SUD	2,461	2,541	2,614	2,736	2,856	2,975
County-Other, Nacogdoches	6,209	6,414	6,603	6,917	7,226	7,530
Woden WSC	2,211	2,283	2,349	2,461	2,571	2,679
D and M WSC	7,496	7,743	7,968	8,346	8,720	9,086
Swift WSC	2,556	2,641	2,717	2,848	2,975	3,100
Cushing	792	819	842	882	922	960
Melrose WSC	2,482	2,564	2,638	2,764	2,886	3,009
Caro WSC	2,567	2,652	2,729	2,859	2,987	3,112
Etoile WSC	1,450	1,497	1,541	1,614	1,686	1,757
NACOGDOCHES COUNTY TOTAL	**69,121**	**71,271**	**73,210**	**76,305**	**79,370**	**82,405**

Table 2.1 Population Projections for the East Texas Regional Water Planning Area by County (Cont.)

County/WUG	Population Projection					
	2030	2040	2050	2060	2070	2080
NEWTON						
Newton	1,506	1,371	1,223	1,087	956	832
South Newton WSC	1,641	1,483	1,312	1,157	1,004	858
Bon Wier WSC	418	363	305	252	200	147
County-Other, Newton	6,641	5,952	5,228	4,571	3,924	3,276
Brookeland FWSD	395	357	316	279	242	206
Mauriceville SUD	468	468	439	397	349	298
South Kirbyville Rural WSC	124	111	98	87	75	64
NEWTON COUNTY TOTAL	**11,193**	**10,105**	**8,921**	**7,830**	**6,750**	**5,681**
ORANGE						
Bridge City	11,861	12,737	12,855	13,221	13,562	13,878
Orange	20,001	20,422	20,510	20,303	20,096	19,889
Pinehurst	2,119	2,162	2,171	2,148	2,125	2,102
South Newton WSC	1,321	1,351	1,357	1,344	1,331	1,318
Orange County WCID 2	3,082	3,067	3,072	2,978	2,887	2,799
Orange County WCID 1	12,233	11,685	11,655	10,896	10,170	9,475
County-Other, Orange	17,181	16,091	14,664	12,692	10,659	8,472
Orangefield WSC	7,386	8,448	9,662	11,051	12,640	14,457
Kelly G Brewer	1,091	1,100	1,104	1,081	1,059	1,037
Mauriceville SUD	10,790	11,416	11,769	11,869	11,836	11,737
ORANGE COUNTY TOTAL	**87,065**	**88,479**	**88,819**	**87,583**	**86,365**	**85,164**
PANOLA						
Carthage	6,237	6,186	6,098	5,982	5,870	5,760
Gill WSC	561	525	477	445	413	381
County-Other, Panola	11,269	10,919	10,340	9,924	9,492	9,046
Beckville	654	581	519	466	421	383
Elysian Fields WSC	39	41	42	45	46	46
Tatum	173	134	104	80	61	46
Panola-Bethany WSC (c)	725	646	579	522	473	432
Clayton WSC	188	206	228	238	249	260
Minden Brachfield WSC	114	136	165	181	197	212
Deberry WSC	477	420	345	299	253	206
Hollands Quarter WSC	928	888	836	797	758	721
Rehobeth WSC	544	492	423	378	333	290
PANOLA COUNTY TOTAL	**21,909**	**21,174**	**20,156**	**19,357**	**18,566**	**17,783**

Table 2.1 Population Projections for the East Texas Regional Water Planning Area by County (Cont.)

County/WUG	Population Projection					
	2030	2040	2050	2060	2070	2080
POLK						
Corrigan	1,409	1,519	1,572	1,630	1,688	1,744
Lake Livingston WSC	1,115	1,205	1,250	1,298	1,346	1,392
County-Other, Polk	4,062	4,388	4,548	4,724	4,897	5,071
Damascus-Stryker WSC	1,544	1,668	1,729	1,797	1,862	1,927
Moscow WSC (c)	590	636	660	686	711	735
Leggett WSC	14	15	16	16	17	17
Chester WSC	289	312	323	336	348	360
Soda WSC	150	162	169	175	182	188
POLK COUNTY TOTAL	**9,173**	**9,905**	**10,267**	**10,662**	**11,051**	**11,434**
RUSK						
Elderville WSC	1,497	1,451	1,378	1,296	1,215	1,133
Garrison	4	4	3	3	3	3
Kilgore	3,657	3,550	3,377	3,183	2,990	2,796
New London	786	762	725	682	641	598
Overton (c)	1,960	1,902	1,810	1,707	1,604	1,502
Southern Utilities (c)	408	396	375	353	331	307
Cross Roads SUD (c)	2,814	2,924	3,048	3,195	3,363	3,556
Wright City WSC	155	151	143	135	126	118
Chalk Hill SUD (c)	2,772	2,686	2,551	2,399	2,247	2,095
Crystal Farms WSC	1,349	1,482	1,634	1,812	2,016	2,255
County-Other, Rusk	9,261	8,359	6,944	5,234	3,412	1,454
Gaston WSC	1,339	1,298	1,232	1,159	1,086	1,013
Jacobs WSC	2,645	2,803	2,980	3,187	3,421	3,691
Mt Enterprise WSC	1,392	1,349	1,281	1,204	1,128	1,052
Tatum	1,329	1,288	1,223	1,151	1,078	1,005
West Gregg SUD	87	106	132	163	204	255
Ebenezer WSC	717	696	660	620	581	542
Henderson	12,409	12,285	12,208	12,198	12,237	12,334
Goodsprings WSC	2,261	2,191	2,081	1,957	1,833	1,709
Minden Brachfield WSC	1,884	1,827	1,735	1,633	1,529	1,425
New Prospect WSC	942	911	866	815	763	711
South Rusk County WSC	1,356	1,314	1,249	1,174	1,100	1,025
RUSK COUNTY TOTAL	**51,024**	**49,735**	**47,635**	**45,260**	**42,908**	**40,579**

Table 2.1 Population Projections for the East Texas Regional Water Planning Area by County (Cont.)

County/WUG	Population Projection					
	2030	2040	2050	2060	2070	2080
SABINE						
Hemphill	982	903	830	787	746	706
Pineland	898	818	746	702	659	615
G M WSC	5,503	5,013	4,562	4,290	4,021	3,753
Brookeland FWSD	514	469	425	402	376	351
New WSC	66	59	54	50	48	45
County-Other, Sabine	1,262	1,153	1,054	995	935	878
SABINE COUNTY TOTAL	**9,225**	**8,415**	**7,671**	**7,226**	**6,785**	**6,348**
SAN AUGUSTINE						
San Augustine	1,817	1,731	1,682	1,655	1,654	1,689
G M WSC	160	155	151	144	137	129
Choice WSC	18	16	15	13	12	12
New WSC	1,253	1,128	1,020	948	876	808
County-Other, San Augustine	2,261	1,748	1,292	1,053	798	512
Sand Hills WSC	34	41	48	48	47	47
San Augustine Rural WSC	1,587	1,736	1,840	1,799	1,752	1,699
Denning WSC	192	173	156	145	134	123
SAN AUGUSTINE COUNTY TOTAL	**7,322**	**6,728**	**6,204**	**5,805**	**5,410**	**5,019**
SHELBY						
Center	4,764	4,690	4,574	4,459	4,344	4,233
Joaquin	586	469	379	299	236	187
County-Other, Shelby	9,059	9,115	8,906	8,668	8,346	7,943
Huxley	1,599	1,367	1,180	1,028	903	801
Tenaha	817	725	595	505	412	317
Timpson	865	765	623	526	427	324
Choice WSC	798	853	921	1,000	1,094	1,207
East Lamar WSC	755	806	870	945	1,033	1,140
Five Way WSC	1,171	1,180	1,188	1,184	1,181	1,178
Flat Fork WSC	525	437	366	300	247	202
New WSC	59	69	82	90	98	108
Sand Hills WSC	1,753	1,998	2,336	2,536	2,746	2,966
McClelland WSC	946	846	701	601	500	393
SHELBY COUNTY TOTAL	**23,697**	**23,320**	**22,721**	**22,141**	**21,567**	**20,999**

Table 2.1 Population Projections for the East Texas Regional Water Planning Area by County (Cont.)

County/WUG	Population Projection					
	2030	2040	2050	2060	2070	2080
SMITH						
Arp	821	752	703	638	575	513
Bullard	4,169	4,827	5,286	5,713	6,129	6,535
Jackson WSC (c)	2,720	2,940	3,095	3,216	3,335	3,452
Lindale Rural WSC	3,067	3,302	3,468	3,595	3,720	3,842
Overton (c)	31	33	34	36	36	37
County-Other, Smith (c)	10,055	8,963	7,989	7,121	6,348	5,658
Southern Utilities (c)	40,550	43,682	45,885	47,577	49,237	50,867
Whitehouse	7,404	7,494	7,561	7,506	7,457	7,412
Tyler (c)	118,744	133,041	149,059	157,803	167,059	176,859
R P M WSC	72	62	55	46	38	30
Liberty Utilities Silverleaf Water	655	779	865	947	1,027	1,105
Wright City WSC	1,324	1,370	1,418	1,468	1,519	1,572
Ben Wheeler WSC	28	34	38	42	45	48
Emerald Bay MUD	1,029	1,084	1,122	1,166	1,166	1,166
Carroll WSC	668	742	794	838	882	925
Walnut Grove WSC	10,389	11,137	11,663	12,055	12,440	12,818
Dean WSC	4,592	4,947	5,197	5,389	5,577	5,761
Troup	2,002	2,072	2,122	2,142	2,162	2,182
Lindale	1,641	1,698	1,738	1,754	1,770	1,787
Crystal Systems Texas	422	494	544	590	636	680
SMITH COUNTY TOTAL	**210,383**	**229,453**	**248,636**	**259,642**	**271,158**	**283,249**
TRINITY						
Groveton	340	301	254	219	183	145
Centerville WSC	633	566	489	432	373	310
Pennington WSC (c)	189	152	127	106	88	74
County-Other, Trinity (c)	1,783	1,738	1,708	1,703	1,699	1,698
TRINITY COUNTY TOTAL	**2,945**	**2,757**	**2,578**	**2,460**	**2,343**	**2,227**
TYLER						
Tyler County SUD	3,104	2,970	2,859	2,778	2,703	2,639
Seneca WSC	738	699	662	637	612	588
County-Other, Tyler	6,478	5,523	4,575	3,763	2,910	1,989
Warren WSC	2,064	2,064	2,064	2,064	2,064	2,064
Moscow WSC (c)	21	27	35	41	46	53
Chester WSC	593	518	439	381	318	253
Wildwood POA	400	366	332	307	282	255
Cypress Creek WSC	522	462	410	365	326	294
Woodville	4,200	4,404	4,643	4,903	5,205	5,563
Colmesneil	688	661	638	622	607	595
TYLER COUNTY TOTAL	**18,808**	**17,694**	**16,657**	**15,861**	**15,073**	**14,293**

Table 2.1 Population Projections for the East Texas Regional Water Planning Area by County (Cont.)

County/WUG	Population Projection					
	2030	2040	2050	2060	2070	2080
TOTAL FOR ETRWPA	**1,126,375**	**1,153,046**	**1,170,483**	**1,169,886**	**1,169,921**	**1,170,658**

Abbreviations:

ETRWPA = East Texas Regional Water Planning Area
FWSD = Fresh Water Supply District
MUD = municipal utility district
MWD = municipal water district
POA = Property Owner Associations
SUD = special utility district
TDCJ = Texas Department of Criminal Justice
WCID = Water Control & Improvement District
WSC = water supply corporation
WUG = water user group

Notes:

(a) Historical WUG population data was retrieved from municipal supporting data on the TWDB's website in a spreadsheet titled "Historical Population & GPCD for WUGs." County-Other population data was also retrieved from the same location in a spreadsheet titled "Historical Population & GPCD for County-Other Rural Areas."
(b) These counties are split between more than one TWDB regional water planning area. The populations shown represent the portion that fall within the East Texas Regional Water Planning Area (ETRWPA).
(c) These WUGS are split between more than one county. The population shown represents the portion that falls within the county indicated.

Sources:

1. Population projection provided by Texas Water Development Board.

2.3 WATER DEMANDS

In the current round of planning, the total water demand in the ETRWPA is expected to increase from 755,106 ac-ft/yr in 2030 to 987,594 ac-ft/yr in 2080. These projections represent a 5 percent decrease in projected demand in 2030 and a 12 percent increase in projected demand in 2070 compared to the same planning horizon presented in the 2021 Plan which had a demand of 793,495 ac-ft/yr in 2023 and 839,601 ac-ft/yr in 2080. Table 2.2 shows a summary of the water usage by water use category for each decade of the planning period and Table 2.3 shows the projected change within each category and each category's contribution to the total demand. Details of each water use category are provided in subsequent sections. Figure 2.3 presents the water usage in the east Texas regional water planning area by use category.

Table 2.2 Summary of Water Usage Projections for the East Texas Regional Water Planning Area by Use Category and Decade (ac-ft/yr)

Water Use Category	2030	2040	2050	2060	2070	2080
Municipal	214,040	219,630	224,789	226,176	227,792	229,673
Manufacturing	360,181	402,032	444,136	486,507	529,147	572,071
Mining	9,673	9,759	9,847	9,952	10,062	10,179
Steam-Electric Power	41,782	41,782	41,782	41,782	41,782	41,782
Livestock	30,001	31,116	32,434	33,979	34,460	34,460
Irrigation	99,429	99,429	99,429	99,429	99,429	99,429
Total for ETRWPA	**755,106**	**803,748**	**852,417**	**897,825**	**942,672**	**987,594**

Note: Demand projection provided by Texas Water Development Board.

Table 2.3 Demand Projection Percentages for the East Texas Regional Water Planning Area by Category

Water User Group	Percent Change in Demand 2030 to 2080	Percent of Total ETRWPA Demand	
		2030	2080
Municipal	7%	28%	23%
Manufacturing	59%	48%	58%
Mining	5%	1%	1%
Steam-Electric Power	0%	6%	4%
Livestock	15%	4.0%	4%
Irrigation	0%	13%	10%

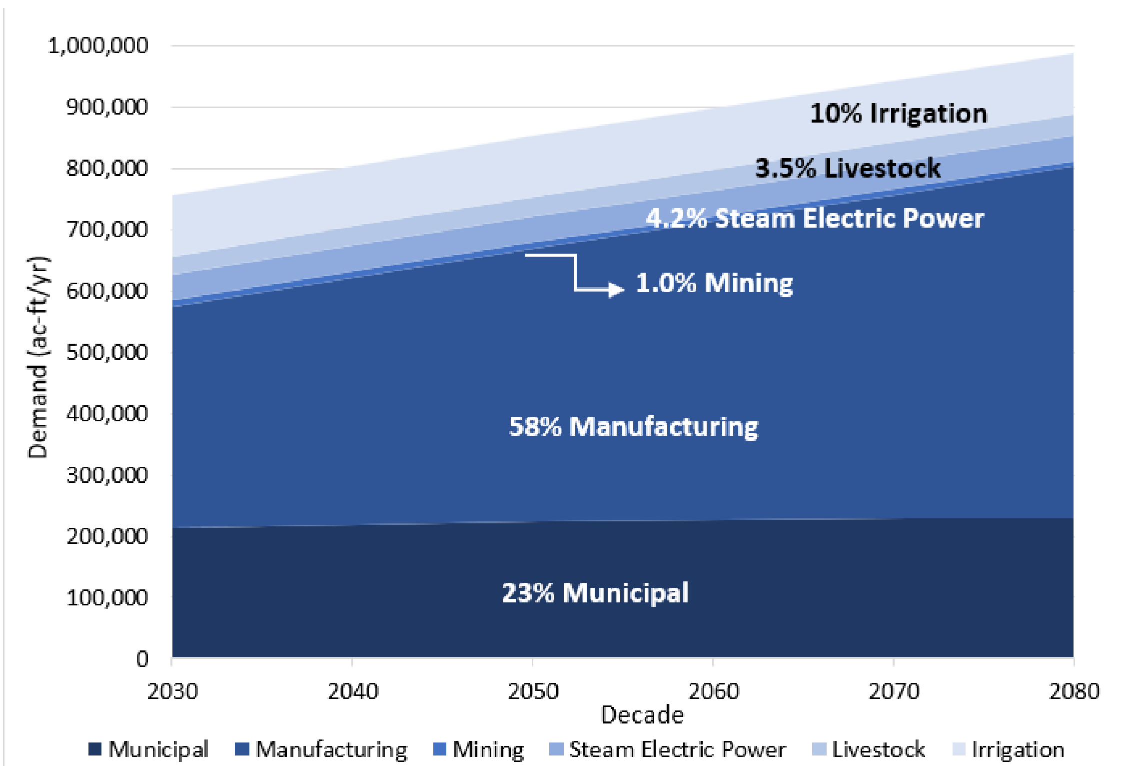


Figure 2.3 Water Demand Projection in the East Texas Regional Water Planning Area by Use Category

2.3.1 Municipal Demands

Municipal water use includes single and multi-family residential use and use from non-residential establishments (commercial, institutional, light industrial). It does not include water used by industry, such as manufacturing plants, power generating facilities, and mining operations, which are accounted for under their associated non-municipal demand categories. Municipal water demand projections are estimated by multiplying the projected population of an entity by the baseline dry year GPCD estimates less water efficiency (plumbing code) savings

Table 2.4 provides a summary of the calculated municipal use by entities in the ETRWPA. A summary of net water use estimates and historical GPCD estimates by county are presented in Appendix 2-C. The projected changes in municipal water demands are presented in Table 2.5.

Municipal water use in the ETRWPA is expected to grow from 214,040 ac-ft/yr in 2030 to 229,673 ac-ft/yr to 2080. This represents an approximate 7.3 percent increase in municipal water demand over the planning horizon. The average annual percent increase in each county for municipal demand over the planning period is represented in Table 2.5. Counties with the most growth in municipal demand include Cherokee, Polk, and Smith counties.

Compared to the last round of planning, the municipal demand projections in 2030 this round show an increase of approximately 7 percent compared to the 2021 Plan, which showed a projected municipal demand of 199,870 ac-ft/yr in 2030. Subsequently, the projections from this Plan gradually decrease to approximately 6 percent lower than the projected municipal demand presented in the 2021 Plan, which showed a projected demand of 243,611 ac-ft/yr in 2070.

Figure 2.4 presents the projected demand by decade for Jefferson and Smith counties compared to the remaining 18 counties in the ETRWPA labeled as “Other” because these two counties account for more than 50 percent of the total population in the region. The remaining 18 counties are presented in Figure 2.5. The average annual projected growth for municipal water use is shown on Figure 2.6. Additional details on WUG demand projections by county and river basin are provided in Appendix ES-A, Report 02.

Table 2.4 Projected Municipal Water Demand in the East Texas Regional Water Planning Area by County and WUG (ac-ft/yr)

County/WUG	Municipal Demand Projection (in ac-ft/yr)					
	2030	2040	2050	2060	2070	2080
ANDERSON						
Four Pines WSC	298	296	293	290	287	284
Berryville	2	2	2	2	2	2
Slocum WSC	325	323	318	314	310	306
Neches WSC	156	154	152	151	149	147
County-Other, Anderson	620	593	574	542	505	466
Norwood WSC	150	149	147	145	144	142
Elkhart	304	303	299	296	292	289
TDCJ Coffield Michael	3,469	3,465	3,465	3,465	3,465	3,465
Brushy Creek WSC (c)	430	427	422	416	411	406
Frankston	212	211	208	205	203	200
Palestine	5,717	5,699	5,629	5,561	5,494	5,425
Walston Springs WSC	461	497	539	585	634	688
The Consolidated WSC	477	482	489	497	505	512
Anderson County Cedar Creek WSC	114	114	112	110	109	108
B B S WSC (c)	138	137	135	133	132	130
B C Y WSC	264	262	258	255	252	249
Frankston Rural WSC	236	234	231	228	225	222
Pleasant Springs WSC	194	194	191	189	187	184
TDCJ Beto Gurney and Powledge Units	1,741	1,738	1,738	1,738	1,738	1,738
Tucker WSC	130	129	127	126	124	122
ANDERSON COUNTY TOTAL	**15,438**	**15,409**	**15,329**	**15,248**	**15,168**	**15,085**
ANGELINA						
Angelina WSC	355	359	361	365	368	372
Redland WSC	201	203	205	207	209	211
M and M WSC	260	262	264	267	269	272
Four Way SUD	435	439	443	447	451	455
Central WCID of Angelina County	620	631	637	643	650	656
Upper Jasper County Water Authority	29	29	29	29	29	29
Lufkin	6,592	6,674	6,726	6,792	6,857	6,922
Diboll	683	693	700	707	714	721
County-Other, Angelina	538	545	551	556	562	567
Hudson WSC	1,003	1,020	1,028	1,038	1,047	1,057
Huntington	261	264	266	269	271	274
Zavalla	102	103	104	104	105	107
Pollok-Redtown WSC	197	199	200	202	204	206
Woodlawn WSC	242	245	246	249	251	254
ANGELINA COUNTY TOTAL	**11,518**	**11,666**	**11,760**	**11,875**	**11,987**	**12,103**

Table 2.4 Projected Municipal Water Demand in the East Texas Regional Water Planning Area by County and WUG (ac-ft/yr) (Cont.)

County/WUG	Municipal Demand Projection (in ac-ft/yr)					
	2030	2040	2050	2060	2070	2080
CHEROKEE						
Jacksonville	2,576	2,541	2,494	2,442	2,390	2,338
Alto	218	215	211	206	202	197
Alto Rural WSC	941	1,026	1,123	1,231	1,350	1,482
Bullard	90	89	87	85	83	81
Gum Creek WSC	103	101	99	97	95	92
Rusk Rural WSC	331	326	321	315	310	304
Craft Turney WSC	635	626	613	600	586	572
County-Other, Cherokee	435	370	293	208	116	17
North Cherokee WSC	472	465	456	446	436	425
Walnut Grove WSC	10	10	9	9	9	9
New Summerfield	113	111	109	106	104	101
West Jacksonville WSC	231	227	222	218	213	208
Afton Grove WSC	214	219	225	231	238	245
Wells	124	130	138	146	155	164
Rusk	855	856	858	859	863	868
Troup	11	11	11	11	11	10
Southern Utilities (c)	652	642	630	616	602	588
Wright City WSC	47	46	46	45	43	43
Blackjack WSC	102	100	98	96	94	92
Pollok-Redtown WSC	8	8	8	8	8	7
South Rusk County WSC	5	5	5	5	4	4
CHEROKEE COUNTY TOTAL	**8,173**	**8,124**	**8,056**	**7,980**	**7,912**	**7,847**
HARDIN						
Lake Livingston WSC	10	10	10	9	9	9
County-Other, Hardin	1,098	997	881	732	580	424
Kountze	248	245	242	237	231	226
Silsbee	1,001	1,051	1,109	1,171	1,236	1,305
Wildwood POA	118	117	116	113	110	108
Lumberton MUD	3,329	4,054	4,727	4,617	4,508	4,401
Sour Lake	296	293	289	282	276	269
West Hardin WSC (c)	385	383	378	369	360	352
North Hardin WSC	539	553	568	583	598	614
Hardin County WCID 1	130	131	134	136	139	141
HARDIN COUNTY TOTAL	**7,154**	**7,834**	**8,454**	**8,249**	**8,047**	**7,849**

Table 2.4 Projected Municipal Water Demand in the East Texas Regional Water Planning Area by County and WUG (ac-ft/yr) (Cont.)

County/WUG	Municipal Demand Projection (in ac-ft/yr)					
	2030	2040	2050	2060	2070	2080
HENDERSON						
Berryville	95	90	97	98	99	99
Brownsboro	246	267	263	271	279	288
Brushy Creek WSC (c)	5	5	5	5	5	5
Frankston	7	8	8	8	9	9
County-Other, Henderson	789	736	664	563	433	267
Bethel Ash WSC (c)	269	270	281	285	290	294
Leagueville WSC	229	242	242	249	255	262
Chandler	676	831	1,023	1,261	1,553	1,914
Athens	42	42	42	42	42	42
Murchison	110	108	114	115	116	118
Virginia Hill WSC (c)	202	208	212	217	221	226
R P M WSC	63	69	67	70	72	74
Edom WSC	35	38	37	38	39	40
Moore Station WSC	382	412	408	420	433	445
HENDERSON COUNTY TOTAL	**3,150**	**3,326**	**3,463**	**3,642**	**3,846**	**4,083**
HOUSTON						
Grapeland	225	228	235	237	240	243
Lovelady	109	105	100	98	96	94
County-Other, Houston	453	324	229	140	66	1
Crockett	1,080	1,014	915	888	852	809
TDCJ Eastham Unit	1,090	1,088	1,088	1,088	1,088	1,088
The Consolidated WSC	1,311	1,358	1,414	1,444	1,469	1,494
Pennington WSC (c)	71	64	54	51	47	43
HOUSTON COUNTY TOTAL	**4,339**	**4,181**	**4,035**	**3,946**	**3,858**	**3,772**
JASPER						
Jasper	1,777	1,689	1,587	1,496	1,405	1,316
Jasper County WCID 1	208	206	207	209	215	225
Kirbyville	407	404	406	412	424	443
Rural WSC	106	100	94	88	82	76
Upper Jasper County Water Authority	419	396	370	347	324	301
County-Other, Jasper	1,137	1,049	948	851	748	636
Brookeland FWSD	45	42	40	37	35	32
Mauriceville SUD	10	10	10	10	9	9
Rayburn Country MUD	278	264	247	231	216	201
South Jasper County WSC	215	203	190	178	166	154
South Kirbyville Rural WSC	90	93	97	102	109	118
JASPER COUNTY TOTAL	**4,692**	**4,456**	**4,196**	**3,961**	**3,733**	**3,511**

Table 2.4 Projected Municipal Water Demand in the East Texas Regional Water Planning Area by County and WUG (ac-ft/yr) (Cont.)

County/WUG	Municipal Demand Projection (in ac-ft/yr)					
	2030	2040	2050	2060	2070	2080
JEFFERSON						
Port Arthur	18,309	18,454	18,405	18,183	17,964	17,748
Beaumont	29,419	30,134	30,967	30,565	30,167	29,774
China	178	179	179	176	174	172
Jefferson County WCID 10	597	600	598	591	584	577
County-Other, Jefferson	2,092	1,769	1,135	1,036	939	839
Meeker MWD	385	387	385	381	376	372
Bevil Oaks	99	100	100	98	97	96
Nederland	2,422	2,433	2,427	2,397	2,368	2,340
Federal Correctional Complex Beaumont	613	610	610	610	610	610
Groves	2,289	2,279	2,279	2,279	2,279	2,279
Port Neches	1,558	1,564	1,560	1,541	1,522	1,504
Trinity Bay Conservation District	36	36	36	36	35	35
West Jefferson County MWD	929	928	936	948	960	972
Nome	145	146	145	144	142	140
JEFFERSON COUNTY TOTAL	**59,071**	**59,619**	**59,762**	**58,985**	**58,217**	**57,458**
NACOGDOCHES						
Nacogdoches	7,421	7,614	7,809	8,104	8,397	8,690
Appleby WSC	1,044	1,076	1,107	1,160	1,212	1,263
Garrison	259	266	273	284	295	305
Lilly Grove SUD	500	514	529	554	578	602
County-Other, Nacogdoches	600	614	632	662	692	721
Woden WSC	262	269	276	289	302	315
D and M WSC	1,054	1,084	1,116	1,169	1,221	1,272
Swift WSC	422	434	446	468	489	509
Cushing	139	144	148	155	162	168
Melrose WSC	815	839	863	904	944	985
Caro WSC	372	383	394	413	431	449
Etoile WSC	337	347	357	374	391	407
NACOGDOCHES COUNTY TOTAL	**13,225**	**13,584**	**13,950**	**14,536**	**15,114**	**15,686**
NEWTON						
Newton	343	311	278	247	217	189
South Newton WSC	233	211	187	165	143	122
Bon Wier WSC	86	74	63	52	41	30
County-Other, Newton	693	618	543	474	407	340
Brookeland FWSD	61	55	49	43	37	32
Mauriceville SUD	31	31	30	27	23	20
South Kirbyville Rural WSC	12	11	10	9	7	6
NEWTON COUNTY TOTAL	**1,459**	**1,311**	**1,160**	**1,017**	**875**	**739**

Table 2.4 Projected Municipal Water Demand in the East Texas Regional Water Planning Area by County and WUG (ac-ft/yr) (Cont.)

County/WUG	Municipal Demand Projection (in ac-ft/yr)					
	2030	2040	2050	2060	2070	2080
ORANGE						
Bridge City	1,271	1,358	1,370	1,409	1,446	1,479
Orange	3,522	3,582	3,598	3,561	3,525	3,489
Pinehurst	346	352	353	350	346	342
South Newton WSC	188	192	193	191	189	187
Orange County WCID 2	456	452	452	439	425	412
Orange County WCID 1	1,456	1,383	1,380	1,290	1,204	1,122
County-Other, Orange	1,907	1,774	1,616	1,399	1,175	934
Orangefield WSC	917	1,043	1,193	1,365	1,561	1,786
Kelly G Brewer	315	317	318	311	305	298
Mauriceville SUD	725	767	791	798	795	789
ORANGE COUNTY TOTAL	**11,103**	**11,220**	**11,264**	**11,113**	**10,971**	**10,838**
PANOLA						
Carthage	1,649	1,632	1,609	1,578	1,549	1,520
Gill WSC	91	84	77	71	66	61
County-Other, Panola	1,073	1,031	977	937	896	854
Beckville	87	77	69	62	56	51
Elysian Fields WSC	5	6	6	6	6	6
Tatum	33	25	20	15	11	9
Panola-Bethany WSC (c)	141	125	112	101	91	84
Clayton WSC	257	281	311	325	340	355
Minden Brachfield WSC	13	15	19	20	22	24
Deberry WSC	94	82	68	59	50	40
Hollands Quarter WSC	124	118	111	106	101	96
Rehobeth WSC	88	79	68	61	54	47
PANOLA COUNTY TOTAL	**3,655**	**3,555**	**3,447**	**3,341**	**3,242**	**3,147**
POLK						
Corrigan	238	255	264	274	283	293
Lake Livingston WSC	75	81	84	87	90	94
County-Other, Polk	406	436	452	469	487	504
Damascus-Stryker WSC	188	202	210	218	226	234
Moscow WSC (c)	85	91	95	98	102	106
Leggett WSC	2	2	3	3	3	3
Chester WSC	49	53	55	57	59	61
Soda WSC	17	18	19	20	20	21
POLK COUNTY TOTAL	**1,060**	**1,138**	**1,182**	**1,226**	**1,270**	**1,316**

Table 2.4 Projected Municipal Water Demand in the East Texas Regional Water Planning Area by County and WUG (ac-ft/yr) (Cont.)

County/WUG	Municipal Demand Projection (in ac-ft/yr)					
	2030	2040	2050	2060	2070	2080
RUSK						
Elderville WSC	161	156	148	139	131	122
Garrison	1	1	1	1	1	1
Kilgore	1,089	1,054	1,003	945	888	830
New London	282	273	260	244	229	214
Overton (c)	446	432	411	387	364	341
Southern Utilities (c)	79	76	72	68	64	59
Cross Roads SUD (c)	296	305	318	334	351	371
Wright City WSC	23	22	21	20	18	17
Chalk Hill SUD (c)	232	222	211	199	186	174
Crystal Farms WSC	130	141	156	173	192	215
County-Other, Rusk	963	863	717	540	352	150
Gaston WSC	149	144	137	128	120	112
Jacobs WSC	309	326	346	370	397	429
Mt Enterprise WSC	222	214	204	191	179	167
Tatum	251	242	230	216	202	189
West Gregg SUD	9	11	13	17	21	26
Ebenezer WSC	181	175	166	156	146	137
Henderson	3,060	3,021	3,002	3,000	3,009	3,033
Goodsprings WSC	230	221	210	198	185	173
Minden Brachfield WSC	213	207	196	185	173	161
New Prospect WSC	149	143	136	128	120	112
South Rusk County WSC	242	234	222	209	196	182
RUSK COUNTY TOTAL	**8,717**	**8,483**	**8,180**	**7,848**	**7,524**	**7,215**
SABINE						
Hemphill	471	432	397	377	357	338
Pineland	169	153	140	132	124	115
G M WSC	616	562	511	481	450	420
Brookeland FWSD	80	72	66	62	58	54
New WSC	5	4	4	3	3	3
County-Other, Sabine	103	93	85	80	75	71
SABINE COUNTY TOTAL	**1,444**	**1,316**	**1,203**	**1,135**	**1,067**	**1,001**
SAN AUGUSTINE						
San Augustine	642	610	593	583	583	595
G M WSC	18	17	17	16	15	14
Choice WSC	2	2	2	2	2	2
New WSC	86	77	69	64	59	55
County-Other, San Augustine	207	159	117	96	72	47
Sand Hills WSC	6	7	8	8	8	8
San Augustine Rural WSC	286	312	331	324	315	306
Denning WSC	120	108	98	91	84	77
SAN AUGUSTINE COUNTY TOTAL	**1,367**	**1,292**	**1,235**	**1,184**	**1,138**	**1,104**

Table 2.4 Projected Municipal Water Demand in the East Texas Regional Water Planning Area by County and WUG (ac-ft/yr) (Cont.)

County/WUG	Municipal Demand Projection (in ac-ft/yr)					
	2030	2040	2050	2060	2070	2080
SHELBY						
Center	2,135	2,099	2,047	1,995	1,944	1,894
Joaquin	124	99	80	63	50	39
County-Other, Shelby	956	956	934	909	875	833
Huxley	271	230	199	173	152	135
Tenaha	250	221	182	154	126	97
Timpson	180	159	129	109	89	67
Choice WSC	107	113	122	132	145	160
East Lamar WSC	108	114	123	134	146	162
Five Way WSC	151	152	153	152	152	151
Flat Fork WSC	114	94	79	65	53	44
New WSC	4	5	6	6	7	7
Sand Hills WSC	294	334	390	424	459	495
McClelland WSC	188	167	138	119	99	78
SHELBY COUNTY TOTAL	**4,882**	**4,743**	**4,582**	**4,435**	**4,297**	**4,162**
SMITH						
Arp	155	141	132	120	108	96
Bullard	998	1,153	1,262	1,364	1,464	1,561
Jackson WSC (c)	291	313	329	342	355	367
Lindale Rural WSC	397	426	447	463	479	495
Overton (c)	7	7	8	8	8	8
County-Other, Smith (c)	1,138	1,008	898	801	714	636
Southern Utilities (c)	7,836	8,411	8,835	9,161	9,481	9,795
Whitehouse	1,005	1,012	1,021	1,014	1,007	1,001
Tyler (c)	34,718	38,796	43,467	46,016	48,716	51,573
R P M WSC	11	9	8	7	6	5
Liberty Utilities Silverleaf Water	173	206	229	250	271	292
Wright City WSC	193	199	206	213	220	228
Ben Wheeler WSC	3	3	4	4	5	5
Emerald Bay MUD	254	267	276	287	287	287
Carroll WSC	75	83	89	94	99	104
Walnut Grove WSC	1,253	1,336	1,399	1,446	1,493	1,538
Dean WSC	723	776	815	846	875	904
Troup	388	401	410	414	418	422
Lindale	382	393	403	406	410	414
Crystal Systems Texas	135	158	174	189	204	218
SMITH COUNTY TOTAL	**50,135**	**55,098**	**60,412**	**63,445**	**66,620**	**69,949**
TRINITY						
Groveton	46	41	34	30	25	20
Centerville WSC	119	106	91	81	70	58
Pennington WSC (c)	31	25	21	17	14	12
County-Other, Trinity (c)	120	117	115	114	114	114
TRINITY COUNTY TOTAL	**316**	**289**	**261**	**242**	**223**	**204**

TYLER

Table 2.4 Projected Municipal Water Demand in the East Texas Regional Water Planning Area by County and WUG (ac-ft/yr) (Cont.)

County/WUG	Municipal Demand Projection (in ac-ft/yr)					
	2030	2040	2050	2060	2070	2080
Tyler County SUD	632	602	579	563	548	535
Seneca WSC	123	116	110	106	102	98
County-Other, Tyler	790	670	555	457	353	241
Warren WSC	273	272	272	272	272	272
Moscow WSC (c)	3	4	5	6	7	8
Chester WSC	101	88	74	64	54	43
Wildwood POA	76	69	63	58	53	48
Cypress Creek WSC	101	89	79	71	63	57
Woodville	880	920	970	1,024	1,088	1,162
Colmesneil	163	156	151	147	143	140
TYLER COUNTY TOTAL	**3,142**	**2,986**	**2,858**	**2,768**	**2,683**	**2,604**
TOTAL FOR ETRWPA	**214,040**	**219,630**	**224,789**	**226,176**	**227,792**	**229,673**

Abbreviations:

ETRWPA = East Texas Regional Water Planning Area
FWSD = Fresh Water Supply District
MUD = municipal utility district
MWD = municipal water district
POA = Property Owner Associations
SUD = special utility district
TDCJ = Texas Department of Criminal Justice
WCID = Water Control & Improvement District
WSC = water supply corporation
WUG = water user group

Notes:

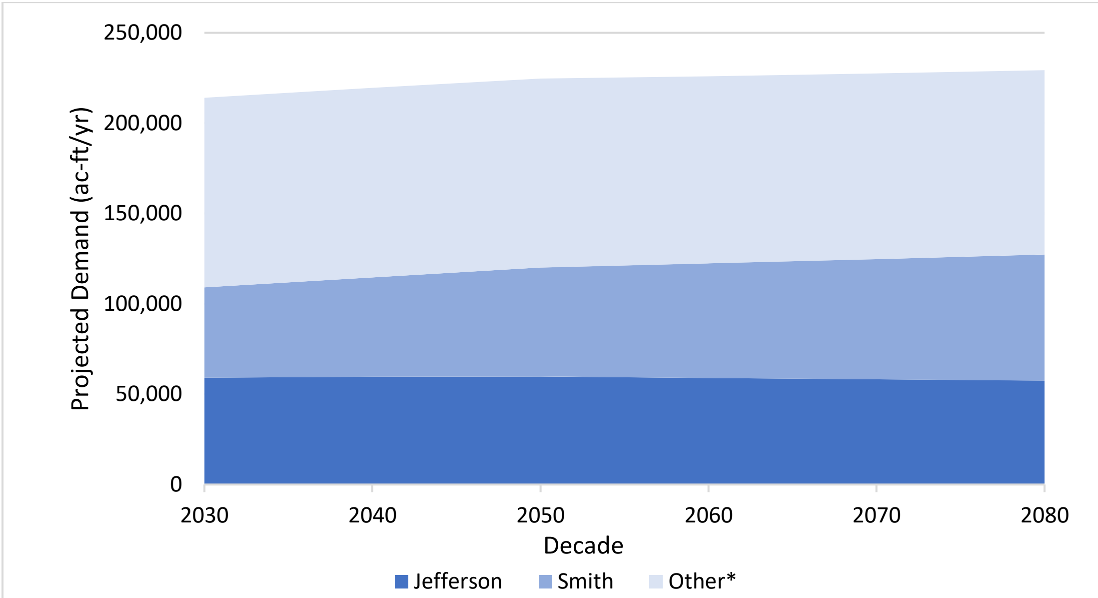
(a) Historical WUG population data was retrieved from municipal supporting data on the TWDB's website in a spreadsheet titled "Historical Population & GPCD for WUGs." County-Other population data was also retrieved from the same location in a spreadsheet titled "Historical Population & GPCD for County-Other Rural Areas."
(b) These counties are split between more than one TWDB regional water planning area. The populations shown represent the portion that fall within the East Texas Regional Water Planning Area (ETRWPA).
(c) These WUGS are split between more than one county. The population shown represents the portion that falls within the county indicated.

Sources:

1. Population projection provided by Texas Water Development Board.

Table 2.5 Municipal Demand Projection Percentages in the East Texas Regional Water Planning Area by County

County	Percent Change in Demand 2030 to 2080	Percent of Total ETRWPA Demand	
		2030	2080
Anderson	-2.3%	7.2%	6.6%
Angelina	5.1%	5.4%	5.3%
Cherokee	-4.0%	3.8%	3.4%
Hardin	10%	3.3%	3.4%
Henderson	30%	1.5%	1.8%
Houston	-13%	2.0%	1.6%
Jasper	-25%	2.2%	1.5%
Jefferson	-3%	28%	25%
Nacogdoches	19%	6.2%	6.8%
Newton	-49%	0.7%	0.3%
Orange	-2.4%	5.2%	4.7%
Panola	-14%	1.7%	1.4%
Polk	24%	0.5%	0.6%
Rusk	-17%	4.1%	3.1%
Sabine	-31%	0.7%	0.4%
San Augustine	-19%	0.6%	0.5%
Shelby	-15%	2.3%	1.8%
Smith	40%	23%	30%
Trinity	-35%	0.1%	0.1%
Tyler	-17%	1.5%	1.1%



*For a breakdown of Other Municipal Demand Projections by County see Figure 2.5.

Figure 2.4 Municipal Demand Projections in the East Texas Regional Water Planning Area Greater than 20,000 ac-ft/yr by County

Note: Sourced from Texas Water Development Board

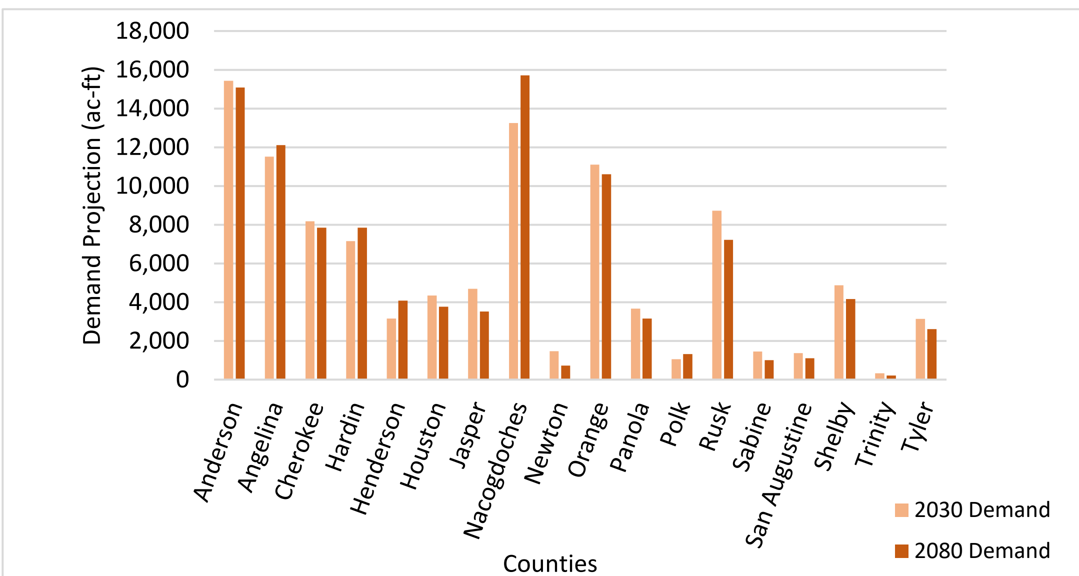


Figure 2.5 Municipal Demand Projections in the East Texas Regional Water Planning Area Less than 20,000 ac-ft/yr by County

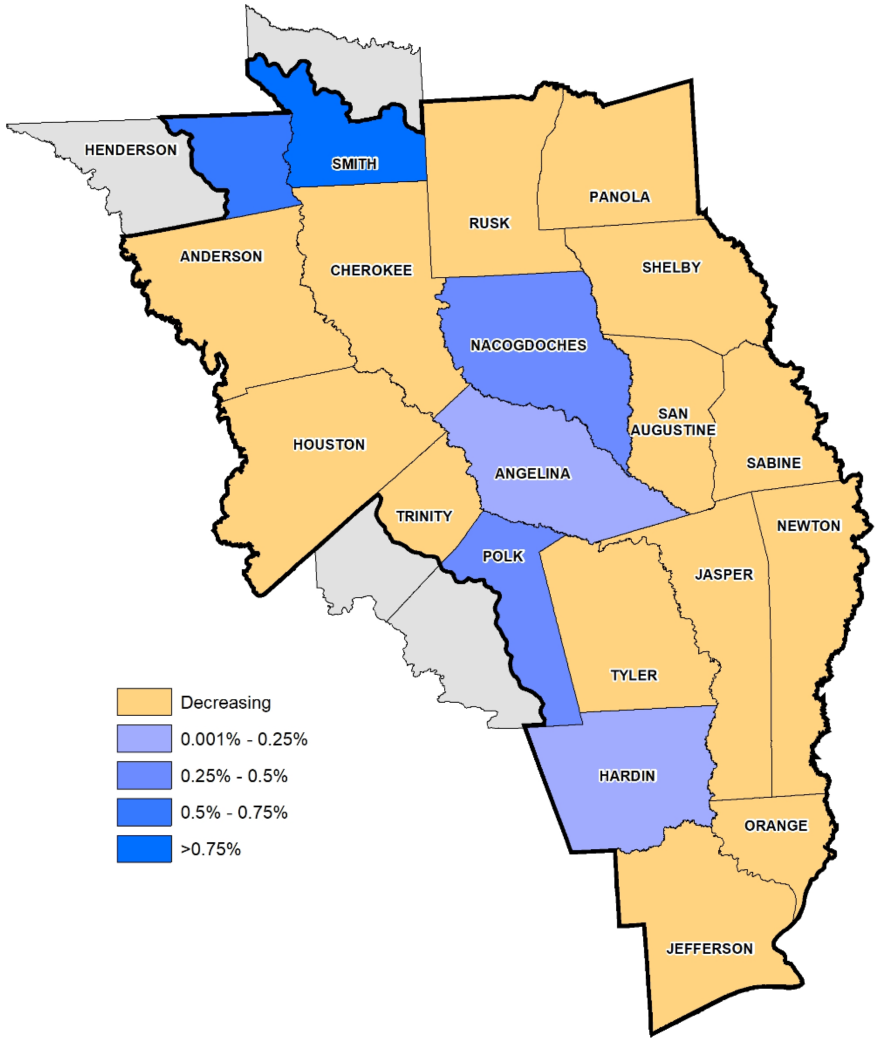


Figure 2.6 Municipal Demand Annual Growth Rate

2.3.2 Manufacturing Demands

Manufacturing demands are expected to increase from 360,181 ac-ft per year to 572,071 ac-ft per year during the planning period. Figure 2.6 summarizes the manufacturing usage by each county. The percent change in manufacturing demand by county is presented in Table 2.7. Counties with projected demands over 10,000 ac-ft per year are summarized on Figure 2.7. All other counties are summarized on Figure 2.8. The average annual projected growth for manufacturing water use is shown on Figure 2.9.

Compared to the last round of planning, the water demand projections in 2030 this round show an increase of approximately 2 percent compared to the 2021 Plan, which showed a projected demand of 353,415 ac-ft per year in 2030. Subsequently, the current projections gradually increase to approximately 50 percent higher than the projected demand presented in the 2021 Plan in 2070, which showed a projected demand of 353,415 ac-ft per year in 2070. The increase in the manufacturing demand projection in this round of planning is primarily due to the anticipated development of new manufacturing facilities in the ETRWPA that require substantial water supply. In the 2021 Plan, manufacturing demand projections were held constant after 2030. The demands anticipated from the new facilities in Angelina, Newton, Orange, and Smith counties were included to inform a new recalculated baseline demand projection in those counties. On the other hand, an alternative projection is recommended for Jefferson County based on feedback from major water providers and analysis of trends in increased manufacturing water use over the last decade. No changes are recommended for all other counties in Region I. Collectively, the updated demand projection methodology yields higher projected manufacturing demands in later decades. This methodology was approved and adopted in the 2026 Plan.

Manufacturing water demand in the ETRWPA is concentrated primarily in Jefferson County, which accounts for almost half of all manufacturing water demand in 2030, and more than 60 percent in 2080. A large portion of current manufacturing water use in Jefferson County is in the petrochemical industry. Manufacturing demand in Jefferson County is projected to grow from 175,000 ac-ft per year by 2030 to 350,000 ac-ft per year by 2080. Historically, the Lower Neches Valley Authority (LNVA) has supplied most of the manufacturing demand in Jefferson County. A large percentage of the growth in projected demand manufacturing demand in Jefferson County is not under contract at the time the 2026 Plan . Supply for the projected manufacturing demand in Jefferson County appears as a Water Management Strategy (WMS) in Chapter 5BJasper and Orange counties are projected to comprise approximately 45 percent of manufacturing use in the region by 2030, and manufacturing water demand is projected to increase in these two counties over the planning period. However, the collective percentage of manufacturing use in the region between these two counties is projected to decrease to approximately 34 percent by 2080.

Table 2.6 Historical and Projected Manufacturing Water Demand in the East Texas Regional Water Planning Area by County (ac-ft/yr)

County	2019 Historical[1]	Projections[2]					
		2030	2040	2050	2060	2070	2080
Anderson	1,307	1,686	1,748	1,813	1,880	1,950	2,022
Angelina	2,286	5,612	5,819	6,034	6,258	6,489	6,729
Cherokee	63	82	85	88	91	94	97
Hardin	37	64	66	68	71	74	77
Henderson[a]	0	0	0	0	0	0	0
Houston	133	201	208	216	224	232	241
Jasper	52,611	57,668	59,802	62,015	64,310	66,689	69,156
Jefferson	128,775	175,000	210,000	245,000	280,000	315,000	350,000
Nacogdoches	2,356	2,892	2,999	3,110	3,225	3,344	3,468
Newton	0	6,140	6,367	6,603	6,847	7,100	7,363
Orange	43,018	103,832	107,674	111,657	115,789	120,073	124,516
Panola	1,138	1,298	1,346	1,396	1,448	1,502	1,558
Polk[a]	235	392	407	422	438	454	471
Rusk	12	26	27	28	29	30	31
Sabine	122	449	466	483	501	520	539
San Augustine	2	4	4	4	4	4	4
Shelby	1,691	1,860	1,929	2,000	2,074	2,151	2,231
Smith[a]	1,936	2,857	2,963	3,072	3,186	3,304	3,426
Trinity[a]	0	0	0	0	0	0	0
Tyler	106	118	122	127	132	137	142
Total for ETRWPA	**235,828**	**360,180**	**402,031**	**444,137**	**486,506**	**529,147**	**572,071**

Notes:

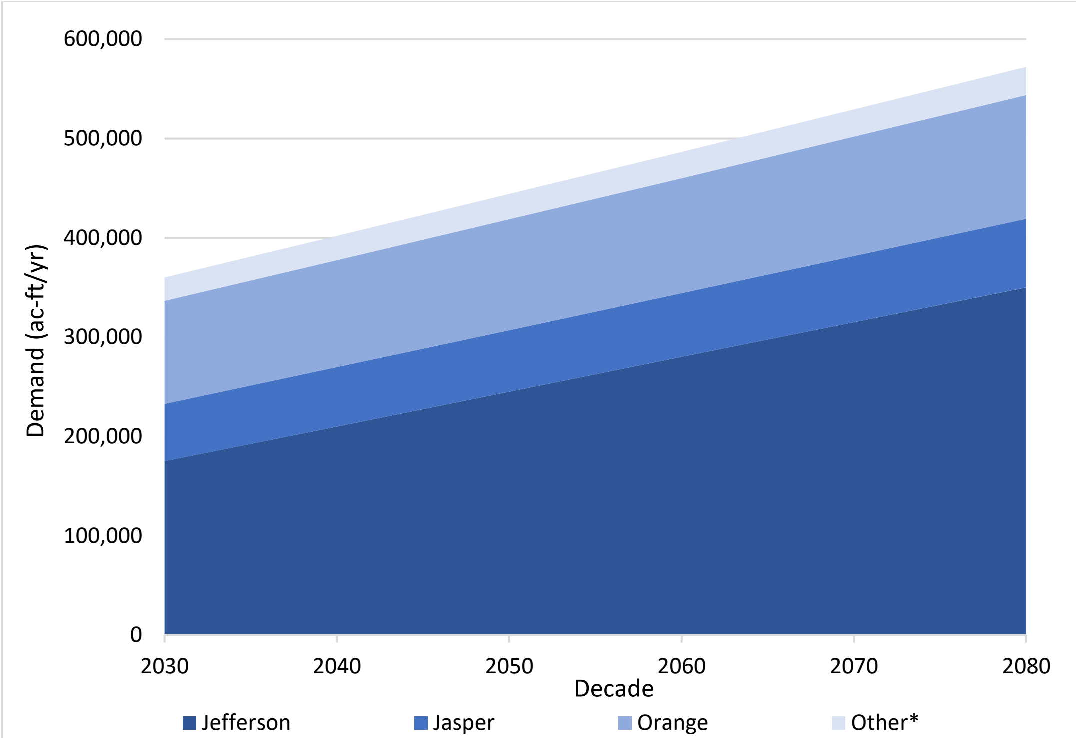
(a) These counties are split between more than one Texas Water Development Board regional water planning area. The demands shown represent the portion that fall within the East Texas Regional Water Planning Area (ETRWPA).

Sources:

(1) TWDB Water Use Survey: Historical Summary Estimates by County
(2) Projection provided by Texas Water Development Board.

Table 2.7 Manufacturing Demand Projection Percentages in the East Texas Regional Water Planning Area by County

County	Percent Change in Demand 2030 to 2080	Percent of Total ETRWPA Demand	
		2030	2080
Anderson	20%	0.5%	0.4%
Angelina	20%	1.6%	1.2%
Cherokee	18%	<0.1%	<0.1%
Hardin	20%	<0.1%	<0.1%
Henderson	-	<0.1%	<0.1%
Houston	20%	<0.1%	<0.1%
Jasper	20%	16%	12%
Jefferson	100%	49%	61%
Nacogdoches	20%	0.8%	0.6%
Newton	20%	1.7%	1.3%
Orange	20%	29%	22%
Panola	20%	0.4%	0.3%
Polk	20%	0.1%	<0.1%
Rusk	19%	<0.1%	<0.1%
Sabine	20%	0.1%	<0.1%
San Augustine	0%	<0.1%	<0.1%
Shelby	20%	0.5%	0.4%
Smith	20%	0.8%	0.6%
Trinity	-	<0.1%	<0.1%
Tyler	20%	<0.1%	<0.1%



*For a breakdown of Other Manufacturing Demand Projections by County see Figure 2.8.

Figure 2.7 Manufacturing Demand Projections in the East Texas Regional Water Planning Area Greater than 10,000 ac-ft/yr by County

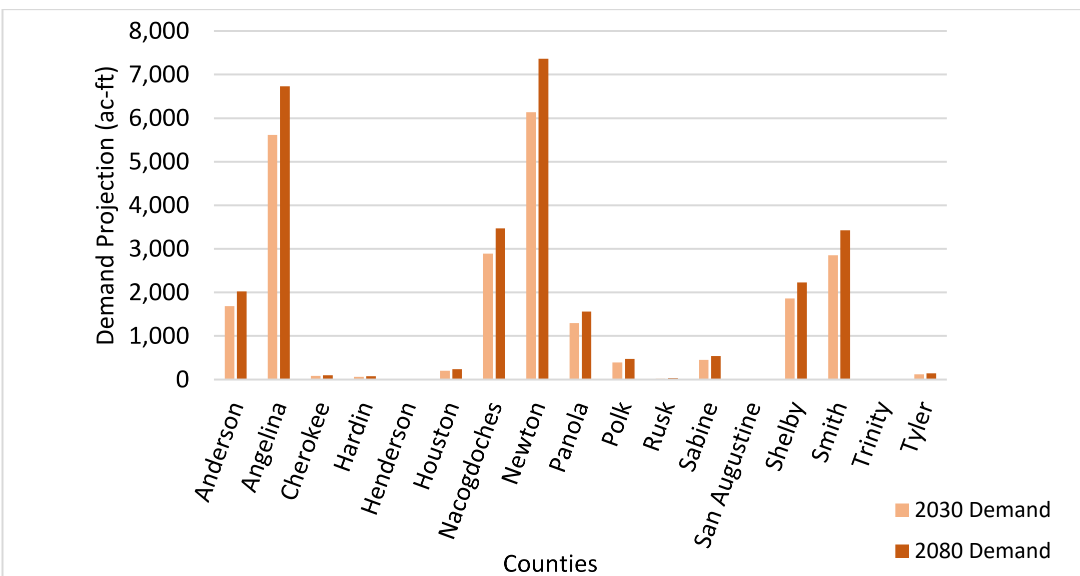


Figure 2.8 Manufacturing Demand Projections in the East Texas Regional Water Planning Area Less than 10,000 ac-ft/yr by County

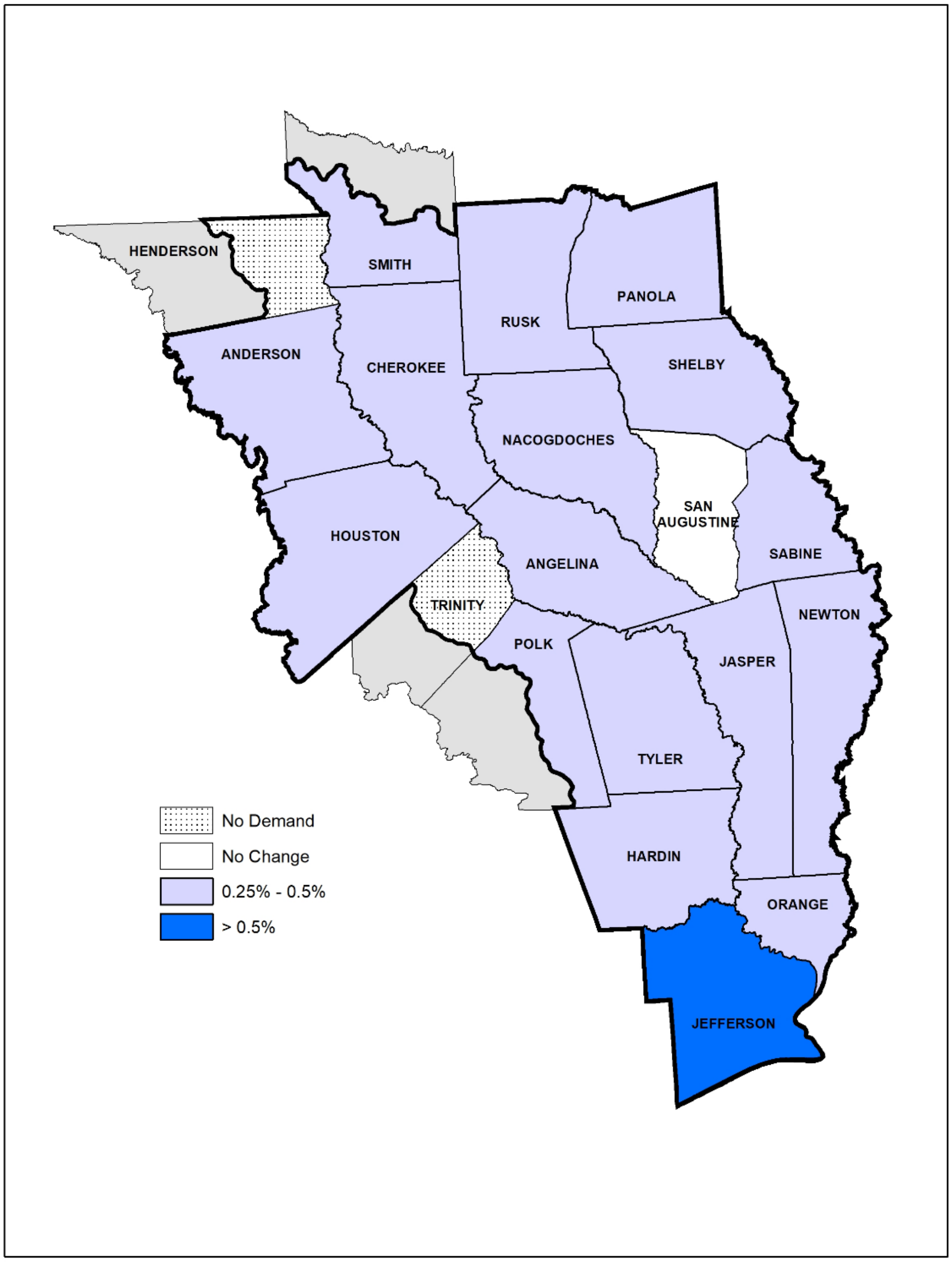


Figure 2.9 Manufacturing Demand Annual Growth Rate

2.3.3 Irrigation Demands

The 2026 Plan projects irrigation demands in 19 of the 20 counties in the region, with no projected demand increase over the planning period. Water use for irrigation is presented in Table 2.8 and Table 2.9. Jefferson County's projected demand is presented in Figure 2.10 with the remaining counties presented individually in Figure 2.11. The irrigation demand projection in this round of planning is within 1 percent of the demand projection from the previous round of planning.

The projection for irrigation demand is based on estimates of crop types, crop acreages, and climatic conditions in Region I. The TWDB provided a draft projection that was based on the average irrigation demand from 2015 through 2019. However, the ETRWPG recommended adjusting the draft projection to take into account the higher demand from the average historical use during the period of 2010-2014, which was a relatively dry period across the region when irrigation use was typically higher, and the TWDB recommended period of 2015-2019. The methodology was approved and adopted in the 2026 Plan.

Table 2.8 Historical and Projected Irrigation Water Demand in the East Texas Regional Water Planning Area by County (ac-ft/yr)

County	2019 Historical(1)	Projections (2)					
		2030	2040	2050	2060	2070	2080
Anderson	912	905	905	905	905	905	905
Angelina	97	779	779	779	779	779	779
Cherokee	309	451	451	451	451	451	451
Hardin	183	989	989	989	989	989	989
Henderson[a]	543	459	459	459	459	459	459
Houston	1,639	2,137	2,137	2,137	2,137	2,137	2,137
Jasper	143	303	303	303	303	303	303
Jefferson	44,575	88,536	88,536	88,536	88,536	88,536	88,536
Nacogdoches	62	266	266	266	266	266	266
Newton	42	101	101	101	101	101	101
Orange	180	1,824	1,824	1,824	1,824	1,824	1,824
Panola	984	1,069	1,069	1,069	1,069	1,069	1,069
Polk[a]	77	230	230	230	230	230	230
Rusk	206	276	276	276	276	276	276
Sabine	0	-	-	-	-	-	-
San Augustine	0	14	14	14	14	14	14
Shelby	7	10	10	10	10	10	10
Smith[a]	375	448	448	448	448	448	448
Trinity[a]	31	278	278	278	278	278	278
Tyler	267	354	354	354	354	354	354
Total for ETRWPA	**50,632**	**99,429**	**99,429**	**99,429**	**99,429**	**99,429**	**99,429**

Notes:

(a) These counties are split between more than one Texas Water Development Board regional water planning area. The demands shown represent the portion that fall within the East Texas Regional Water Planning Area (ETRWPA).

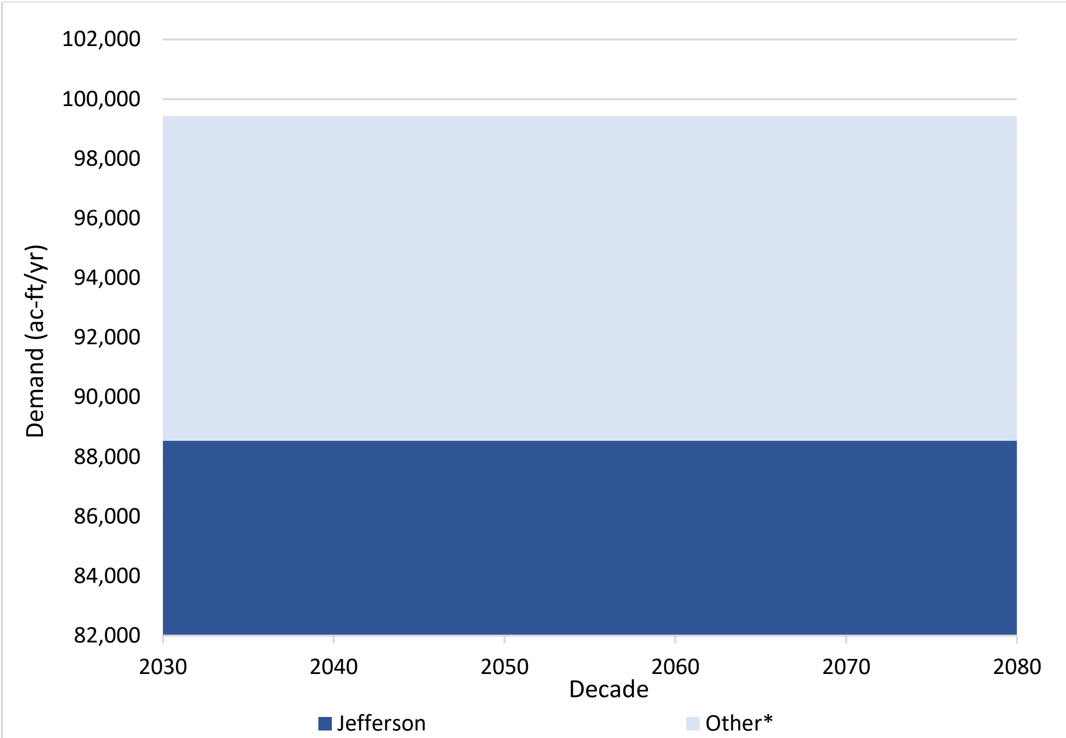
Sources:

(1) TWDB Water Use Survey: Historical Summary Estimates by County

(2) Projection provided by Texas Water Development Board.

Table 2.9 Irrigation Demand Projection Percentages in the East Texas Regional Water Planning Area by County

County	Percent Change in Demand 2030 to 2080	Percent of Total ETRWPA Demand	
		2030	2080
Anderson	0%	0.9%	0.9%
Angelina	0%	0.8%	0.8%
Cherokee	0%	0.5%	0.5%
Hardin	0%	1.0%	1.0%
Henderson	0%	0.5%	0.5%
Houston	0%	2.1%	2.1%
Jasper	0%	0%	0%
Jefferson	0%	89%	89%
Nacogdoches	0%	0.3%	0.3%
Newton	0%	0.1%	0.1%
Orange	0%	2%	2%
Panola	0%	1.1%	1.1%
Polk	0%	0.2%	0.2%
Rusk	0%	0.3%	0.3%
Sabine	-	-	-
San Augustine	0%	<0.1%	<0.1%
Shelby	0%	<0.1%	<0.1%
Smith	0%	0.5%	0.5%
Trinity	0%	0.3%	0.3%
Tyler	0%	0.4%	0.4%



*For a breakdown of Other Irrigation Demand Projections by County see Figure 2.11.

Figure 2.10 Irrigation Demand Projections in the East Texas Regional Water Planning Area Greater than 2,500 ac-ft/yr by County

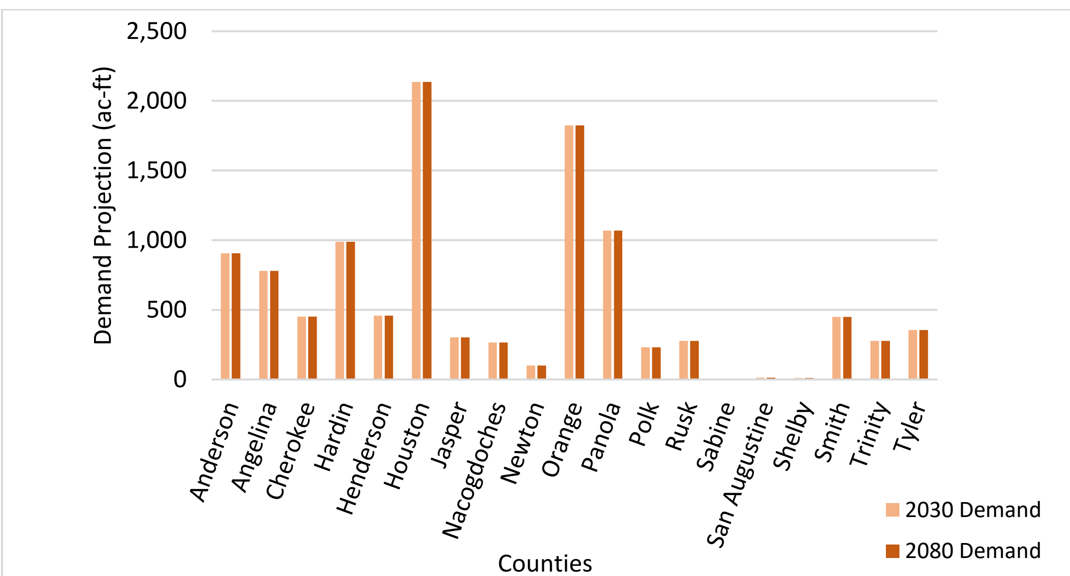


Figure 2.11 Irrigation Demand Projections in the East Texas Regional Water Planning Area Less than 2,500 ac-ft/yr by County

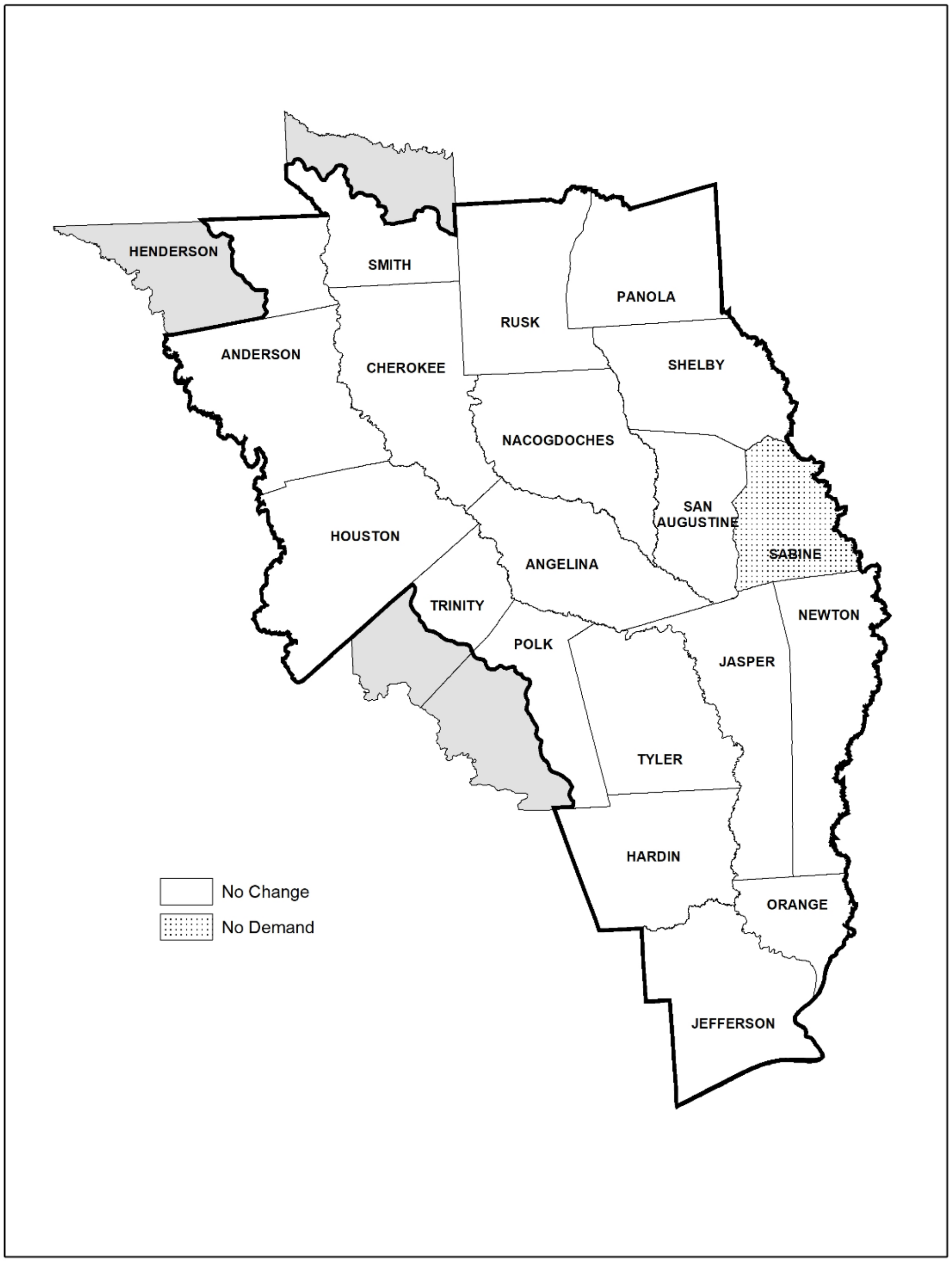


Figure 2.12 Irrigation Demand Annual Growth Rate

2.3.4 Steam-Electric Power Demands

There are nine counties with projected steam-electric power demands in the ETRWPA. Compared to the last round of planning, the projected demands have decreased by 38 percent in 2030. The reduced demand projection in this round of planning is due to retirements of facilities based on information provided by the U.S. Energy Information Administration (EIA) annual database, EIA-860. Region-wide steam-electric power demands are projected to remain constant at 41,970 ac-ft pear year from 2030 to 2080.

The TWDB draft steam-electric water demand projections for the 2026 Regional Water Plans were based upon:

- The highest single-year county water use from within the most recent five years of data (2015-2019) for steam-electric power water users from the annual water use surveys,
- Near-term additions and retirements of generating facilities, and
- Holding the projected water demand volume constant through 2080.

The ETRWPG recommended adjusting the TWDB draft projection to include a new steam-electric power generating facility (6,160 ac-ft/yr) in Orange County throughout the planning horizon. This updated methodology was approved and adopted in the 2026 Plan. After the demand projections for the 2026 Regional Water Plans were adopted, it was discovered that there is a power generating facility in Tyler County whose demand might not have been captured in the 2026 RWP approved projection. This facility has a permitted demand of 190.7 ac-ft/yr and a recent maximum demand of 32.8 ac-ft/yr from 2018 through 2023. Considering the permitted demand, the revised projected steam-electric demand increased from 41,782 ac-ft/yr to 41,970 ac-ft/yr, as shown in Table 2.10.

The water demand projections adopted for the 2026 regional water plans include projected water use for a proposed power generation facility in the Region I portion of Henderson County: the Halyard Henderson Energy Center. This facility had a projected demand of 2,061 ac-ft per year from 2030 to 2080. This plant has not been constructed and does not use any existing water supply (groundwater, surface water, etc.). Since water demand projections were adopted for the 2026 regional water plans, the U.S. Energy Information Administration (EIA) annual database, EIA-860, indicated that plans to develop the Halyard Henderson Energy Center were cancelled. Thus, there is no anticipated water demand projected for steam-electric power water users in Henderson County.

Projected demands for each county are summarized in Table 2.10 and Table 2.11. Figure 2.13graphically depicts the demand projections for the nine counties in the region with steam-electric power demands. Figure 2.14 shows the distribution of steam-electric power demands in the region.

Table 2.10 Historical and Projected Steam-Electric Power Water Demand in the East Texas Regional Water Planning Area by County (ac-ft/yr)

County	2019 Historical[1]	Projections[2]					
		2030	2040	2050	2060	2070	2080
Anderson	0	2,296	2,296	2,296	2,296	2,296	2,296
Angelina	0	-	-	-	-	-	-
Cherokee	309	310	310	310	310	310	310
Hardin	0	1	1	1	1	1	1
Henderson[a]	0	2,061	2,061	2,061	2,061	2,061	2,061
Houston	0	-	-	-	-	-	-
Jasper	0	-	-	-	-	-	-
Jefferson	0	-	-	-	-	-	-
Nacogdoches	193	400	400	400	400	400	400
Newton	6,430	6,808	6,808	6,808	6,808	6,808	6,808
Orange	3,210	10,497	10,497	10,497	10,497	10,497	10,497
Panola	0	-	-	-	-	-	-
Polk[a]	0	-	-	-	-	-	-
Rusk	16,386	19,406	19,406	19,406	19,406	19,406	19,406
Sabine	0	-	-	-	-	-	-
San Augustine	0	-	-	-	-	-	-
Shelby	0	-	-	-	-	-	-
Smith[b]	0	-	-	-	-	-	-
Trinity[b]	0	-	-	-	-	-	-
Tyler	0	3	3	3	3	3	3
Total for ETRWPA from 2026 RWP Adoption	**26,528**	**39,295**	**39,295**	**39,295**	**39,295**	**39,295**	**39,295**
Revised Henderson Demand from RWPG[c]	0	0	0	0	0	0	0
Revised Tyler Demand from RWPG[c]	33	191	191	191	191	191	191
Revised Total for ETRWPA	**26,561**	**41,970**	**41,970**	**41,970**	**41,970**	**41,970**	**41,970**

Notes:

(a) The projected demand in Henderson County is associated with a facility, the Halyard Energy Center, that is no longer being pursued.

(b) These counties are split between more than one Texas Water Development Board regional water planning area. The demands shown represent the portion that fall within the East Texas Regional Water Planning Area (ETRWPA).

(b) There is a power generating facility in Tyler County which has a permitted demand of 190.7 ac-ft/yr and a recent maximum demand of 32.8 ac-ft/yr from 2018 through 2023. It's likely that this demand was not accounted for in the 2026 RWP demand projection. However, the facility currently pumps water from the Gulf Coast Aquifer, which has sufficient available water to meet its permitted demand.

Sources:

(1) TWDB Water Use Survey: Historical Summary Estimates by County

(2) Projection provided by Texas Water Development Board.

Table 2.11 Steam-Electric Power Demand Projection Percentages in the East Texas Regional Water Planning Area by County

County	Percent Change in Demand 2030 to 2080	Percent of Total ETRWPA Demand	
		2030	2080
Anderson	-	<0.1%	<0.1%
Cherokee	0%	0.7%	0.7%
Hardin	0%	<0.1%	<0.1%
Henderson	0%	4.9%	4.9%
Nacogdoches	0%	1.0%	1.0%
Newton	0%	16.3%	16.3%
Orange	0%	25.1%	25.1%
Rusk	0%	46.4%	46.4%
Tyler	0%	0.5%	0.5%

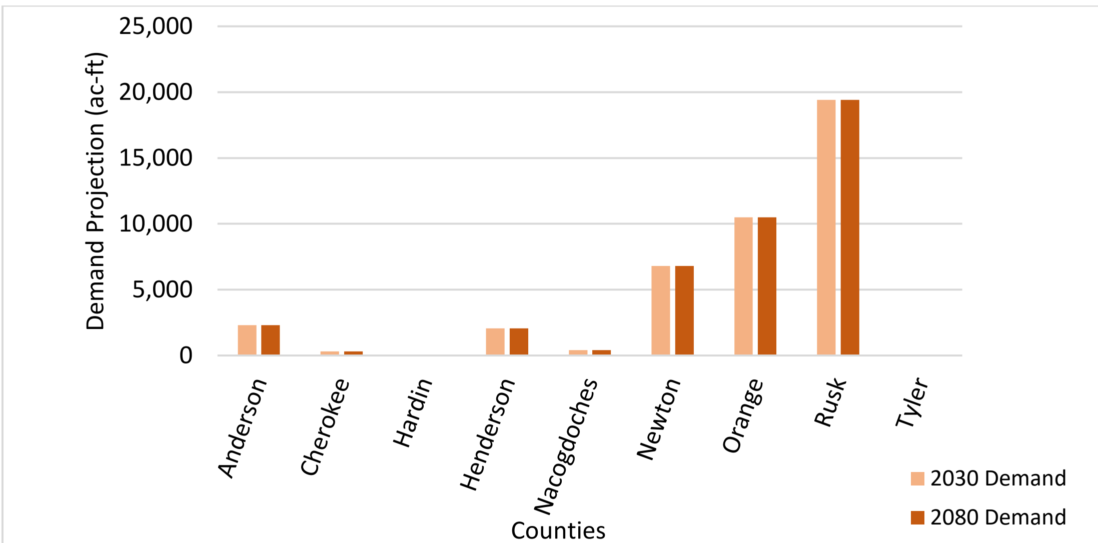


Figure 2.13. Steam-Electric Power Demand Projections in the East Texas Regional Water Planning Area by County

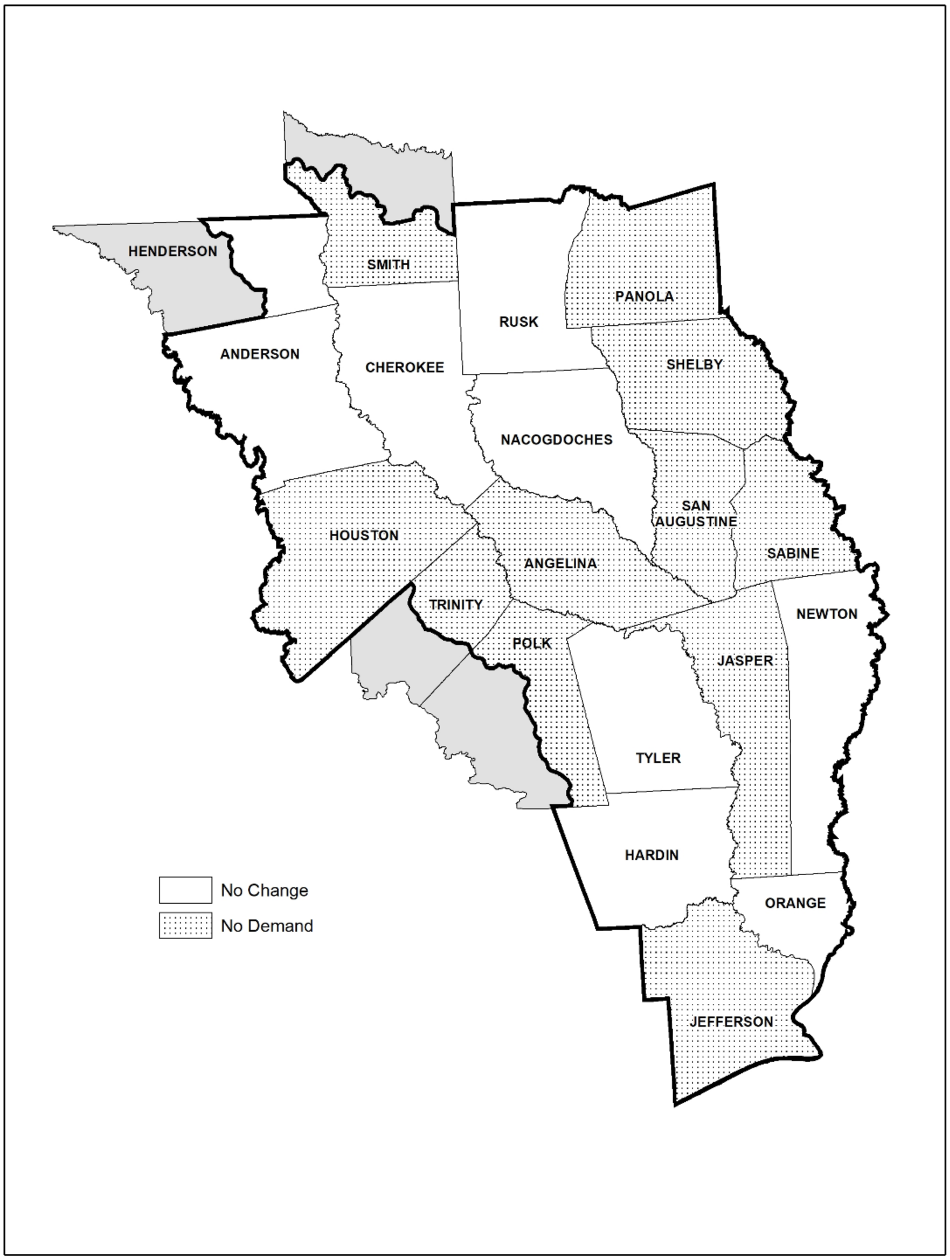


Figure 2.14 Steam-Electric Power Demands Annual Growth Rate

2.3.5 Livestock Demands

The 2026 Plan projects livestock demands in all 20 counties in the region, with more than half the demand in Jasper, Nacogdoches, and Shelby counties through the planning period. The total livestock water usage is expected to increase over the planning period from 30,001 ac-ft per year in 2030 to 34,460 ac-ft per year in 2070. Compared to the projections in the last round of planning, these projections represent almost a 40 percent decrease in 2030 and a 47 percent decrease in 2070. The reduction is due to a smaller demand baseline of 16,866 ac-ft/year from 2015-2019 and more efficient water use by livestock water users based on literature and expert opinion in this round of planning compared to the last round.

The draft TWDB projection was informed by the average livestock demands from 2015-2019, the decade-specific water use growth rates approved during the previous water planning cycle (2021 RWP), and updated water use demands for certain livestock types. The ETRWPG recommended using the maximum livestock demands from the same period to inform a more conservative projection. This methodology was approved and adopted in the 2026 Plan.

The projected usage by county during the planning period is presented in Table 2.12. The largest percentage change in total demand is expected to occur in Sabine County at 106 percent. Additional percent changes can be seen in Table 2.13. Counties with a projected demand over 3,000 ac-ft per year are presented in Figure 2.15 with the remaining counties presented in Figure 2.16. The livestock demand change rates are presented graphically in Figure 2.17. The methodology was approved and adopted in the 2026 Plan.

Table 2.12 Historical and Projected Livestock Water Demand in the East Texas Regional Water Planning Area by County (ac-ft/yr)

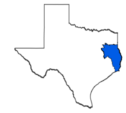
County	2019 Historical[(1)]	Projections(2)					
		2030	2040	2050	2060	2070	2080
Anderson	1,321	1,321	1,321	1,321	1,321	1,321	1,321
Angelina	684	684	684	684	684	684	684
Cherokee	1,231	1,231	1,231	1,231	1,231	1,231	1,231
Hardin	164	201	201	201	201	201	201
Henderson[a]	432	3,179	3,179	3,179	3,179	3,179	3,179
Houston	1,440	1,666	1,815	1,978	2,154	2,380	2,380
Jasper	272	10,273	10,273	10,273	10,273	10,273	10,273
Jefferson	669	799	799	799	799	799	799
Nacogdoches	2,373	2,625	2,754	2,904	3,074	3,329	3,329
Newton	89	114	114	114	114	114	114
Orange	187	187	187	187	187	187	187
Panola	1,049	1,142	1,142	1,142	1,142	1,142	1,142
Polk[a]	93	114	114	114	114	114	114
Rusk	1,207	1,316	1,340	1,364	1,389	1,389	1,389
Sabine	237	323	424	540	667	667	667
San Augustine	475	533	592	660	736	736	736
Shelby	2,802	3,338	3,991	4,788	5,759	5,759	5,759
Smith[a]	464	500	500	500	500	500	500
Trinity[a]	187	187	187	187	187	187	187
Tyler	268	268	268	268	268	268	268
Total for ETRWPA	**15,644**	**30,002**	**31,117**	**32,435**	**33,981**	**34,461**	**34,461**

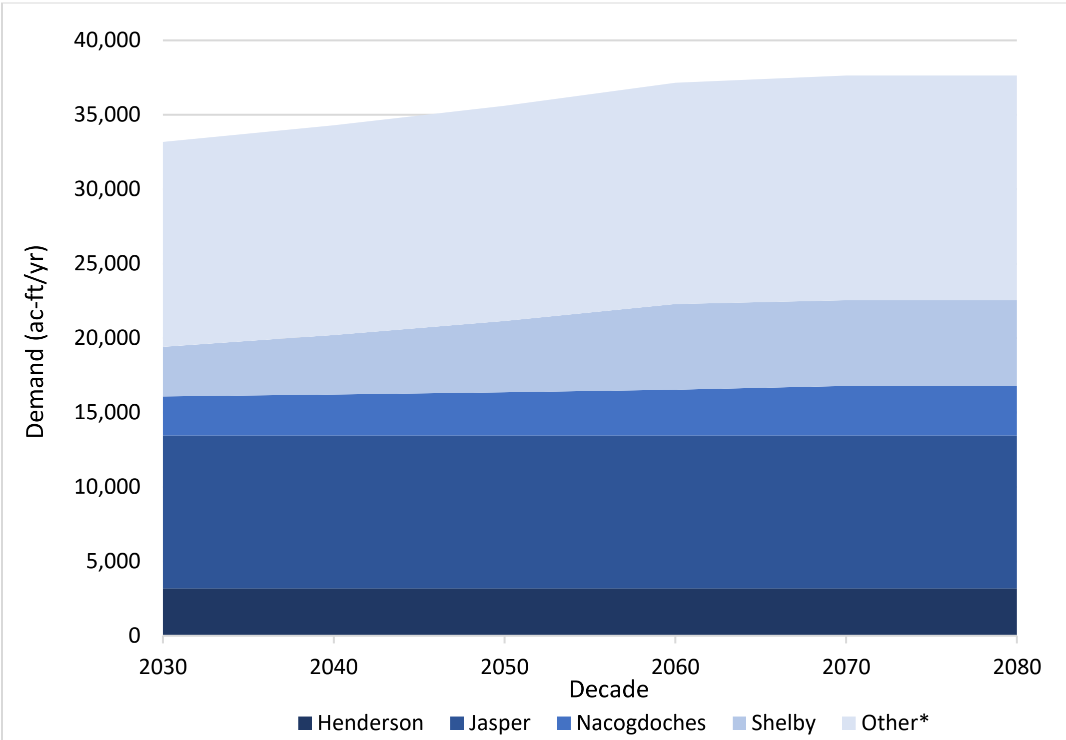
Notes:

(a) These counties are split between more than one Texas Water Development Board regional water planning area. The demands shown represent the portion that fall within the East Texas Regional Water Planning Area (ETRWPA).

Sources:

(1) TWDB Water Use Survey: Historical Summary Estimates by County
(2) Projection provided by Texas Water Development Board.





*For a breakdown of Other Livestock Demand Projections by County see Figure 2.16.

Figure 2.15 Livestock Demand Projections in the East Texas Regional Water Planning Area Greater than 3,000 ac-ft/yr by County

Note: Sourced from Texas Water Development Board

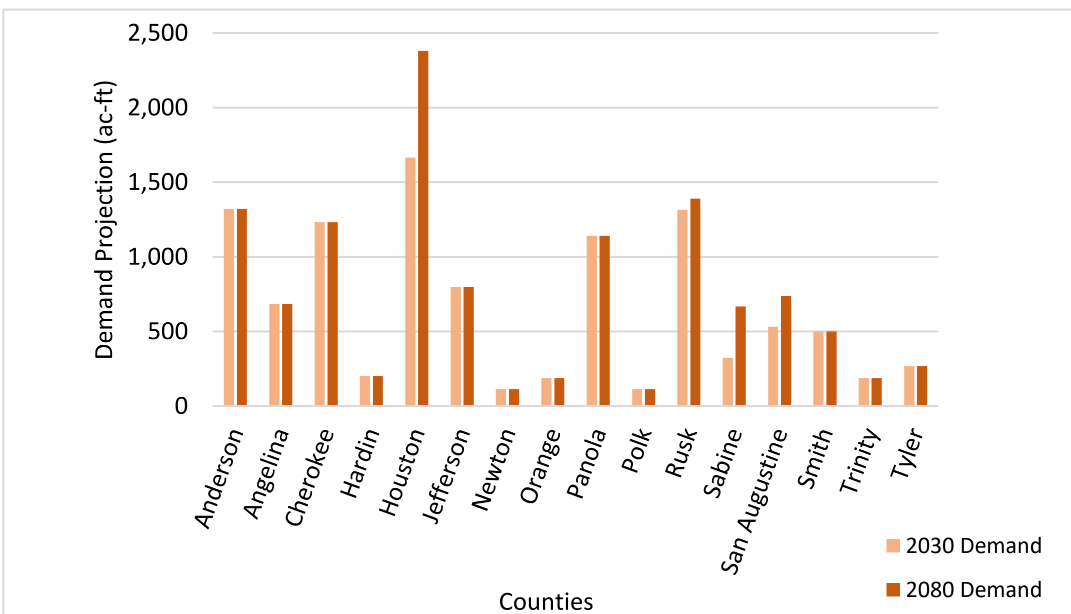


Figure 2.16 Livestock Demand Projections in the East Texas Regional Water Planning Area Less than 3,000 ac-ft/yr by County

Note: Sourced from Texas Water Development Board

Table 2.13. Livestock Demand Projection Percentages in the East Texas Regional Water Planning Area by County

County	Percent Change in Demand 2030 to 2080	Percent of Total ETRWPA Demand	
		2030	2080
Anderson	0%	4.4%	3.8%
Angelina	0%	2.3%	2.0%
Cherokee	0%	4.1%	3.6%
Hardin	0%	0.7%	0.6%
Henderson	0%	11%	9.2%
Houston	43%	5.6%	6.9%
Jasper	0%	34%	30%
Jefferson	0%	2.7%	2.3%
Nacogdoches	27%	8.8%	9.7%
Newton	0%	0.4%	0.3%
Orange	0%	0.6%	0.5%
Panola	0%	3.8%	3.3%
Polk	0%	0.4%	0.3%
Rusk	6%	4.4%	4.0%
Sabine	106%	1.1%	1.9%
San Augustine	38%	1.8%	2.1%
Shelby	73%	11%	17%
Smith	0%	1.7%	1.5%
Trinity	0%	0.6%	0.5%
Tyler	0%	0.9%	0.8%

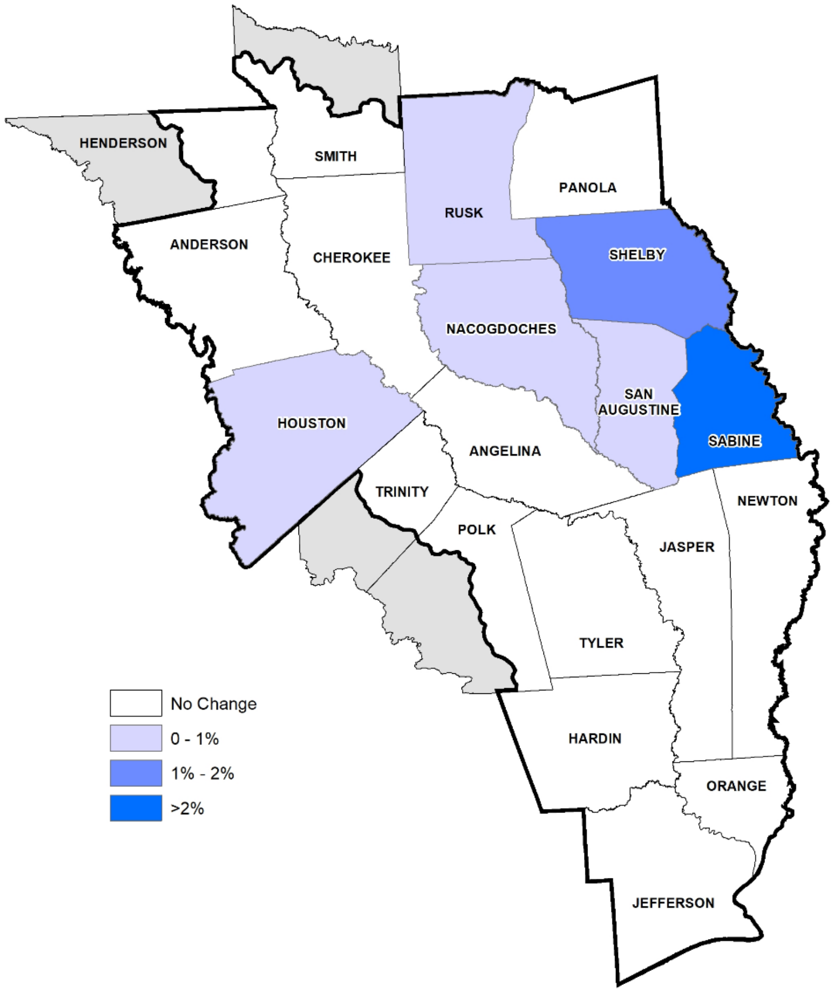


Figure 2.17 Livestock Demand Annual Growth Rate

2.3.6 Mining Demands

The 2026 Plan projects mining demands in all 20 counties in the region. Much of the demand (approximately 38,000 ac-ft per year in 2010 and declining to approximately 10,179 ac-ft per year in 2080) was related to the expanding shale-gas play located within much of the region. Since 2011, the natural gas exploration industry has focused on the Eagle Ford shale in South Texas, resulting in lower projections for water demand in the ETRWPA. Nonetheless, gas exploration has continued in the region and is expected to comprise the majority of the mining demand for the region. For the 2021 Plan, mining water demand was updated to 27,523 ac-ft per year in 2020 and decline to 12,093 ac-ft per year in 2070 with mining water use in all 20 of the counties in the ETRWPA.

Compared to the projections in the 2021 Plan, the current projections are significantly smaller. The differences were less pronounced in the later planning period, with a decrease of 61 percent in the 2030 projections and a decrease of 17 percent in the 2070 projections.

The TWDB draft mining demand projections for the 2026 Regional Water Plans were developed from the 2022 TWDB Mining Water Use Study. The study used different methods to develop projections for each mining water use category: oil and gas, aggregate mining, and coal mining. However, projected mining water use in Region I is comprised of either oil and gas or aggregate mining. There is no projected mining water use from coal mining. The draft projections were adopted in the 2026 Plan.

Table 2.14 provides mining water projections and Table 2.15 shows the percent changes for each county in the ETRWPA. Demands for counties with projections greater than 1,000 ac-ft per year are depicted on Figure 2.18. Those counties with lower projected demands are shown on Figure 2.19. Figure 2.20 illustrates the annual percent change for mining water in each county in the ETRWPA.

Table 2.14 Historical and Projected Mining Water Demand in the East Texas Regional Water Planning Area by County (ac-ft/yr)

County	2019 Historical(1)	Projections(2)					
		2030	2040	2050	2030	2070	2080
Anderson	0	34	34	34	34	34	34
Angelina	372	780	819	855	887	915	940
Cherokee	63	187	187	187	187	187	187
Hardin	265	13	13	13	13	13	13
Henderson[a]	0	173	182	193	222	255	296
Houston	0	302	302	302	302	302	302
Jasper	0	28	28	28	28	28	28
Jefferson	10	294	312	332	354	379	406
Nacogdoches	613	891	891	891	891	891	891
Newton	0	3	3	3	3	3	3
Orange	2	11	11	11	11	11	11
Panola	5,385	2,280	2,280	2,280	2,280	2,280	2,280
Polk[a]	1	26	27	28	29	30	30
Rusk	275	489	489	489	489	489	489
Sabine	0	203	203	203	203	203	203
San Augustine	957	1,411	1,411	1,411	1,411	1,411	1,411
Shelby	660	2,070	2,070	2,070	2,070	2,070	2,070
Smith[a]	261	427	446	466	487	510	534
Trinity[a]	0	9	9	9	9	9	9
Tyler	37	42	42	42	42	42	42
Total for ETRWPA	**8,901**	**9,673**	**9,759**	**9,847**	**9,952**	**10,062**	**10,179**

Notes:

(a) These counties are split between more than one Texas Water Development Board regional water planning area. The demands shown represent the portion that fall within the East Texas Regional Water Planning Area (ETRWPA).

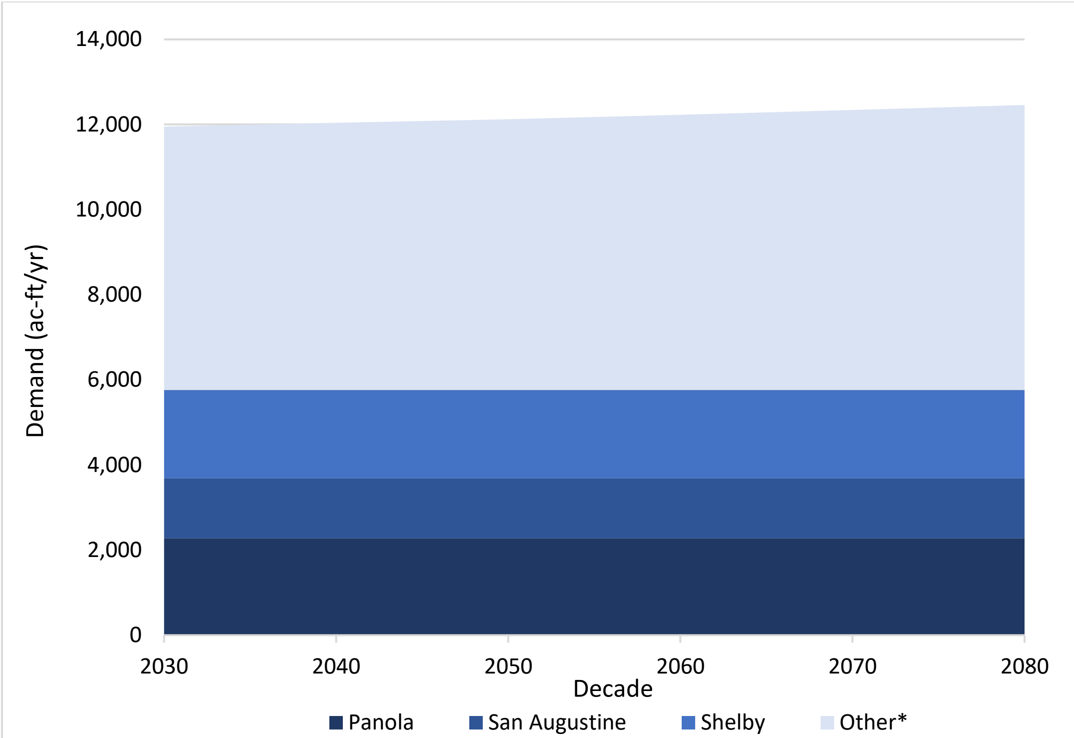
Sources:

(1) TWDB Water Use Survey: Historical Summary Estimates by County

(2) Projection provided by Texas Water Development Board.

Table 2.15 Mining Demand Projection Percentages in the East Texas Regional Water Planning Area by County

County	Percent Change in Demand 2030 to 2080	Percent of Total ETRWPA Demand	
		2030	2080
Anderson	0%	0.4%	0.3%
Angelina	21%	8.1%	9.2%
Cherokee	0%	1.9%	1.8%
Hardin	0%	0.1%	0.1%
Henderson	71%	2%	2.9%
Houston	0%	3.1%	3.0%
Jasper	0%	0%	0%
Jefferson	38%	3.0%	4.0%
Nacogdoches	0%	9.2%	8.8%
Newton	0%	<0.1%	<0.1%
Orange	0%	0.1%	0.1%
Panola	0%	24%	22%
Polk	15%	0.3%	0.3%
Rusk	0%	5.1%	4.8%
Sabine	0%	2.1%	2.0%
San Augustine	0%	15%	14%
Shelby	0%	21%	20%
Smith	25%	4.4%	5.2%
Trinity	0%	<0.1%	<0.1%
Tyler	0%	0.4%	0.4%



*For a breakdown of Other Mining Demand Projections by County see Figure 2.19.

Figure 2.18 Mining Demand Projections in the East Texas Regional Water Planning Area Greater than 1,000 ac-ft/yr by County

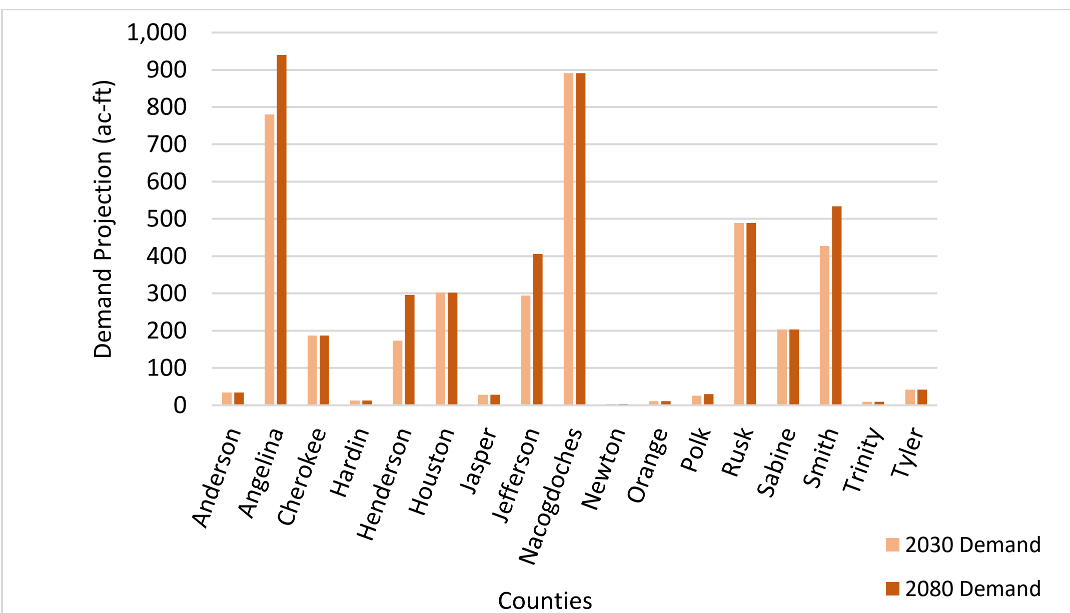


Figure 2.19 Mining Demand Projections in the East Texas Regional Water Planning Area Less than 1,000 ac-ft/yr by County

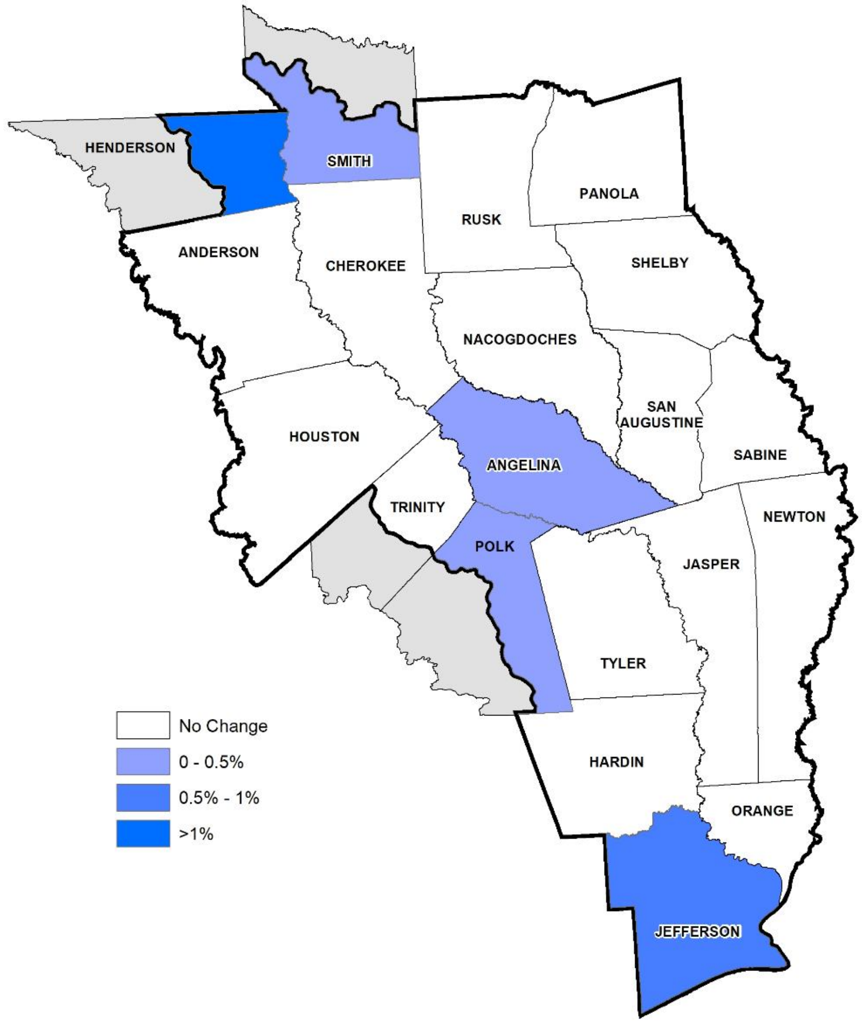


Figure 2.20 Mining Demand Annual Growth Rate

2.3.7 Contracts and Sales Between Water User Groups

The 2026 Plan is required to present the contracts and/or sales between WUGs in the ETRPWA in addition to any demands projected for the corresponding WUG or Major Water Provider (MWP). Table 2.16 summarizes this information by decade. The table does not include sales from WUGs who are also MWPs. See Section 2.4 for a summary of MWP contracts and/or sales to customers.

Table 2.16 Sales Between Water User Groups in the East Texas Regional Water Planning Area

Seller Name	Customer Name	Demands (ac-ft per year)					
		2030	2040	2050	2060	2070	2080
Corrigan	Manufacturing, Polk	9	9	9	9	9	9
County-Other, Nacogdoches	County-Other, San Augustine	1	1	1	1	1	1
County-Other, Rusk	Manufacturing, Rusk	272	272	272	272	272	272
County-Other, Sabine	Brookeland FWSD	10	9	8	8	7	7
County-Other, San Augustine	Manufacturing, San Augustine	3	3	3	3	3	3
County-Other, Shelby	County-Other, Sabine	253	253	253	253	253	253
Diboll	Manufacturing, Angelina	158	158	158	158	158	158
Grapeland	Manufacturing, Houston	4	4	4	4	4	4
Henderson	County-Other, Rusk	9	9	9	9	9	9
Joaquin	County-Other, Shelby	100	95	90	82	75	68
Meeker MWD	Manufacturing, Jefferson	638	638	638	638	638	638
Nederland	County-Other, Jefferson	105	105	105	105	105	105
North Hardin WSC	Manufacturing, Hardin	7	7	7	7	7	7
Orangefield WSC	Bridge City	14	14	14	14	14	14
Palestine	County-Other, Anderson	47	47	47	47	47	47
Palestine	Pleasant Springs WSC	121	121	121	121	121	121
Pineland	G M WSC	270	270	270	270	270	270
Pineland	Manufacturing, Sabine	45	45	45	45	45	45
Rusk Rural WSC	County-Other, Cherokee	1	1	1	1	1	1
San Augustine	San Augustine Rural WSC	286	312	331	324	315	306
Southern Utilities	Manufacturing, Smith	275	275	275	273	0	0
Tenaha	Manufacturing, Shelby	140	169	169	169	169	169

2.4 DEMANDS FOR MAJOR WATER PROVIDERS

As part of the development of the regional water plan, current water demands were identified for the MWPs in the ETRWPA. The MWPs are as follows:

- Angelina and Neches River Authority
- Angelina-Nacogdoches Water Control and Improvements District (WCID) No. 1
- Athens Municipal Water Authority
- City of Beaumont
- City of Carthage
- City of Center
- City of Jacksonville
- City of Lufkin
- City of Nacogdoches
- City of Port Arthur
- City of Tyler
- Houston County Water Control & Improvement District No. 1
- Lower Neches Valley Authority
- Panola County Freshwater Supply District No. 1
- Sabine River Authority of Texas
- Upper Neches River Municipal Water Authority

Chapter 1 provides a description of each MWP in the ETRWPA. For details regarding MWP supplies, needs, and water management strategies, see Chapters 3, 4, and 5, respectively. The projected demands of each customer on each MWP can be found in Table 2.17 on the following pages. Where applicable, the projected demand is equal to the contract volume between the MWP and their customer(s). Table 2.18 presents MWP demands by water use category for 2030. Appendix 4-A contains a summary of MWP demands by water use category from 2030 to 2080

Table 2.17 Projected Demands for Each Major Water Provider in the East Texas Regional Water Planning Area

MWP/Customer	Demand Projections (ac-ft/yr)					
Angelina and Neches River Authority	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Cherokee County-Other	0	3,848	3,848	3,848	3,848	3,848
City of Jacksonville	0	4,275	4,275	4,275	4,275	4,275
City of New Summerfield	0	2,565	2,565	2,565	2,565	2,565
North Cherokee WSC	0	4,275	4,275	4,275	4,275	4,275
City of Rusk	0	4,275	4,275	4,275	4,275	4,275
Rusk Rural WSC	0	855	855	855	855	855
City of Alto	0	428	428	428	428	428
Nacogdoches County-Other	0	428	428	428	428	428
City of Nacogdoches	0	8,551	8,551	8,551	8,551	8,551
City of New London	0	855	855	855	855	855
City of Troup	0	4,275	4,275	4,275	4,275	4,275
City of Arp	0	428	428	428	428	428
Smith County-Other	0	855	855	855	855	855
Jackson WSC	0	855	855	855	855	855
City of Whitehouse	0	8,551	8,551	8,551	8,551	8,551
Region C (Potential Customer - Up to 56,050 ac-ft/yr)	0	0	0	0	30,161	30,081
Total Demand - Lake Columbia	*0*	*45,319*	*45,319*	*45,319*	*75,480*	*75,400*
Additional Contracts						
County-Other (Holmwood Utility, Jasper)	1,137	1,049	948	851	748	636
County-Other (Angelina County Fresh Water Supply District #1)	47	47	47	47	47	47
County-Other (Central Heights Utilities)	81	81	81	81	81	81
County-Other (Prairie Grove WSC)	39	39	39	39	39	39
Nacogdoches County Mining	891	891	891	891	891	891
San Augustine County Mining	1411	1411	1411	1411	1411	1411
Total Additional Contracts	*3,606*	*3,518*	*3,417*	*3,320*	*3,217*	*3,105*
Angelina and Neches River Authority Total Demand	**3,606**	**48,837**	**48,736**	**48,639**	**78,697**	**78,505**

Table 2.17 Projected Demands for Each Major Water Provider in the East Texas Regional Water Planning Area (Cont.)

MWP/Customer	Demand Projections (ac-ft/yr)					
Angelina-Nacogdoches WCID No. 1	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Luminant Energy	431	474	521	573	630	693
Nacogdoches / Southern Power	1,494	1,643	1,807	1,988	2,187	2,406
City of Henderson	153	168	185	204	224	246
Angelina-Nacogdoches Water Control and Improvement District No. 1 Total Demand	2,078	2,285	2,513	2,765	3,041	3,345
Athens MWA	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
City of Athens	2,633	3,161	4,150	4,998	6,023	6,649
Manufacturing, Henderson	20	20	20	20	20	20
Irrigation, Henderson	85	90	95	100	105	110
Livestock, Henderson	3,023	3,023	3,023	3,023	3,023	3,023
Athens Municipal Water Authority Total Demand	**5,761**	**6,294**	**7,288**	**8,141**	**9,171**	**9,802**
City of Beaumont	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
City of Beaumont	29,419	30,134	30,967	30,565	30,167	29,774
Federal Correction Complex Beaumont	613	610	610	610	610	610
County-Other, Jefferson	924	924	924	924	924	924
Manufacturing, Jefferson	2,296	2,755	3,214	3,674	4,133	4,592
Meeker MWD	4	4	4	4	4	4
City of Beaumont Total Demand	**33,256**	**34,427**	**35,719**	**35,777**	**35,838**	**35,904**
City of Carthage	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
City of Carthage	1,649	1,632	1,609	1,578	1,549	1,520
Hollands Quarter WSC	53	53	53	53	53	53
Rehobeth WSC	88	79	68	61	54	47
Clayton WSC	59	59	59	59	59	59
County-Other, Panola	100	100	100	100	100	100
Manufacturing, Panola	1,088	1,128	1,170	1,214	1,259	1,306
City of Carthage Total Demand	**3,037**	**3,051**	**3,059**	**3,065**	**3,074**	**3,085**

Table 2.17 Projected Demands for Each Major Water Provider in the East Texas Regional Water Planning Area (Cont.)

MWP/Customer	Demand Projections (ac-ft/yr)					
City of Center	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Sand Hills WSC	300	341	398	432	467	503
County-Other, Shelby	956	956	934	909	875	833
Manufacturing, Shelby	1,860	1,929	2,000	2,074	2,151	2,231
City of Center [a]	2,135	2,135	2,135	2,135	2,135	2,135
City of Center Total Demand	**5,251**	**5,361**	**5,467**	**5,550**	**5,628**	**5,702**
Note: (a) It appears that the City's current manufacturing demand is double-counted in both the City's demand and the manufacturing demand in Shelby County, overestimating the City's demand by 1,000 ac-ft.						
City of Jacksonville	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Jacksonville	2,576	2,541	2,494	2,442	2,390	2,338
Bullard	1,088	1,242	1,349	1,449	1,547	1,642
County-Other, Cherokee	214	219	225	231	238	245
Craft Turney WSC	635	626	613	600	586	572
Gum Creek WSC	103	101	99	97	95	92
North Cherokee WSC	472	465	456	446	436	425
Manufacturing	82	85	88	91	94	97
City of Jacksonville Total Demand	**5,170**	**5,279**	**5,324**	**5,356**	**5,386**	**5,411**
City of Lufkin	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Lufkin	6,592	6,674	6,726	6,792	6,857	6,922
County-Other, Angelina	74	74	74	74	74	74
Diboll	1,940	1,940	1,940	1,940	1,940	1,940
Huntington	448	448	448	448	448	448
Redland WSC	307	307	307	307	307	307
Woodlawn WSC	221	221	221	221	221	221
Manufacturing, Angelina	1,122	1,164	1,207	1,252	1,298	1,346
Steam-Electric power, Angelina	16,802	16,802	16,802	16,802	16,802	16,802
Irrigation, Angelina	779	779	779	779	779	779
City of Lufkin Total Demand	**28,285**	**28,408**	**28,503**	**28,614**	**28,725**	**28,838**

Table 2.17 Projected Demands for Each Major Water Provider in the East Texas Regional Water Planning Area (Cont.)

MWP/Customer	Demand Projections (ac-ft/yr)					
City of Nacogdoches	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Nacogdoches	7,421	7,614	7,809	8,104	8,397	8,690
Manufacturing, Nacogdoches	2,892	2,999	3,110	3,225	3,344	3,468
D & M WSC	258	258	258	258	258	258
Appleby WSC	93	93	93	93	93	93
County Other, Nacogdoches	67	67	67	67	67	67
Woden WSC	262	269	276	289	302	315
Melrose WSC	37	37	37	37	37	37
City of Nacogdoches Total Demand	**11,030**	**11,337**	**11,650**	**12,073**	**12,498**	**12,928**
City of Port Arthur	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
City of Port Arthur	18,309	18,454	18,405	18,183	17,964	17,748
County-Other, Jefferson (Texas Parks and Wildlife)	5	5	5	5	5	5
Manufacturing, Jefferson	15,641	19,531	19,580	19,802	20,021	20,237
City of Port Arthur Total Demand	**33,955**	**37,990**	**37,990**	**37,990**	**37,990**	**37,990**
City of Tyler	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Tyler (Region I)	34,718	38,796	43,467	46,016	48,716	51,573
Tyler (Region D)	233	209	194	173	153	133
Manufacturing, Smith	1,714	1,778	1,843	1,912	1,982	2,056
Whitehouse	747	747	747	747	747	747
Southern Utilities	428	456	477	492	507	522
Walnut Grove Water System	1,495	1,495	1,495	1,495	1,495	1,495
County-other, Smith	239	239	239	239	239	239
Irrigation	400	400	400	400	400	400
City of Tyler Total Demand	**39,975**	**44,121**	**48,862**	**51,474**	**54,240**	**57,165**
Houston County WCID No. 1	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Manufacturing, Houston	201	208	216	224	232	241
Crockett	1,080	1,014	915	888	852	809
Lovelady	109	105	100	98	96	94
Consolidated WSC	1,788	1,840	1,903	1,941	1,974	2,006
Houston County Water Control and Improvement District No. 1 Total Demand	**3,178**	**3,167**	**3,134**	**3,151**	**3,154**	**3,150**

Table 2.17 Projected Demands for Each Major Water Provider in the East Texas Regional Water Planning Area (Cont.)

MWP/Customer	Demand Projections (ac-ft/yr)					
Lower Neches Valley Authority	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Region I WUGs						
City of Beaumont - Base Contract	6,000	6,000	6,000	6,000	6,000	6,000
City of Groves	2,289	2,279	2,279	2,279	2,279	2,279
Jefferson County WCID 10	597	600	598	591	584	577
City of Nederland	2,590	2,601	2,595	2,565	2,536	2,508
City of Nome	145	146	145	144	142	140
City of Port Arthur	33,955	37,990	37,990	37,990	37,990	37,990
City of Port Neches	2,018	2,024	2,020	2,001	1,982	1,964
West Jefferson County MWD	1,023	1,022	1,030	1,042	1,054	1,066
City of Woodville - Contract	5,600	5,600	5,600	5,600	5,600	5,600
Irrigation, Jefferson	140,000	140,000	140,000	140,000	140,000	140,000
Livestock, Jasper	10,000	10,000	10,000	10,000	10,000	10,000
Manufacturing, Nacogdoches	10,000	10,000	10,000	10,000	10,000	10,000
Manufacturing, Jasper	10,171	10,171	10,171	10,171	10,171	10,171
Manufacturing, Jefferson	150,000	150,000	150,000	150,000	150,000	150,000
Total Demand for Region I WUGs	*374,388*	*378,433*	*378,428*	*378,383*	*378,338*	*378,295*
Region H WUGs						
Trinity Bay Conservation District	737	737	737	737	737	737
Bolivar Peninsula SUD	6,000	6,000	6,000	6,000	6,000	6,000
Irrigation, Chambers	37,000	37,000	37,000	37,000	37,000	37,000
Irrigation, Liberty	23,000	23,000	23,000	23,000	23,000	23,000
Total Demand for Region H WUGs	*66,737*	*66,737*	*66,737*	*66,737*	*66,737*	*66,737*
Delivery Losses						
Delivery Losses	*55,141*	*55,646*	*55,646*	*55,640*	*55,634*	*55,629*
Lower Neches Valley Authority Total Demand	**496,266**	**500,816**	**500,811**	**500,760**	**500,709**	**500,661**
Panola County FWSD No. 1	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
City of Carthage	13,452	13,452	13,452	13,452	13,452	13,452
Mining, Panola	1,368	1,368	1,368	1,368	1,368	1,368
Panola County Freshwater Supply District No. 1 Total Demand	14,820	14,820	14,820	14,820	14,820	14,820

Table 2.17 Projected Demands for Each Major Water Provider in the East Texas Regional Water Planning Area (Cont.)

MWP/Customer	Demand Projections (ac-ft/yr)					
Sabine River Authority	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Toledo Bend						
El Camino WSC (County-Other, Sabine)	37	37	37	37	37	37
Hemphill	476	476	476	476	476	476
Huxley	280	280	280	280	280	280
G M WSC	560	560	560	560	560	560
Steam-Electric Power, Rusk	17,922	17,922	17,922	17,922	17,922	17,922
Manufacturing, Orange	31	31	31	31	31	31
Mining - Panola, Shelby, and Sabine counties	7,500	7,500	7,500	7,500	7,500	7,500
Total Demand for Toledo Bend Division	*26,806*	*26,806*	*26,806*	*26,806*	*26,806*	*26,806*
Canal (Gulf Coast Division)						
Rose City (County-Other, Orange)	228	228	228	228	228	228
Irrigation, Orange	2,402	2,402	2,402	2,402	2,402	2,402
Manufacturing, Jefferson	1,120	1,120	1,120	1,120	1,120	1,120
Manufacturing, Orange	78,364	78,364	78,364	78,364	78,364	78,364
Steam-Electric Power, Orange	11,079	11,079	11,079	11,079	11,079	11,079
Steam-Electric Power, Newton	13,442	13,442	13,442	13,442	13,442	13,442
Total Demand for Canal Division	*106,635*	*106,635*	*106,635*	*106,635*	*106,635*	*106,635*
Potential Future Customers - Lower Basin						
Manufacturing, Orange	29,117	29,117	29,117	31,529	35,813	40,256
Manufacturing, Newton	5,611	5,838	6,074	6,318	6,571	6,834
Total Future Demands in Lower Basin	*34,728*	*34,955*	*35,191*	*37,847*	*42,384*	*47,090*
Sabine River Authority Total Demand	**168,169**	**168,396**	**168,632**	**171,288**	**175,825**	**180,531**
Upper Neches River Municipal Water Authority	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
City of Dallas (Not Connected)	114,337	114,337	114,337	114,337	114,337	114,337
City of Tyler	67,200	67,200	67,200	67,200	67,200	67,200
City of Palestine	28,000	28,000	28,000	28,000	28,000	28,000
Irrigation, Cherokee	41	36	32	28	25	25
Irrigation, Henderson	82	73	64	57	51	51
Irrigation, Smith	487	478	469	462	456	456
Manufacturing, Smith	100	100	100	100	100	100
Upper Neches River Municipal Water Authority Total Demand	**210,247**	**210,224**	**210,202**	**210,184**	**210,169**	**210,169**

Table 2.18 Projected 2030 Demands for each Major Water Provider by Use Type in the East Texas Regional Water Planning Area (ac-ft/yr)

MWP [a]	Municipal	Irrigation	Livestock	Manufact-uring	Mining	Steam Electric Power	Other MWPs [a]
Angelina and Neches River Authority	1,304	0	0	0	2,302	0	0
Angelina-Nacogdoches WCID No. 1	153	0	0	0	0	431	1,494
Athens MWA	2,633	85	3,023	20	0	0	0
City of Beaumont	30,960	0	0	2,296	0	0	0
City of Carthage	1,949	0	0	1,088	0	0	0
City of Center [b]	3,391	0	0	1,860	0	0	0
City of Jacksonville	4,616	472	0	82	0	0	0
City of Lufkin	9,508	853	0	1,122	0	16,802	0
City of Nacogdoches	8,138	0	0	2,892	0	0	0
City of Port Arthur	18,314	0	0	15,641	0	0	0
City of Tyler	37,861	400	0	1,714	0	0	0
Houston County WCID No. 1	2,977	0	0	201	0	0	0
Lower Neches Valley Authority	20,999	200,000	10,000	170,171	0	0	39,955
Panola County FWSD No. 1	13,452	0	0	0	1,368	0	0
Sabine River Authority	1,581	2,402	0	114,243	7,500	42,443	0
Upper Neches River Municipal Water Authority	142,337	610	0	100	0	0	67,200

Note:
The water use category for sales To Other Major Water Providers is captured in the recipient Major Water Provider demands. For recipient Major Water Provider details, see
(a) Table 2.17.
(b) It appears that the City's current manufacturing demand is double-counted in both the City's demand and the manufacturing demand in Shelby County, overestimating the City's demand by 1,000 ac-ft.

REFERENCES

[1] U.S. Census Bureau. (2022). 2020 Census Undercount and Overcount Rates by State. Retrieved from: https://www.census.gov/library/stories/2022/05/2020-census-undercount-overcount-rates-by-state.html

Chapter 3: Evaluation of Current Water Supplies in the Region

2026 Initially Prepared Plan

Prepared for:

East Texas Regional Water Planning Group

February 2025

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Appendix 3-C: Summary of WAM Modifications in the Development of Surface Water Supplies for the 2026 East Regional Water Plan

Appendix 3-D: Desired Future Conditions and Modeled Available Groundwater Report(s)

LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AMWA	Athens Municipal Water Authority
DFC	Desired Future Condition
ETRWPA	East Texas Regional Water Planning Area
ft	foot
ft msl	Foot mean sea level
ft/yr	foot per year
FWSD	Fresh Water Supply District
GAM	Groundwater Availability Model
GCDs	groundwater conservation districts
GMAs	Groundwater Management Areas
LNVA	Lower Neches Valley Authority
MAG	Modeled Available Groundwater
mg/L	milligram per liter
MGD	million gallons per day
MUD	Municipal Utility District
MWD	Municipal Water District
MWPs	Major Water Providers
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPGs	Regional Water Planning Groups
SRA	Sabine River Authority
SUD	Special Utility District
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TPWD	Texas Parks and Wildlife Department
TRWD	Tarrant Regional Water District
TWDB	Texas Water Development Board
UNRMWA	Upper Neches River Municipal Water Authority
WAMs	Water Availability Models
WCID	Water Control and Improvement District
WSC	Water Supply Corporation
WTP	Water Treatment Plant
WUG	Water User Group
WWP	Wholesale Water Provider

3 EVALUATION OF CURRENT WATER SUPPLIES IN THE REGION

Under regional water planning guidelines, each region is to identify currently available water supplies to the region by 1) source and 2) user. The supplies available by source are based on the supply available during drought-of-record conditions. Surface water and groundwater represent the primary types of water supply sources. Reuse of treated wastewater (i.e., water reuse) is also considered a source of supply. However, the current level of water reuse in the East Texas Regional Water Planning Area (ETRWPA) is small compared to groundwater and surface water supplies.

Existing water supplies available to each user include those that have been permitted or contracted, with infrastructure in place to transport and treat (if necessary). Some water supplies are permitted or are contracted for use, but the infrastructure is not yet in place, or some other water supply limitation exists. Water supply limitations considered in this analysis include raw water source availability, well field production capacities, permit limits, contract amounts, water quality, transmission infrastructure, and water treatment capacities. In this case, connecting such supplies is considered a water management strategy for future use.

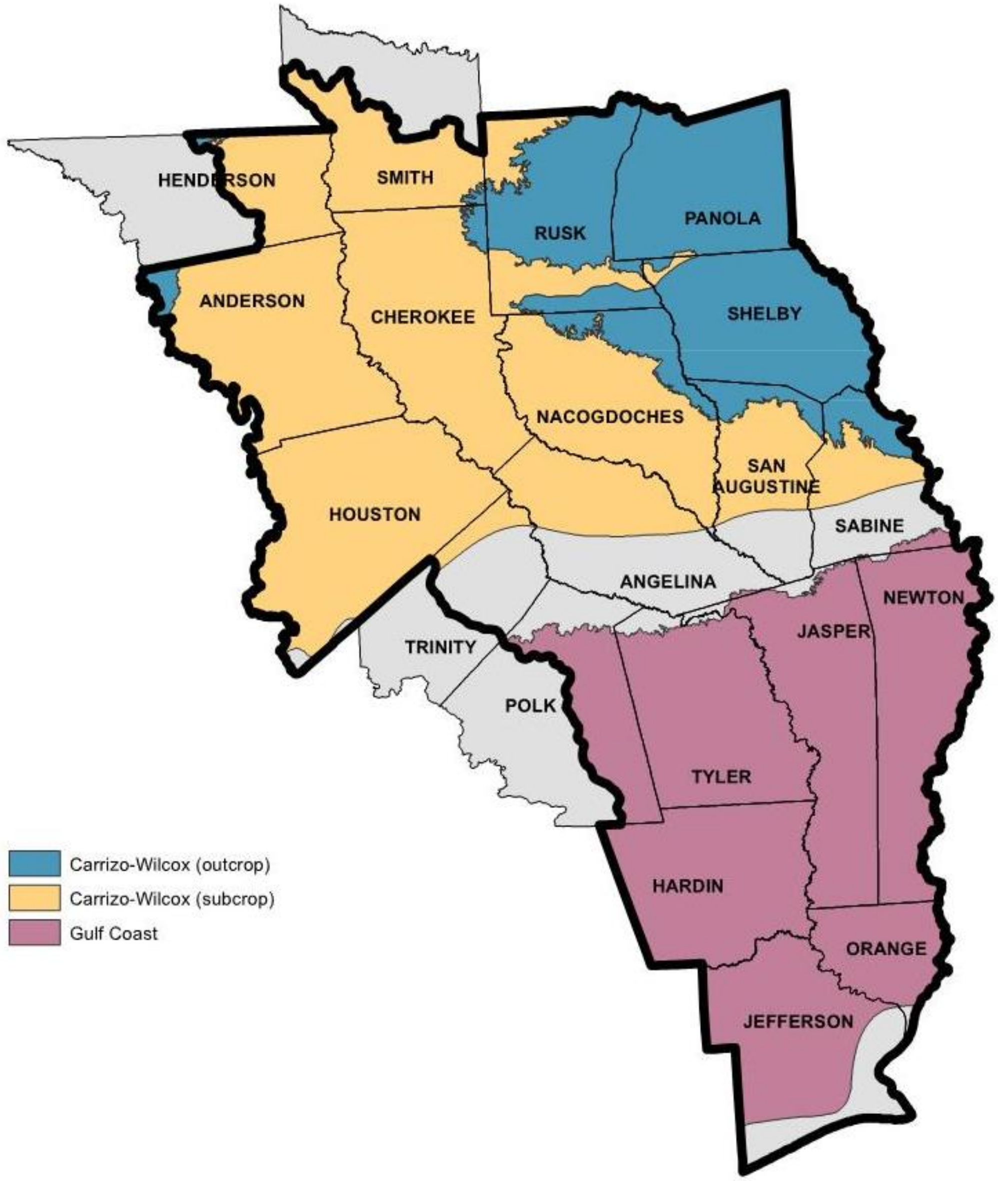
The following sections discuss the water supplies available in the ETRWPA on a regional basis (Section 3.1) and water available through surface water (Section 3.2), groundwater (Section 3.3), and reuse (Section 3.4). Section 3.5 discusses impacts on water availability, including imports and exports of water related to the ETRWPA, water quality of water supplies in the ETRWPA, and the status of the State environmental flow process for the Sabine and Neches River Basins. Discussions are also included for existing supplies by water user group (WUG) (Section 3.6) and by Major Water Provider (MWP) (Section 3.7). The Texas Water Development Board (TWDB) data reports pertaining to water availability and water supplies are included in Appendix 3-A and 3-B respectively. These reports include a listing of total available supply by source, existing supplies available to water users, and the amount of water by source that may be available for future use.

Most of the available water supply (84 percent) in the ETRWPA is surface water. Approximately 16 percent of the total freshwater supply is groundwater. However, groundwater is an important resource in the region and is used to supply much of the municipal and rural water needs.

Groundwater resources in the region consist of two major aquifers and three minor aquifers. The two major aquifers are the Gulf Coast aquifer and the Carrizo Wilcox aquifer (Figure 3.1). The three minor aquifers are Sparta, Queen City, and Yegua-Jackson (Figure 3.2). A small amount of water is also available from “other” local aquifers that have not been designated as major or minor aquifers by the TWDB.

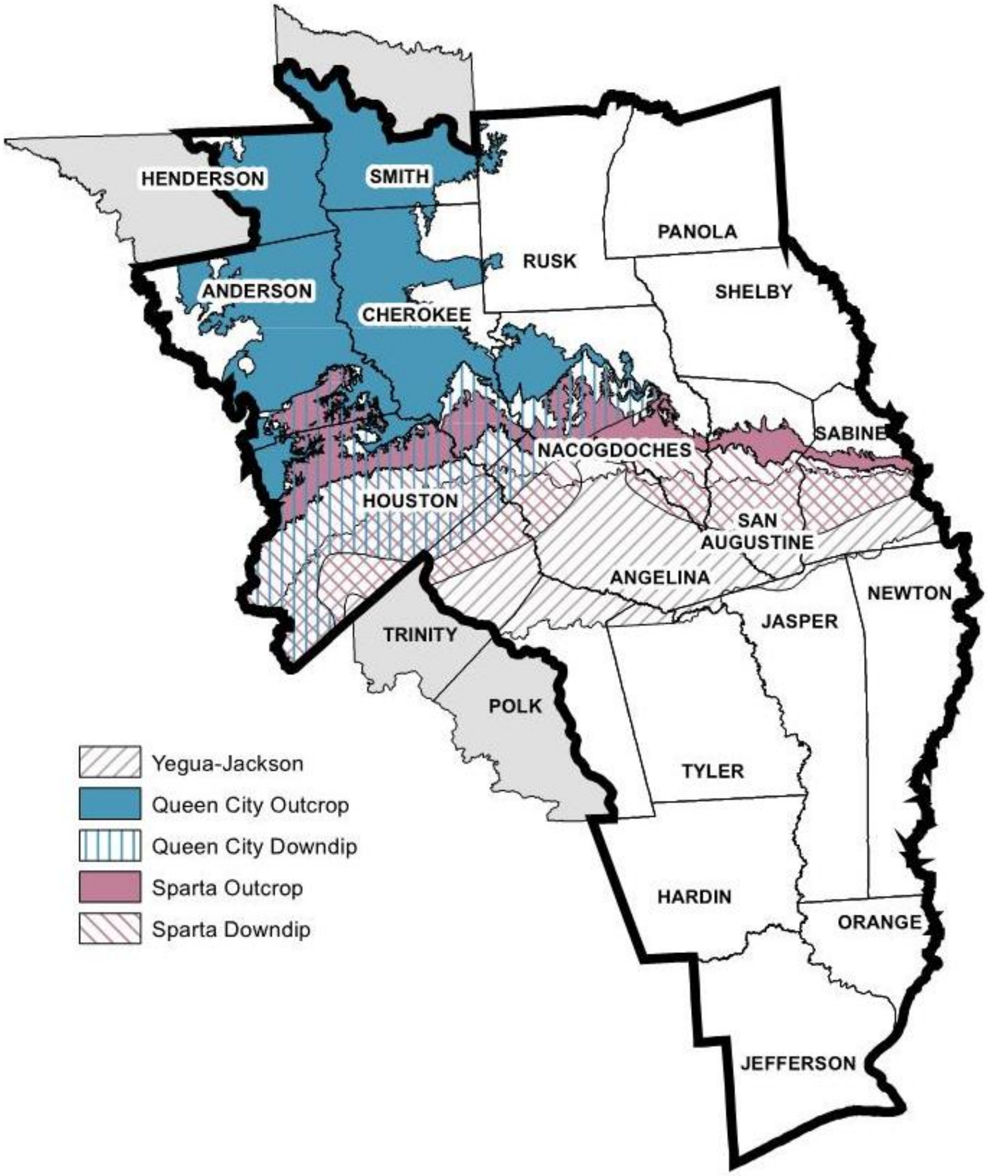
Surface water includes reservoirs, run-of-river supplies, and local surface water (such as stock ponds). For surface water reservoirs, the reliable supply by source is the equivalent of firm yield supply or permitted amount (whichever is lower). For run-of-the-river supplies, this is the minimum supply available in a year over the historical hydrologic record. For both of these types of surface water supplies, the Texas Commission on Environmental Quality (TCEQ) water availability models (WAMs) are used to determine reliable supplies. For local surface water, estimates of historical use as reported by the TWDB that are not associated with a water right are the basis for these supply quantities. Figure 3.3 presents the major surface water sources in the ETRWPA, including major river basins and water supply reservoirs.

Other water supplies considered for planning purposes include reuse of treated wastewater. Reuse supplies are assessed based on historical and current use.



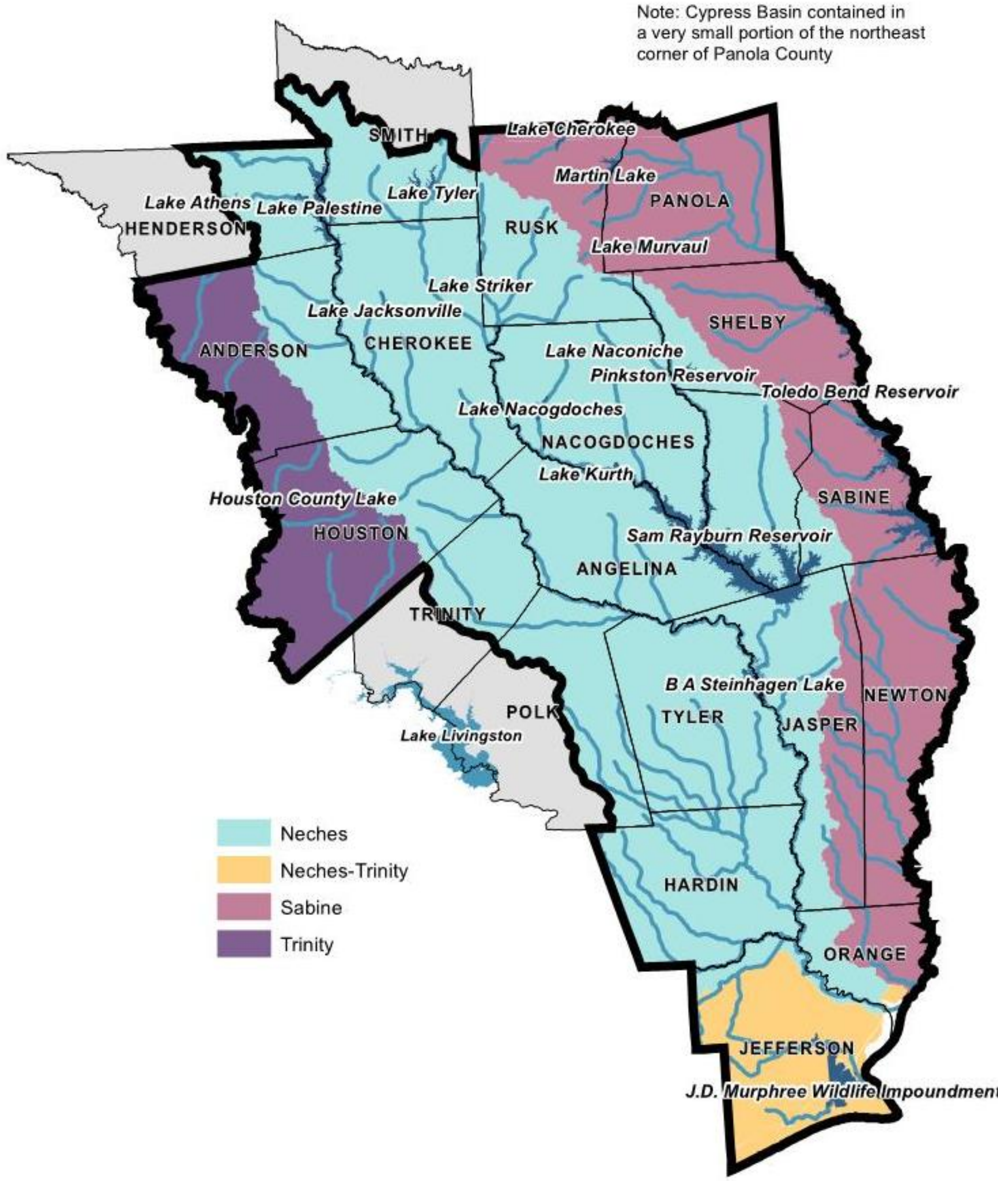
Note: Major aquifers shapefile obtained from the Texas Water Development Board website.

Figure 3.1 Major Aquifers



Note: Minor aquifers shapefile obtained from the Texas Water Development Board website.

Figure 3.2 Minor Aquifers



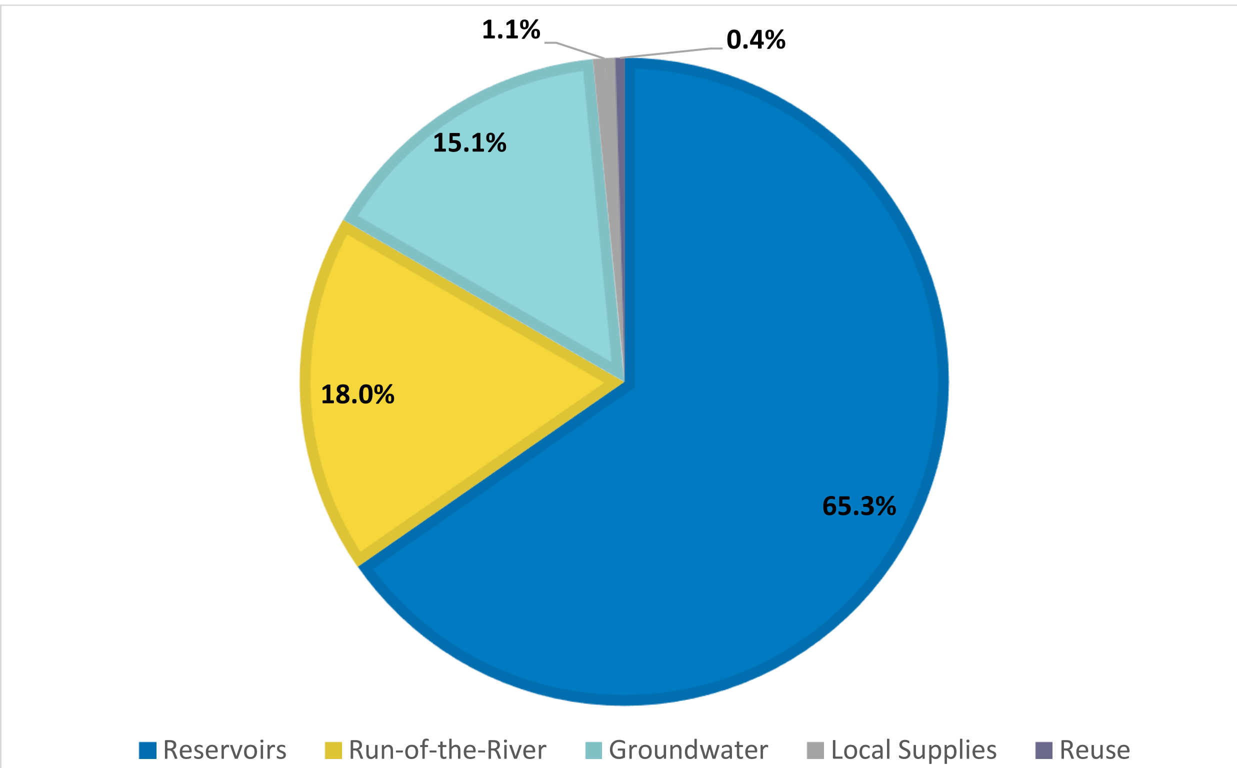
Note: Shapefiles obtained from the Texas Water Development Board website and the U.S. Census Bureau.

Figure 3.3 Surface Water Sources

Table 3.1 and Figure 3.4 summarize overall water supply availability in the ETRWPA. Approximately 2.6 million ac-ft per year of surface water supplies are currently available in the region. The total groundwater availability in the ETRWPA is slightly less than 490,000 ac-ft per year. Reuse supplies total approximately 1,600 ac-ft per year.

Table 3.1 Summary of Currently Available Water Supplies in the ETRPWA(ac-ft/yr)

Source of Supply	2030	2040	2050	2060	2070	2080
Reservoirs	2,112,306	2,107,723	2,103,345	2,098,614	2,094,089	2,089,564
Run-of-the-River	582,231	582,689	583,106	582,924	582,933	583,098
Groundwater	488,746	488,746	488,745	488,745	488,362	488,362
Local Supplies	36,496	36,496	36,496	36,496	36,496	36,496
Reuse	1,601	1,614	1,627	1,638	1,652	1,667
Total	**3,221,380**	**3,217,268**	**3,213,319**	**3,208,417**	**3,203,532**	**3,199,187**



Note: total may not sum due to rounding.

Figure 3.4 Year 2030 Available Supplies by Source Type in the ETRWPA

3.1 SURFACE WATER AVAILABILITY

In accordance with the established procedures of the TWDB, the surface water supplies for the regional water plans were determined using the TCEQ WAMs. In the ETRWPA, surface water supply availability was evaluated in four major river basins: Neches, Neches-Trinity, Trinity, and Sabine (see Figure 3.3).

The WAMs were developed for the purpose of reviewing and granting new surface water rights permits using a hypothetical repetition of historical hydrology. The results from the modeling for regional water planning are used for planning purposes only and do not affect the right of an existing water right holder to divert and use the full amount of water authorized by its permit. The assumptions in the WAMs are based in part on the legal interpretation of water rights, and, in some cases, do not accurately reflect current operations. For planning purposes, adjustments were made to the TCEQ WAMs to better reflect current and future surface water conditions in the region.

TCEQ WAM Run 3, as modified below, was used to assess surface water supplies. The principal assumptions of Run 3 are that all water right holders divert the full permitted amount of their right by priority date order and do not return any of the diversion to the watershed unless an amount is specified in the permit. This assumption provides a conservative estimate of surface water supplies in the ETRWPA. For the Region I 2026 RWP, a hydrologic variance request was submitted to use modified versions of the WAM Run 3 for the Trinity River, Neches River, and Sabine River Basins to develop supplies. Changes to the TCEQ WAMs generally include the following:

- Assessment of reservoir sedimentation rates, and the calculation of area-capacity conditions for current (2020) and future conditions (2030 -2080). Reservoir supplies for future conditions were estimated assuming each incremental horizontal volume was best represented by either a trapezoidal or conical cross-section, where the method with the best fit to the original rating curve data was used;
- Inclusion of subordination agreements that are currently in place.
- Inclusion of system operations where appropriate.
- Basin-specific modifications.

3.1.1 Trinity Basin and Neches-Trinity Basin WAMs

For the Trinity River Basin, Region I adopted the updated Trinity Basin WAM developed by the Region C Water Planning Group for the 2026 Region C Water Plan. These changes are documented in Region C's hydrologic variance request to the TWDB. Region I also includes part of the Neches-Trinity Coastal Basin. No changes were proposed by Region I to the Neches-Trinity WAM, therefore surface water supplies in that basin were developed using the unmodified Neches-Trinity Coastal Basin WAM Run 3.

3.1.2 Neches River Basin WAM

Changes to the Neches River Basin WAM for the 2026 RWP are based on changes consistent with previous cycles of regional water planning, as well as the inclusion of updated sedimentation of major reservoirs, as specified by Exhibit C ("Second Amended General Guidelines for Sixth Cycle of Regional Water Plan Development"). The following subsections describe all changes made to the TCEQ Neches WAM Run 3 (2021) to develop the modified Neches WAM, which was used to determine existing supplies in the Neches River Basin in the 2026 RWP.

Area-Capacity Relationships. Exhibit C requires RWPGs to include anticipated sedimentation of all major reservoirs (those with a capacity greater than 5,000 ac-ft) in the WAM model runs. There are twelve permitted major reservoirs in the Neches Basin. Information related to the methodology utilized for calculating anticipated sedimentation rates and revised area-capacity rating curves for these reservoirs is shown in Table 3.2. The source of the sedimentation rates used for each reservoir is summarized in Appendix 3-C. The area-capacity-elevation data were determined for the 2030, 2050, and 2080 decades. This information was included in the Region I WAM for each of these decades.

Lake Columbia has not yet been constructed, so to be conservative, Lake Columbia's full design capacity and original area-capacity curve were used when evaluating firm yields for all other reservoirs in the Neches Basin. The effect of sedimentation on Lake Columbia was assessed, assuming the reservoir would be built in 2030 and begin collecting sediment at that time.

Table 3.2 Sedimentation Rates and Projected Storage Capacity of Major Reservoirs in the Neches River Basin

Reservoir	Most Recent Survey		2026 RWP Sedimentation Rate (ac-ft/yr/mi^2)	Sediment-Contributing Drainage Area (mi^2)	Projected 2030 Capacity (ac-ft)	Projected 2080 Capacity (ac-ft)
	Year	Conservation Pool Capacity (ac-ft)				
Lake Athens	2016	29,475	4.35	22	26,449	21,679
Lake Columbia [b]	[a]	195,500	0.19	277	195,500	192,910
Lake Jacksonville	2006	25,732	2.88	34	23,420	18,532
Lake Kurth	1996	14,769	8.57	4	13,636	11,923
Lake Nacogdoches	1994	39,523	1.75	89	33,929	26,115
Lake Naconiche	[a]	9,072	0.19	27	8,953	8,699
Lake Palestine	2012	367,310	0.76	817	356,531	325,482
Pinkston Lake	[a]	7,380	0.19	14	7,237	7,104
Sam Rayburn Reservoir	2004	2,876,033	0.18	3,010	2,861,827	2,834,167
Lake B. A. Steinhagen	2011	69,259	0.06	3,251	65,971	56,921
Lake Striker	2021	21,799	0.62	182	20,813	15,184
Lake Tyler	2013	77,284	1.00	45	75,472	70,122

Notes:
(a) No survey available. Conservation pool capacity reflects design capacity.
(b) Permitted but not yet constructed. Projected 2080 capacity based on assumption of sedimentation beginning 1/1/2030.

Subordination of Sam Rayburn Reservoir and B. A. Steinhagen Lake. Special conditions 5C and 5D of Certificate of Adjudication 06-4411 require subordination of LNVA's rights in the Rayburn-Steinhagen system to (a) water rights upstream of the proposed Weches and Ponta Dam sites and (b) intervening municipal rights above Sam Rayburn Reservoir. These conditions were last amended in Amendment H, filed August 14, 2008, and granted July 20, 2010, which limited subordination to rights with priority dates between November 1963 and April 2008. Changes were implemented in the WAM related to dual simulation, output, and the refilling of Rayburn and Steinhagen including: the 1963 rights for impoundment at Rayburn and Steinhagen were reordered so that Rayburn, the upstream reservoir, would be filled from available streamflow before refilling Steinhagen.

Reservoir System Operations. Two additional reservoir system operations were identified and implemented within the Neches River Basin WAM Run 3:

(1) UNRMWA – Lake Palestine and Rocky Point Dam. The Upper Neches River Municipal Water Authority operates Lake Palestine in conjunction with Rocky Point Dam, a downstream diversion dam on the Neches River in Anderson and Cherokee Counties. Diversions associated with Rocky Point Dam draw from intervening flows between Lake Palestine and Rocky Point Dam, impounded water behind the dam, and downstream releases from Lake Palestine. To limit the impact on the yield of Lake Palestine in the Region I WAM, the Rocky Point diversions were modified so that they would first be backed up by the water made available by the subordination of Steinhagen Lake before making releases from Lake Palestine so that intervening flows would be fully used before making releases of stored Lake Palestine water. Any remaining shortages would be backed up by releases from Lake Palestine.

(2) LNVA – Sam Rayburn Backup of Pine Island Bayou. Operation of LNVA's water rights was modeled as a system by including the backup of LNVA's Pine Island water rights with storage from Sam Rayburn.

Minimum Elevations – Sam Rayburn and B.A. Steinhagen. The minimum elevations of the Sam Rayburn and B.A. Steinhagen reservoirs were set to make the current authorized permitted diversion from the Rayburn-Steinhagen system (820,000 ac-ft per year) be 100% firm in each decade based on the updated area-capacity elevation curves. The TCEQ WAM Run 3 does not specify a minimum elevation for either reservoir. Inactive pools were not applied to subordination-related backup rights for either reservoir.

Lake Tyler For the 2026 Region I WAM, Lake Tyler was modeled as a single reservoir, and associated water rights were adjusted accordingly. This is consistent with the development of the original Neches WAM, which treated this source as one reservoir.

City of Beaumont Available supply was evaluated based on daily time-step analysis based on historical data from October 1951 to December 2022. The City of Beaumont is the only major municipal water user with a run-of-river water right. Other major users that receive water from run-of-river water rights either purchase water from the Lower Neches Valley Authority (LNVA) or use saline water. The purchased run-of-the-river water is backed up by stored water that is owned and operated by LNVA, making this supply less vulnerable to drought. This approach was applied in the development of supplies for the 2026 ETRWP. Appendix 3-C includes a memorandum summarizing the analysis for estimating the City of Beaumont's run-of-river supplies.

3.1.3 Sabine River Basin WAM

The following subsections describe all changes made to the TCEQ Sabine WAM Run 3 (2015) to develop the modified Sabine WAM, which was used to determine existing supplies from the Sabine River Basin in the 2026 RWP.

Area-Capacity Relationships Exhibit C requires RWPGs to include anticipated sedimentation of all major reservoirs (those with a capacity greater than 5,000 ac-ft) in the WAM model runs. There are 12 such permitted reservoirs in the Sabine Basin; information related to the methodology utilized for calculating anticipated sedimentation rates and revised area-capacity rating curves for these reservoirs is shown in Table 3.3. The source of the sedimentation rates used for each reservoir is summarized in Appendix 3-C. The area-capacity-elevation data were determined for the 2030, 2050, and 2080 decades. This information was included in the Region I WAM for each of these decades.

Table 3.3 Sedimentation Rates and Projected Storage Capacity of Major Reservoirs in the Sabine River Basin

Reservoir	Most Recent Survey		2026 Sedimentation Rate (ac-ft/yr/ mi^2)	Sediment-Contributing Drainage Area (mi^2)	Projected 2030 Capacity (ac-ft)	Projected 2080 Capacity (ac-ft)
	Year	Conservation Pool Capacity (ac-ft)				
Lake Tawakoni	2009	871,693	1.75	756	844,627	778,513
Lake Fork Reservoir	2009	636,504	2.69	493	609,572	543,216
Lake Gladewater	2000	4,738	1.33	35	3,345	1,017
Lake Cherokee	2015	44,475	0.47	158	44,553	40,930
Brandy Branch Reservoir	[a]	29,513	0.24	4.1	29,467	29,419
Martin Lake	2014	75,726	0.37	130	74,996	72,622
Murvaul Lake	1998	38,284	1.64	115	32,418	22,988
Toledo Bend Reservoir	[a]	4,477,000	0.12	5,384	4,436,134	4,403,831
Lake Hawkins	1962	11,890	0.24	30	11,405	11,045
Lake Holbrook	[a]	7,990	0.24	15	7,748	7,568
Lake Quitman	[a]	7,440	0.24	31	6,937	6,565
Lake Winnsboro	[a]	8,100	0.24	27	7,662	7,338

Note: (a) No survey available. Conservation pool capacity reflects design capacity.

Firm Yield of Toledo Bend Reservoir. The Sabine River Authority (SRA) has a right to divert up to 970,067 acre-feet per year from Toledo Bend. Of that amount, 220,067 ac-ft of water can be diverted when hydropower generation is turned off as per Certificate of Adjudication (CoA) 4658B. If hydropower is being used, the total amount is 945,650 acre-feet per year. Hydropower operations were included in the evaluation of supplies for all reservoirs and run-of-river supplies. The yield of Toledo Bend was evaluated assuming all diversions were taken lakeside, after passing water for SRA's downstream senior run-of-the-river rights and hydropower generation. Within the WAM, all diversions from the lake are shared equally between SRA-Texas and SRA-Louisiana.

3.1.4 Reservoir Availability

Reservoirs in the ETRWPA with over 5,000 ac-ft of conservation storage (i.e., major reservoirs) were evaluated, as were some smaller reservoirs that are used for municipal supply. The available water supply from reservoirs is limited to currently permitted diversions or firm yield. The firm yield is the greatest amount of water a reservoir could have supplied on an annual basis without shortage during a repeat of historical hydrologic conditions, particularly the drought of record.

Both Sam Rayburn and Toledo Bend Reservoirs were constructed for multiple purposes and include hydropower generation. Hydropower is not considered a consumptive use of water, but it is an operational consideration. The inclusion of hydropower in the firm yield analyses was an operating decision by the reservoir owner. As mentioned above, hydropower is not considered in the yield determination of Toledo Bend Reservoir. Hydropower is included for the Sam Rayburn/Lake B. A. Steinhagen System; however, the actual operation of hydropower may differ from the assumptions in the WAM models. A summary of the available supplies for reservoirs in the ETRWPA is shown in Table 3.4.

Table 3.4 Currently Available Supplies from Permitted Reservoirs Serving the ETRWPA (ac-ft/yr)

Reservoir	Water Right Numbers	Priority Date	Basin	County	Permitted Diversion	2030	2040	2050	2060	2070	2080
Lake Athens	CA-3256	1/17/1955	Neches	Henderson	8,500	4,540	4,480	4,420	4,360	4,300	4,240
Bellwood Lake	CA-3237	11/10/1915 10/10/1978	Neches	Smith	2,200	859	859	859	859	859	859
Lake Columbia [a]	CA-4537	1/22/1985	Neches	Cherokee	85,507	68,850	68,780	68,710	68,640	68,570	68,499
Lake Jacksonville	CA-3274	6/13/1955	Neches	Cherokee	6,200	6,200	6,200	6,200	6,200	6,200	6,200
Lake Kurth	CA-4393	9/1/1957	Neches	Angelina	19,100	17,425	17,448	17,471	17,494	17,517	17,540
Lake Nacogdoches	CA-4864	5/24/1988	Neches	Nacogdoches	22,000	14,335	13,973	13,611	13,249	12,887	12,525
Lake Palestine system	CA-3254	01/05/1970 06/27/1977	Neches	Anderson	238,110	177,110	175,040	172,970	170,950	168,930	166,910
Pinkston Reservoir	CA-4404	2/7/1972	Neches	Shelby	3,800	3,612	3,600	3,587	3,575	3,562	3,550
Rusk City Lake	CA-4219	6/1/1982	Neches	Cherokee	160	10	10	10	10	10	10
San Augustine City Lake	CA-4409	11/1/1957	Neches	San Augustine	1,285	1,285	1,285	1,285	1,285	1,285	1,285
Sam Rayburn & Steinhagen System	CA-4411	Multiple	Neches	Jasper	820,000	820,000	820,000	820,000	820,000	820,000	820,000
Striker Creek Reservoir	CA-4847	1/10/1984	Neches	Rusk	22,233	10,500	9,990	9,480	8,970	8,460	7,950

Table 3.4 Currently Available Supplies from Permitted Reservoirs Serving the ETRWPA (ac-ft/yr) (Cont.)

Reservoir	Water Right Numbers	Priority Date	Basin	County	Permitted Diversion	2030	2040	2050	2060	2070	2080
Lake Timpson	A-4399	5/9/1955	Neches	Shelby	350	350	350	350	350	350	350
Lake Tyler/Tyler East	CA-4853	Multiple	Neches	Smith	40,325	32,900	32,665	32,430	32,203	31,977	31,750
Lake Cherokee [b]	CA-4642	10/5/1946	Sabine	Cherokee/ Gregg	62,400	31,480	31,224	30,960	30,712	30,456	30,200
Lake Center	CA-4657	08/04/1922 08/14/1952	Sabine	Shelby	1,460	500	500	500	500	500	500
Lake Murvaul	CA-4654	7/19/1956	Sabine	Panola	22,400	20,800	20,016	19,482	18,448	17,664	16,880
Martin Lake	CA-4649	7/19/1971	Sabine	Rusk	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Toledo Bend	CA-4658	03/05/1958 01/22/1986	Sabine	Sabine	970,067	941,900	941,583	941,230	940,949	940,632	940,315
Houston County Lake	CA-5097	03/03/0965	Trinity	Houston	3,500	3,500	3,500	3,500	3,500	3,500	3,500
TOTAL – PERMITTED RESERVOIRS						**2,112,306**	**2,107,723**	**2,103,345**	**2,098,614**	**2,094,089**	**2,089,564**

Notes:
(a) The yield for Lake Columbia is not included in the total for the region since it has not yet been constructed. The yield shown in the table represents the estimated firm yield using the modified Neches WAM Run 3 from 2030 to 2080.
(b) Lake Cherokee is located in both the ETRWPA and Northeast Texas region (Region D). Most of the water from this source is used in the Northeast Texas region.

3.1.1 Run-of-the-River Diversion Availability

Table 3.5 presents the run-of-the-river supplies by county and basin. The run-of-the-river supplies were calculated using the TCEQ WAM Run 3. The firm supply was determined as the minimum annual diversion from the river for all use types (municipal, industrial, mining, recreational, and irrigation). For the City of Beaumont, their run-of-the-river supplies are used conjunctively with their other water sources (e.g., groundwater, surface water from LNVA) and a monthly analysis is not appropriate to determine availability. Therefore, a daily analysis was conducted to evaluate the City of Beaumont’s run-of-river supplies. The run-of-river supplies associated with City of Beaumont (WR 4415) increase over time based on this analysis. Appendix 3-C includes a memorandum summarizing the analysis for estimating the City of Beaumont’s run-of-river supplies.

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Table 3.5 Summary of the Available Supply from Run-of-River Diversions in the ETRWPA (ac-ft/yr)

County	River Basin	Use	Water Right Number	Owner	2030	2040	2050	2060	2070	2080
Anderson	Neches	Irrigation	3261, 3266, 3280, 3282, 3283, 3284, 3285, 3286, 5228	Multiple	80	80	80	80	80	80
Anderson	Trinity	Irrigation	3261, 3266, 3280, 3282, 3283, 3284, 3285, 3286, 5228	Multiple	1,290	1,290	1,290	1,290	1,290	1,290
Angelina	Neches	Industrial	4384	Georgia-Pacific Panel Products LLC	0	0	0	0	0	0
Angelina	Neches	Irrigation	4382, 4383, 4386, 5389	Multiple	10	10	10	10	10	10
Cherokee	Neches	Irrigation	3878, 3269, 3275, 3276, 3277, 3278, 3279, 4543, 3301, 4596, 3303, 4094, 4857, 4858, 4859, 4860, 4861, 4055, 4846	Multiple	58	58	58	58	58	58
Hardin	Neches	Irrigation	4432	Idylwild Golf Club, Inc.	54	54	54	54	54	54
Henderson	Neches	Irrigation	3248, 3250	Multiple	0	0	0	0	0	0
Houston	Neches	Irrigation	3287, 3288, 3292, 3291, 3290, 3293, 3294, 3289, 3295, 3297, 3296, 3298, 3299	Multiple	147	147	147	147	147	147
Houston	Trinity	Irrigation	3287, 3288, 3292, 3291, 3290, 3293, 3294, 3289, 3295, 3297, 3296, 3298, 3299	Multiple	2,522	2,522	2,522	2,522	2,522	2,522
Jasper, Jefferson	Neches	Industrial	4411	LNVA	381,876	381,876	381,876	381,876	381,876	381,876

Table 3.5 Summary of the Available Supply from Run-of-River Diversions in the ETRWPA (ac-ft/yr) (Cont.)

County	River Basin	Use	Water Right Number	Owner	2030	2040	2050	2060	2070	2080
Jasper	Neches	Industrial	4412	TPWD (hatchery)	557	557	557	557	557	557
Jasper	Neches	Industrial	5027	Louisiana Pacific	0	0	0	0	0	0
Jasper	Neches	Irrigation	4413, 4414	Tin LLC, Crown Pine Timber	93	93	93	93	93	93
Jefferson	Neches	Industrial	4415	Beaumont	836	1,005	1,168	1,314	1,477	1,659
Jefferson	Neches	Municipal	4415	Beaumont	11,266	11,555	11,809	11,481	11,327	11,310
Jefferson	Neches-Trinity	Industrial	4441, 4479	Kansas City Southern Railway Co.; Veolia ES Technical Solutions	586	586	586	586	586	586
Jefferson	Neches-Trinity	Irrigation	Multiple	Multiple	40,194	40,194	40,194	40,194	40,194	40,194
Jefferson	Neches-Trinity	Irrigation	4475	M Half Circle Ranch Company	5,139	5,139	5,139	5,139	5,139	5,139
Jefferson	Neches-Trinity	Irrigation	4477	Joe E. Broussard, II	5,321	5,321	5,321	5,321	5,321	5,321
Jefferson	Neches-Trinity	Mining	4442	Premcor Pipeline Co	34	34	34	34	34	34
Nacogdoches	Neches	Industrial	4401	Charles Frederick and George B Frederick	3	3	3	3	3	3
Nacogdoches	Neches	Irrigation	4862, 5486, 4865, 4866, 4867, 5134, 4869, 4872, 4873, 4395, 4397, 4396, 4401, 4403, 4406	Multiple	79	79	79	79	79	79

Table 3.5 Summary of the Available Supply from Run-of-River Diversions in the ETRWPA (ac-ft/yr) (Cont.)

County	River Basin	Use	Water Right Number	Owner	2030	2040	2050	2060	2070	2080
Newton	Sabine	Industrial	4659	Weirgate Lumber Company, Inc.	135	135	135	135	135	135
Newton	Sabine	Industrial	4662	SRA	93,987	93,987	93,987	93,987	93,987	93,987
Newton	Sabine	Irrigation	4662	SRA	35,974	35,974	35,974	35,974	35,974	35,974
Newton	Sabine	Irrigation	4660	Crown Pine Timber 1, L.P.	50	50	50	50	50	50
Orange	Sabine	Irrigation	4663	J A Heard Et Al	28	28	28	28	28	28
Panola	Sabine	Industrial	4652	Hills Lake Fishing Club	114	114	114	114	114	114
Panola	Sabine	Industrial	5219	Luminant Mining Company LLC	147	147	147	147	147	147
Panola	Sabine	Irrigation	4226, 4238, 4653, 4656	Multiple	152	152	152	152	152	152
Panola	Sabine	Mining	5747	Luminant Mining Company LLC	168	168	168	168	168	168
Rusk	Neches	Industrial	4839, 5314	CR Kelley Estate & CD Josh Ham	1	1	1	1	1	1
Rusk	Neches	Irrigation	4839, 4840, 4841, 5629	Multiple	59	59	59	59	59	59
Rusk	Sabine	Irrigation	4627, 4638, 4639, 4640	Multiple	127	127	127	127	127	127
Rusk	Sabine	Municipal	5578	Henderson	10	10	10	10	10	10
Sabine	Neches	Industrial	4410	Georgia-Pacific Wood Products LLC	162	162	162	162	162	162
Smith	Neches	Irrigation	3224, 3226, 3233, 3235, 3236, 4030	Multiple	45	45	45	45	45	45
Smith	Neches	Mining	3230, 3231	Bell Sand Company	0	0	0	0	0	0

Table 3.5 Summary of the Available Supply from Run-of-River Diversions in the ETRWPA (ac-ft/yr) (Cont.)

County	River Basin	Use	Water Right Number	Owner	2030	2040	2050	2060	2070	2080
Trinity	Neches	Irrigation	4380	Temple Boggy Slough, LLC, TII Temple Foundation	0	0	0	0	0	0
Tyler	Neches	Irrigation	5484, 4387, 4392, 4426, 4429, 4430	Multiple	88	88	88	88	88	88
TOTAL					**581,392**	**581,850**	**582,267**	**582,085**	**582,094**	**582,259**

3.1.5 Local Supply Availability

Local supply generally includes small surface water supplies not associated with a water right, i.e., are unpermitted. Most of the local supply is surface water used from livestock ponds. A small amount of local supply is for mining purposes. These stock ponds are generally filled using groundwater supplies or recycled water captured from surface flow that has not entered the waters of the State. The maximum recent historical use from these sources (according to TWDB records) is assumed to be available in the future. Local supplies included in the ETRWP for all counties and uses are based on historical use data and were not modeled to confirm whether they are firm under drought of record conditions. Local supplies are summarized by county, river basin, and use in Table 3.6.

Table 3.6 Summary of Available Local Supply (ac-ft/yr)

County	River Basin	Use	2030	2040	2050	2060	2070	2080
Anderson	Neches	Livestock	427	427	427	427	427	427
Anderson	Trinity	Livestock	848	848	848	848	848	848
Angelina	Neches	Livestock	997	997	997	997	997	997
Cherokee	Neches	Livestock	1,694	1,694	1,694	1,694	1,694	1,694
Cherokee	Neches	Mining	58	58	58	58	58	58
Hardin	Neches	Livestock	184	184	184	184	184	184
Hardin	Neches	Mining	265	265	265	265	265	265
Henderson	Neches	Livestock	770	770	770	770	770	770
Houston	Neches	Livestock	473	473	473	473	473	473
Houston	Trinity	Livestock	1,318	1,318	1,318	1,318	1,318	1,318
Jasper	Neches	Livestock	118	118	118	118	118	118
Jasper	Sabine	Livestock	93	93	93	93	93	93
Jefferson	Neches	Livestock	800	800	800	800	800	800
Jefferson	Neches-Trinity	Mining	102	102	102	102	102	102
Jefferson	Neches	Mining	7	7	7	7	7	7
Nacogdoches	Neches	Livestock	8,913	8,913	8,913	8,913	8,913	8,913
Nacogdoches	Neches	Mining	420	420	420	420	420	420
Newton	Sabine	Livestock	157	157	157	157	157	157
Newton	Sabine	Mining	78	78	78	78	78	78
Orange	Neches	Livestock	27	27	27	27	27	27
Orange	Sabine	Livestock	71	71	71	71	71	71
Orange	Sabine	Mining	161	161	161	161	161	161
Panola	Sabine	Livestock	2,596	2,596	2,596	2,596	2,596	2,596
Polk	Neches	Livestock	147	147	147	147	147	147
Polk	Neches	Mining	1	1	1	1	1	1
Rusk	Neches	Livestock	991	991	991	991	991	991
Rusk	Sabine	Livestock	424	424	424	424	424	424
Rusk	Sabine	Mining	1,258	1,258	1,258	1,258	1,258	1,258
Sabine	Neches	Livestock	26	26	26	26	26	26

Table 3.6 Summary of Available Local Supply (ac-ft/yr) (Cont.)

County	River Basin	Use	2030	2040	2050	2060	2070	2080
Sabine	Sabine	Livestock	175	175	175	175	175	175
San Augustine	Neches	Livestock	1,632	1,632	1,632	1,632	1,632	1,632
San Augustine	Sabine	Livestock	203	203	203	203	203	203
Shelby	Neches	Livestock	2,101	2,101	2,101	2,101	2,101	2,101
Shelby	Sabine	Livestock	8,168	8,168	8,168	8,168	8,168	8,168
Smith	Neches	Livestock	313	313	313	313	313	313
Trinity	Neches	Livestock	233	233	233	233	233	233
Tyler	Neches	Livestock	239	239	239	239	239	239
Tyler	Neches	Mining	8	8	8	8	8	8
Total Local Supply			**36,496**	**36,496**	**36,496**	**36,496**	**36,496**	**36,496**

3.2 GROUNDWATER AVAILABILITY

Chapter 36 of the Texas Water Code generally describes how Groundwater Conservation Districts (GCDs) are the preferred entities to manage groundwater resources in Texas and that chapter contains provisions that require the GCDs to prepare management plans. Consistent with the Texas Water Code, the TWDB has also created 16 Groundwater Management Areas (GMAs), which are based largely on hydrogeologic and aquifer boundaries instead of political boundaries. One of the purposes for GMAs is to manage groundwater resources on a more aquifer-wide basis. GCDs within each GMA are responsible for executing joint groundwater planning as described in Chapter 36 to develop the amount of groundwater available for use and/or development by the Regional Water Planning Groups. To accomplish this, all GCDs within each GMA determine the Desired Future Conditions (DFCs) for the groundwater resources within the GMA boundaries at least once every 5 years. Figure 3.5 shows the regulatory boundaries of the GCDs and GMAs within the ETRWPA.

DFCs are defined by statute as "the desired, quantified condition of groundwater resources (such as water levels, spring flows, or volumes) within a management area at one or more specified future times as defined by participating groundwater conservation districts within a groundwater management area as part of the joint groundwater planning process." DFCs are quantifiable management goals that reflect what metrics the GCDs will use to manage groundwater in each GCD and throughout the GMA. The most common DFCs are based on the volume of groundwater in storage over time, water levels (limiting decline within the aquifer), water quality (limiting deterioration of quality) or spring flow (defining a minimum flow to sustain).

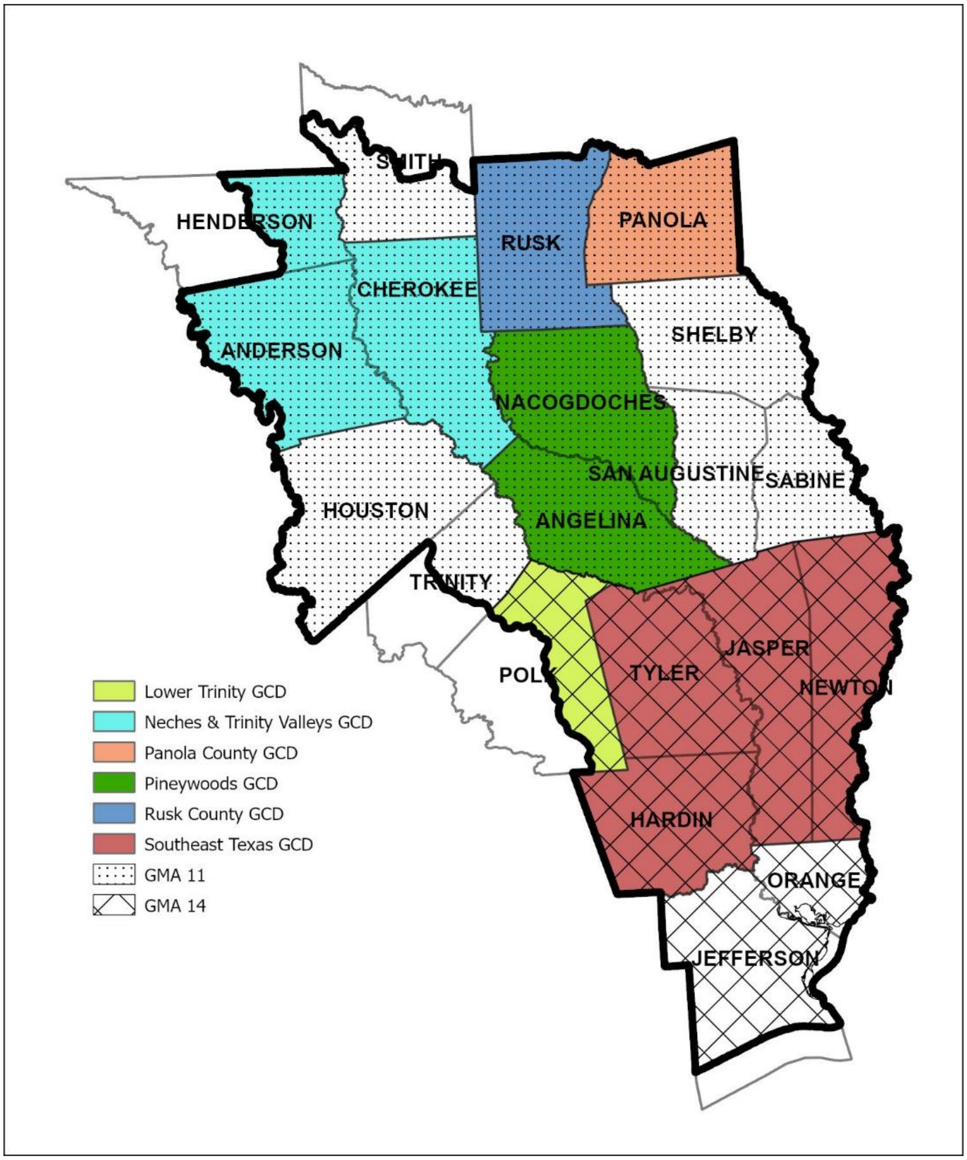
After the DFCs are determined by the GMAs, the TWDB performs quantitative analysis to determine the amount of groundwater available for production to meet the DFC. For aquifers where a Groundwater Availability Model (GAM) exists, the GAM is used to develop the Modeled Available Groundwater (MAG). For aquifers without a GAM, other quantitative approaches or models are used to estimate the MAG.

TWDB technical guidelines establish the MAG (within each aquifer, county, and river basin) as the maximum amount of groundwater that can be used for existing uses and new strategies in Regional Water

Plans. In other words, the MAG volumes are a cap on groundwater production for TWDB planning purposes. In certain cases, the TWDB allows RWPGs to use "MAG peak factors" to increase the volume of groundwater above the MAG for allocation to water management strategies. Region I did not use any MAG peak factors.

3.2.1 Model Assumptions

In the ETRWPA, GAM Run 21-016 for GMA-11 and GAM Run 21-019 for GMA-14 were used to develop the MAG volumes. Both models meet the desired future conditions adopted by the members of each groundwater management area. The TWDB reports documenting the Desired Future Conditions (DFCs) and Modeled Available Groundwater (MAGs) for aquifers in Region I are included in Appendix 3-D.



Note: Shapefiles obtained from the Texas Water Development Board website.

Figure 3.5 Groundwater Conservation Districts and Groundwater Management Areas

GAM Run 21-016. One model was used for the northern portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers (Fryar and others, 2003; Kelley and others, 2004). The Trinity, Nacatoch, Yegua-Jackson and Gulf Coast aquifers were declared non-relevant in GMA-11. GMA-11 adopted the DFCs in Table 3.7 for each county within the ETRWPA.

Table 3.7 Desired Future Conditions in Groundwater Management Area-11 Modeled Drawdowns (in feet) by County and Aquifer

County	Carrizo-Wilcox	Queen City	Sparta
Anderson	155	44	30
Angelina	67	28	6
Cherokee	176	31	7
Henderson	106	33	NP
Houston	86	12	3
Nacogdoches	73	22	7
Panola	21	NP	NP
Rusk	86	17	26
Sabine	9	3	1
San Augustine	22	7	2
Shelby	17	12	18
Smith	265	132	121
Trinity	56	18	5

Abbreviations: NP = Not present

On August 11, 2021, GMA-11 adopted DFCs intended to provide a balance between the highest practicable level of groundwater production and the conservation, preservation, protection, recharging, and prevention of waste of groundwater in the management area. Model runs were conducted to determine an amount and distribution of pumping that would stimulate the adopted DFC; this pumping amount was then reported as the MAG for the GMA, RWPA, Districts, counties and river basins.

GAM Run 21-019 MAG. Resolution No. 2021-10-5 by GMA-14 provided the DFCs for each county in the GMA as the average modeled drawdown in the Chicot, Evangeline, and Jasper aquifers, as well as the Burkeville confining unit. On January 5, 2022, GMA-14 adopted the DFCs in Table 3.8 for each county within the ETRWPA.

Table 3.8 Desired Future Conditions in Groundwater Management Area-14

Aquifer	Desired Future Condition (DFC)
Gulf Coast	In each county in Groundwater Management Area 14, no less than 70 percent median available drawdown remaining in 2080 or no more than an average of 1.0 additional foot of subsidence between 2009 and 2080.

3.2.2 Regional Groundwater Availability

Groundwater supplies in the ETRWPA may be divided into the northern and southern regions. The northern region is generally consistent with GMA-11 and the southern region is generally consistent with

GMA-14. The conditions and available information for each region are presented separately. A limited supply of groundwater in the region is also found in what are known as "non-relevant" portions of known aquifers and "other" aquifers. These local supplies are addressed at the end of this section.

Northern Region. The Carrizo-Wilcox Aquifer provides the majority of the groundwater supply in the northern region. Minor aquifers in the northern region include the Queen City, Sparta, and Yegua-Jackson. In some areas, the Queen City aquifer provides a significant quantity of water, although the well yields are typically smaller than in the underlying Carrizo-Wilcox aquifer. Because it has a relatively large surface area, the Queen City aquifer also receives a significant volume of recharge from precipitation and thus provides significant baseflow to creeks and rivers in the region. The Yegua-Jackson aquifer provides water in the area between the downdip extent of the Carrizo-Wilcox and the outcrop area of the Gulf Coast aquifer (See Figure 3.1 and Figure 3.2).

The modeled available groundwater volumes for the counties in the northern region are provided in Table 3.9. MAG volumes are the largest amount of water that can be withdrawn from a given source without violating DFCs. Table 3.9 presents the total MAG volumes by aquifer in the ETRWPA. The Trinity, Nacatoch, Yegua-Jackson and Gulf Coast aquifers were declared non-relevant in GMA-11.

Southern Region. The Gulf Coast Aquifer provides most of the groundwater supply in the southern region (Figure 3.1) and has the largest amount of modeled available groundwater in the ETRWPA (Table 3.9). The Southeast Texas GCD (Jasper, Newton, Tyler, and Hardin Counties) is the only groundwater conservation district located in the southern region. Table 3.9 also contains a summary of modeled available groundwater volume in the southern region.

Table 3.9 Modeled Available Groundwater by Aquifer (ac-ft/yr)

County	Aquifer	Basin	2030	2040	2050	2060	2070	2080
Northern Region								
Anderson	Carrizo-Wilcox	Neches	21,958	21,958	21,958	21,958	21,958	21,958
Anderson	Carrizo-Wilcox	Trinity	5,066	5,066	5,066	5,066	5,066	5,066
Anderson	Queen City	Neches	11489	11489	11488	11488	11488	11,488
Anderson	Queen City	Trinity	5,102	5,102	5,102	5,102	5,102	5,102
Anderson	Sparta	Neches	109	109	109	109	109	109
Anderson	Sparta	Trinity	198	198	198	198	198	198
Angelina	Carrizo-Wilcox	Neches	27,611	27,611	27,611	27,611	27,611	27,611
Angelina	Queen City	Neches	1,095	1,095	1,095	1,095	1,095	1,095
Angelina	Sparta	Neches	390	390	390	390	390	390
Cherokee	Carrizo-Wilcox	Neches	15,241	15,241	15,241	15,241	15,241	15,241
Cherokee	Queen City	Neches	8,812	8,812	8,812	8,812	8,812	8,812
Cherokee	Sparta	Neches	352	352	352	352	352	352
Henderson	Carrizo-Wilcox	Neches	3,996	3,996	3,996	3,996	3,996	3,996
Henderson	Queen City	Neches	10,516	10,516	10,516	10,516	10,516	10,516
Houston	Carrizo-Wilcox	Neches	1,721	1,721	1,721	1,721	1,721	1,721
Houston	Carrizo-Wilcox	Trinity	634	634	634	634	634	634
Houston	Queen City	Neches	2,080	2,080	2,080	2,080	2,080	2,080
Houston	Queen City	Trinity	216	216	216	216	216	216
Houston	Sparta	Neches	505	505	505	505	505	505
Houston	Sparta	Trinity	977	977	977	977	977	977
Nacogdoches	Carrizo-Wilcox	Neches	20,859	20,859	20,859	20,859	20,859	20,859
Nacogdoches	Queen City	Neches	2946	2946	2946	2946	2946	2,946
Nacogdoches	Sparta	Neches	362	362	362	362	362	362
Panola	Carrizo-Wilcox	Cypress	0	0	0	0	0	0
Panola	Carrizo-Wilcox	Sabine	4,999	4,999	4,999	4,999	4,999	4,999
Rusk	Carrizo-Wilcox	Neches	7,111	7,111	7,111	7,111	7,111	7,111
Rusk	Carrizo-Wilcox	Sabine	6,907	6,907	6,907	6,907	6,907	6,907
Rusk	Queen City	Neches	39	39	39	39	39	39
Rusk	Queen City	Sabine	20	20	20	20	20	20
Rusk	Sparta	Neches	0	0	0	0	0	0
Sabine	Carrizo-Wilcox	Neches	356	356	356	356	356	356
Sabine	Carrizo-Wilcox	Sabine	1,032	1,032	1,032	1,032	1,032	1,032
Sabine	Queen City	Neches	0	0	0	0	0	0
Sabine	Queen City	Sabine	0	0	0	0	0	0
Sabine	Sparta	Neches	36	36	36	36	36	36
Sabine	Sparta	Sabine	13	13	13	13	13	13

Table 3.9 Modeled Available Groundwater by Aquifer (ac-ft/yr) (Cont.)

County	Aquifer	Basin	2030	2040	2050	2060	2070	2080
San Augustine	Carrizo-Wilcox	Neches	303	303	303	303	303	303
San Augustine	Carrizo-Wilcox	Sabine	284	284	284	284	284	284
San Augustine	Queen City	Neches	0	0	0	0	0	0
San Augustine	Sparta	Neches	163	163	163	163	163	163
San Augustine	Sparta	Sabine	3	3	3	3	3	3
Shelby	Carrizo-Wilcox	Neches	2,621	2,621	2,621	2,621	2,621	2,621
Shelby	Carrizo-Wilcox	Sabine	3,698	3,698	3,698	3,698	3,698	3,698
Shelby	Queen City	Sabine	0	0	0	0	0	0
Shelby	Sparta	Sabine	0	0	0	0	0	0
Smith	Carrizo-Wilcox	Neches	17,607	17,607	17,607	17,607	17,607	17,607
Smith	Queen City	Neches	20121	20121	20121	20121	20121	20,121
Smith	Sparta	Neches	0	0	0	0	0	0
Trinity	Carrizo-Wilcox	Neches	266	266	266	266	266	266
Trinity	Queen City	Neches	0	0	0	0	0	0
Trinity	Sparta	Neches	152	152	152	152	152	152
County	**Aquifer**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Southern Region								
Hardin	Gulf Coast	Neches	37,571	37,571	37,571	37,571	37,571	37,571
Hardin	Gulf Coast	Trinity	150	150	150	150	150	150
Jasper	Gulf Coast	Neches	40,821	40,821	40,821	40,821	40,821	40,821
Jasper	Gulf Coast	Sabine	32,544	32,544	32,544	32,544	32,544	32,544
Jefferson	Gulf Coast	Neches	1,853	1,853	1,853	1,853	1,853	1,853
Jefferson	Gulf Coast	Neches-Trinity	13,571	13,571	13,571	13,571	13,571	13,571
Newton	Gulf Coast	Neches	199	199	199	199	199	199
Newton	Gulf Coast	Sabine	37,309	37,309	37,309	37,309	37,309	37,309
Orange	Gulf Coast	Neches	6,266	6,266	6,266	6,266	6,266	6,266
Orange	Gulf Coast	Neches-Trinity	280	280	280	280	280	280
Orange	Gulf Coast	Sabine	18,659	18,659	18,659	18,659	18,659	18,659
Polk	Gulf Coast	Neches	16,765	16,765	16,765	16,765	16,765	16,765
Tyler	Gulf Coast	Neches	34,390	34,390	34,390	34,390	34,390	34,390

Table 3.10 presents the total MAG volumes by aquifer for planning years 2030 through 2080. The Gulf Coast aquifer has the largest volume of modeled available groundwater at 240,378 ac-ft per year in the ETRWPA.

Table 3.10 Modeled Available Groundwater Aquifer Totals (ac-ft/yr)

Region	Carrizo-Wilcox	Queen City	Sparta	Gulf Coast
GMA 11 TOTAL	142,270	62,435	3,260	N/A
GMA 14 TOTAL	N/A	N/A	N/A	240,378

Note: Data Provided by TWDB GAM Run 21-016 MAG, GAM Run 21-019 MAG

Non-Relevant Aquifer Availability. Non-relevant aquifers are areas determined by the GCDs that may have aquifer characteristics, groundwater demands, and/or current groundwater uses that do not warrant adoption of a DFC for purposes of joint groundwater planning. Declaring an area non-relevant does not preclude a GCD from managing the groundwater in the area through other means available to the district as outlined in Chapter 36 of the Texas Water Code. In some cases, an area is determined non-relevant because declaring a DFC for the aquifer or portion of the aquifer would not affect other GCDs or GMAs. Generally, if a groundwater conservation district determines an aquifer (or portions of an aquifer) to be non-relevant, it is anticipated that there will be no large-scale production from in the area prior to the next round of joint groundwater planning. Additionally, it is assumed that what production does occur will not affect conditions in relevant portions of the aquifer(s) or other GCDs or GMAs. Regional Water Planning Groups and the TWDB work together to establish groundwater volumes available from non-relevant aquifers by evaluating modeling data and local hydrogeologic information. Table 3.11 includes availability estimates for supplies in 'other aquifer'.

Table 3.11 Groundwater Availability from Non-Relevant Aquifers

Aquifer	County	Basin	2030	2040	2050	2060	2070	2080
Gulf Coast	Polk	Neches	1,060	1,060	1,060	1,060	1,060	1,060
Yegua-Jackson	Angelina	Neches	16,890	16,890	16,890	16,890	16,507	16,507
Yegua-Jackson	Houston	Neches	1,324	1,324	1,324	1,324	1,324	1,324
Yegua-Jackson	Houston	Trinity	4,061	4,061	4,061	4,061	4,061	4,061
Yegua-Jackson	Jasper	Neches	600	600	600	600	600	600
Yegua-Jackson	Nacogdoches	Neches	235	235	235	235	235	235
Yegua-Jackson	Polk	Neches	570	570	570	570	570	570
Yegua-Jackson	Sabine	Neches	3,724	3,724	3,724	3,724	3,724	3,724
Yegua-Jackson	Sabine	Sabine	575	575	575	575	575	575
Yegua-Jackson	San Augustine	Neches	2,102	2,102	2,102	2,102	2,102	2,102
Yegua-Jackson	San Augustine	Sabine	9	9	9	9	9	9
Yegua-Jackson	Trinity	Neches	700	700	700	700	700	700

Groundwater Local Supplies (Other Aquifer) Availability. Groundwater from 'other aquifer' local supplies refers to groundwater originating from another aquifer that has not been classified as either a major or a minor aquifer of the state. These areas are generally small, often are alluvial aquifers, but can be locally significant. Some may originate from a major or minor aquifer but have historically been classified incorrectly. Table 3.12 includes availability estimates for supplies in 'other aquifer.'

Table 3.12 Groundwater Availability from Other Aquifers

County	Basin	Availability (ac-ft/yr)
Anderson	Trinity	298
Angelina	Neches	812
Cherokee	Neches	268
Henderson	Neches	5
Henderson	Trinity	680
Houston	Neches	378
Houston	Trinity	888
Nacogdoches	Neches	1,131
Rusk	Neches	270
Rusk	Sabine	469
Sabine	Neches	336
San Augustine	Neches	1,395
Smith	Neches	922
Trinity	Neches	700
TOTAL		**8,552**

3.3 REUSE AVAILABILITY

There are two types of reuse: direct reuse and indirect reuse. Direct reuse is treated wastewater effluent that is beneficially reused directly from the treatment facility and is not discharged to a State water course. Indirect reuse is treated effluent that is discharged to a State water course and then re-diverted by the owner for beneficial use. The reuse listed as available to the region is for existing projects based on current permits and authorizations. Categories of reuse include (1) currently operating indirect reuse projects for non-industrial purposes, in which water is reused after being returned to the stream; and (2) authorized direct reuse projects for which facilities are already developed. Currently, only direct non-potable reuse is available in Region I.

The reuse activities within Region I from 2016 to 2022 are listed in Table 3.13. From 2016 to 2022, Oxbow Calcining LLC is the largest reuse user in Region I. Oxbow Calcining reuses their processed water and stores it in a nearby pond, which also captures local stormwater, filters it, and recycles it for their production cooling process.

Table 3.13 Summary of Current Reuse Activity (ac-ft/yr)

WUGs	County	Total Reuse Intake (ac-ft/yr)						
		2016	2017	2018	2019	2020	2021	2022
City of Elkhart	Anderson	2	-	-	-	-	-	-
City of Jacksonville	Cherokee	9	8	6	6	6	6	6
City of Port Arthur	Jefferson	-	-	647	669	702	793	793(a)
Emerald Bay MUD	Smith	-	-	-	-	-	100	82
Georgia Pacific Chemicals LLC	Angelina	38	46	45	37	42	45	44
Georgia Pacific Wood Products	Polk	-	7	5	-	-	-	-
GP Wood Products South	Polk	3	-	-	-	-	-	-
Norbord Texas Nacogdoches OSB	Nacogdoches	0	0	0	0	0	23	0
Orion Engineered Carbons, LLC-Echo Plant	Orange	350	-	-	-	-	-	-
Oxbow Calcining LLC	Jefferson	158	158	202	1,153	1,153	1,152	1,152
Tyler Pipe Company	Smith	30	30	-	-	-	-	-
	Reuse Total	**591**	**250**	**904**	**1,865**	**1,903**	**2,118**	**2,076**

Note: (a) For the City of Port Arthur, it is assumed that the reuse intake in 2022 was the same as it was in 2021.

1) Sourced from TWDB Historical Water Use and Intake Reports (2016-2022), Dated 02/01/2024.

Table 3.14 shows a summary of existing reuse supplies across the ETRWPA included in the 2026 RWP. The ETRWPG is currently evaluating some of these reuse sources to determine their relevance for this planning cycle. The ETRWPA is assessing whether other sources listed in Table 3.13 should be incorporated into the 2026 RWP as active, existing reuse sources. Additionally, the City of Center has plans to construct a reuse facility with a capacity of 1 to 2 MGD within the next two to five years. This planned project is included as a water management strategy. The supply amounts reflect drought of record conditions, as the reuse portion is a relatively small part of the potable demand and is drought-resistant. The amounts also reflective of the current infrastructure and demand conditions.

Table 3.14 Summary of 2030 Existing Reuse Supplies in the 2026 ETRWP

Reuse Type	County	River Basin	2030 Reuse Supply in 2026 RWP (ac-ft/yr)	Note
Direct Reuse	Jefferson	Neches-Trinity	180 [a]	City of Port Author non-potable reuse
Direct Reuse	Orange	Sabine	15 [a]	City of Orange non-potable reuse
Direct Reuse	Sabine	Sabine	20 [a]	City of Pineland industrial reuse
Direct Reuse	Shelby	Sabine	233 [a]	Shelby County FWSD 1 manufacturing reuse
Water Recycling	Jefferson	Neches-Trinity	1,153	Oxbow Calcining LLC recycling
		Total	**1,601**	-

Notes:

(a) Region I RWPG is currently reviewing these four sources to verify their relevance for this planning cycle.

3.4 IMPACTS ON AVAILABILITY

Potential impacts on existing water availability in the ETRWPA were examined, including imports and exports of water supply to and from the region, potential impacts of water quality on supplies, and impacts of environmental flow policies on water rights, water availability, and water planning. The following subsections describe these impacts.

3.4.1 Imports and Exports

There are several imported supplies to the ETRWPA from adjoining regions and Louisiana. Water from Lake Fork in the Northeast Region is used by the City of Henderson and the City of Kilgore, which sells water from Lake Fork to customers in the ETRWPA. Other surface water imports include water from Lake Livingston to Trinity County-Other, the TRWD Reservoir System to Henderson County-Other, Lake Gladewater to Smith County-Other, and surface water for the City of Joaquin and Shelby County-Other from the City of Logansport, Louisiana. The specific source for this import is the Louisiana portion of the Toledo Bend Reservoir.

There are also uses of groundwater from sources located outside of the ETRWPA. Most are associated with entities that extend over multiple regions. Groundwater from the Carrizo-Wilcox Aquifer in the Northeast Region (Region D) is provided to Jackson WSC, Southern Utilities, and Smith County-Other, while groundwater from this aquifer in Region C is provided to Bethel Ash WSC and Virginia Hill WSC. A small amount of groundwater from the Yegua-Jackson Aquifer in Trinity County (Region H) is provided to County-Other, irrigation, livestock, and mining industries within Trinity County. Groundwater from the Gulf Coast Aquifer System in Region H supplies Trinity County-Other and manufacturing in Polk County.

Some water from the ETRWPA is exported to users outside of the region. This supply is included in the total available supply in the ETRWPA but is not available to water users in the region. Water from Lake Tyler and Lake Palestine are used to supply the City of Tyler's customers in the Northeast Region as the City of Tyler overlaps with the Region I and Region D planning area. In addition, water from Lake Athens is used to supply the City of Athens in Region C and water from LNVA is used to supply several water waters in Region H. The Upper Neches River Municipal Water Authority (UNRMWA) also has an existing contract to supply water to Dallas from Lake Palestine for an amount 114,337 ac-ft per year. Lake Palestine is currently in the process of being connected to Dallas' system, with an anticipated completion before 2030. A summary of exports and imports is provided in Table 3.15.

Table 3.15 Summary of Existing Exports and Imports in the ETRWPA (ac-ft/yr)

Source	2030	2040	2050	2060	2070	2080
Exports						
Lake Athens – Region C	665	1,187	1,807	1,964	1,967	1,969
Sam Rayburn/B.A. Steinhagen – Region H	66,719	66,720	66,721	66,722	66,723	66,724
Lake Cherokee – Region D	15,573	15,573	15,573	15,574	15,558	15,558
Lake Tyler – Region D	121	109	101	89	82	71
Lake Palestine – Region D	124	112	105	96	85	75
TOTAL	**83,078**	**83,589**	**84,202**	**84,349**	**84,330**	**84,322**
Imports						
Carrizo-Wilcox Aquifer – Region C	483	501	509	521	533	547
Carrizo-Wilcox Aquifer – Region D	2,968	3,091	3,122	3,122	3,122	3,122
Yegua-Jackson Aquifer – Region H	41	39	36	35	33	31
Gulf Coast Aquifer – Region H	74	69	65	61	58	55
Lake Gladewater – Region D	23	23	23	23	23	23
Lake Fork – Region D	4,795	4,772	4,740	4,716	4,697	4,681
Lake Livingston – Region H	511	511	511	511	511	511
Toledo Bend - Louisiana	224	194	170	145	125	107
TOTAL	**9,119**	**9,200**	**9,176**	**9,134**	**9,102**	**9,077**

Note: Values subjected to change until the end of the planning cycle.

3.4.2 Impacts of Water Quality on Supplies

The quality of a surface water body or groundwater aquifer can be a significant factor in the ability to use the water for specific purposes. Water quality dictates the level of treatment necessary to render a water body available for its intended use, which can affect the quantity of produced water. In cases of severe contamination, it is possible a water supply source could be considered untreatable and, hence, unusable for some specific uses. The water quality impacts for sources within the ETRWPA are generally minor with respect to their effect on availability and treatability.

Key water quality parameters for the ETRWPA are identified and discussed in Chapter 6. These parameters are generally a consideration for surface waters. Some of these parameters could be an issue for groundwater as well. The key water quality parameters identified include the following:

- Total Dissolved Solids (TDS)
- Dissolved Oxygen
- Nutrients
- Metals
- Turbidity

These parameters can potentially affect some aspects of aquatic life or the use of the water for recreation. However, in some cases they could affect its availability for water supply as well. Water quality impacts for surface water and groundwater as they relate to availability and treatment requirements are discussed below. Overall, surface water quality in the ETRWPA is addressed in Chapter 1.

Generally, the water quality impairments identified for surface water sources through the TCEQ's Clean Rivers Program do not limit the availability of surface water or the treatability of these sources. The brackish or saline run-of-the-river water rights are limited to uses compatible with high TDS water. This plan assumes these water rights are being used for such purposes.

Based on water quality data for aquifers within the ETRWPA the limitations on water supply availability or treatability are rare for groundwater supplies in the ETRWPA. The most prevalent of the primary drinking water contaminants was found to be arsenic, which exceeded the primary standard of 10 µg/L in about nine percent of samples collected between 1981 and 2019 in the Carrizo-Wilcox, Gulf Coast, Queen City and Sparta aquifers. However, the median concentration of arsenic is 2.0 µg/L and the average is 5.8 µg/L. Arsenic can be removed from water using advanced treatment processes such as iron removal (adsorption and co-precipitation in high iron waters), coagulation and filtration, filters, or ion exchange. Given the relatively low incidence of arsenic contamination, it is unlikely it would become a significant issue for the ETRWPA.

Secondary drinking water contaminants evaluated included copper, fluoride, chloride, iron, manganese, pH, sulfate, and TDS. Of these, copper, iron, manganese, and pH were commonly found in excess of secondary standards in some samples from all four aquifers. Iron and manganese are naturally occurring constituents in groundwater. In excess, they can cause taste and odor problems in drinking water, but not significant health problems. This is commonly treated by aeration. Industrial users of water with excessive levels of iron or manganese may require significant removal prior to using the water in industrial processes.

The well data also indicated it is relatively common for pH concentrations in groundwater to be outside the allowable range (i.e., 6.5 to 8.5 standard units) for the four aquifers evaluated. However, neither the median nor the average values were found outside the range for any of the aquifers. Control of pH is easily accomplished through the addition of pH adjusting chemicals. This indicates pH concerns for groundwater in the ETRWPA are not a significant limiting factor in availability or treatability.

TDS was found to exceed the Texas secondary standard of 1,000 mg/L in only five percent of the samples. The average concentration for samples in the Carrizo-Wilcox and Gulf Coast aquifers is 392 mg/L. In the Queen City and Sparta samples, the average TDS is 429 mg/L.

3.4.3 Impact of Environmental Flow Policies on Water Rights, Water Availability, and Water Planning

With the passage of Senate Bill 3 in the 2007 80th Regular Session, the State created a basin-by-basin process for developing recommendations to meet the instream flow needs of rivers as well as freshwater inflow needs of affected bays and estuaries and required TCEQ to adopt the recommendations in the form of environmental flow standards. Standards for the Neches and Sabine River Basins were adopted by the TCEQ on April 20, 2011. These standards are utilized in the decision-making process for new water right applications and in establishing an amount of unappropriated water to be set aside for the environment. Existing water rights at the time of adoption are not subject to the environmental flow standards. These water rights were evaluated on a case-by-case basis to assess the effect of authorizing a new use of water with the need for that water to maintain a sound ecological system as part of the water rights permitting process. The environmental flow requirements set forth through Senate Bill 3 do not impact the region's currently available supplies shown in previous sections.

The implementation of environmental flow recommendations will result in a need to more carefully consider environmental flow needs during the development of surface water management strategies. Environmental flow requirements are one component that is considered when assessing the long-term protection of the region's water resources in Chapter 6.

3.5 EXISTING WATER SUPPLIES BY WATER USER GROUP

The water availability by WUG is limited by the ability to deliver and/or use the water. These limitations include firm yield of reservoirs, well field capacity, aquifer characteristics, water quality, water rights, permits, contracts, regulatory restrictions, raw water delivery infrastructure and water treatment capacities where appropriate. Appendix 3-B presents the current water supplies for each WUG by county in the ETRWPA. WUGs include cities, water supply corporations, county-other municipal users and county-wide manufacturing, irrigation, mining, livestock, and steam electric uses. For county-wide user groups, historical use was considered in the determination of currently available supplies.

The table in Appendix 3-B shows the amount of supply available to each water user group in the ETRWPA from each source by decade based on existing facilities. The supplies by county are shown in Table 3.16.

Table 3.16 Summary of Existing Water Supplies of Water User Groups by County in the ETRPWA (ac-ft/yr)

County	2030	2040	2050	2060	2070	2080
Anderson	23,150	23,276	23,409	23,526	23,647	23,772
Angelina	19,897	20,073	20,202	20,350	20,498	20,651
Cherokee	10,514	10,438	10,334	10,216	10,096	9,974
Hardin	9,669	10,450	11,186	11,130	11,080	11,038
Henderson [a]	8,636	8,866	8,512	8,183	7,876	7,687
Houston	9,883	9,780	9,692	9,702	9,597	9,503
Jasper	72,591	72,360	72,100	71,865	71,637	71,415
Jefferson	414,908	419,412	419,819	419,581	419,534	419,647
Nacogdoches	39,369	39,953	40,562	41,390	42,235	43,093
Newton	21,915	21,994	22,079	22,180	22,291	22,418
Orange	143,764	143,849	143,920	146,414	150,792	155,335
Panola	15,762	15,811	15,833	15,850	15,850	15,870
Polk [a]	2,374	2,471	2,557	2,642	2,725	2,805
Rusk	64,595	64,466	64,297	64,123	63,939	63,773
Sabine	3,159	3,212	3,188	3,171	3,158	3,142
San Augustine	4,938	4,949	4,953	4,953	4,953	4,953
Shelby	23,634	23,592	23,555	23,519	23,487	23,457
Smith [a]	59,274	63,639	68,491	71,190	74,103	77,277
Trinity [a]	647	647	618	600	580	561
Tyler	9,725	9,569	9,441	9,351	9,266	9,187
TOTAL	**958,404**	**968,807**	**974,748**	**979,936**	**987,344**	**995,558**

a. County is split between two planning regions. The available supply presented in this table represents only the portion of the county within the ETRWPA.

Note: Values subjected to change until the end of the planning cycle.

3.6 EXISTING WATER SUPPLIES BY MAJOR WATER PROVIDER

There are 16 designated Major Water Providers (MWPs) in the ETRWPA. In the ETRWPA, a MWP is defined as a wholesale water provider that provides 5,000 ac-ft per year or more during the planning period. Similar to the available supply to WUGs, the water availability for each MWP is limited by the ability to deliver the raw water. These limitations include firm yield of reservoirs, well field capacity, aquifer characteristics, water quality, water rights, permits, contracts, regulatory restrictions, and infrastructure. Total available supply by decade for each Major Water Provider is shown in Table 3.17.

Table 3.17 Summary of Existing Water Supplies for Major Water Providers in the ETRPWA (ac-ft/yr)

Major Water Provider	2030	2040	2050	2060	2070	2080
Angelina and Neches River Authority	3,606	3,518	3,417	3,320	3,217	3,105
Angelina-Nagodoches WCID No. 1	10,500	9,990	9,480	8,970	8,460	7,950
Athens Municipal Water Authority	6,027	5,967	5,907	5,847	5,787	5,727
Beaumont	23,748	24,206	24,623	24,441	24,450	24,615
Carthage	4,891	4,891	4,891	4,891	4,891	4,891
Center	4,112	4,100	4,087	4,075	4,062	4,050
Houston Co. WCID 1	3,500	3,500	3,500	3,500	3,500	3,500
Jacksonville	7,391	7,391	7,391	7,391	7,391	7,391
Lower Neches Valley Authority	1,204,049	1,201,876	1,201,876	1,201,876	1,201,876	1,201,876
Lufkin	35,313	35,336	35,359	35,382	35,405	35,428
Nacogdoches	20,827	20,465	20,103	19,741	19,379	19,017
Panola Co. Freshwater Supply District No. 1	20,800	20,016	19,482	18,448	17,664	16,880
Port Arthur	33,955	37,990	37,990	37,990	37,990	37,990
Sabine River Authority of Texas (ETRWPA Portion Only)	1,071,861	1,071,544	1,071,191	1,070,910	1,070,593	1,070,276
Tyler	66,930	66,695	66,460	66,233	66,007	65,780
Upper Neches River Municipal Water Authority	177,110	175,040	172,970	170,950	168,930	166,910
Total	**2,694,620**	**2,692,525**	**2,688,727**	**2,683,965**	**2,679,602**	**2,675,386**

Note: Values subjected to change until the end of the planning cycle.

A brief description of the supply sources for each MWP is presented below. The analyses of the available supplies by source were determined using the assumptions outlined in Section 3.1.1. The results of these analyses are for planning purposes and do not affect the right of a water holder to divert and use the full amount of water authorized by its permit.

3.6.1 Angelina and Neches River Authority

Angelina and Neches River Authority (ANRA) has a state water right permit to construct Lake Columbia on Mud Creek in the Neches River Basin and divert 85,507 ac-ft per year. No currently available supply is shown since the reservoir is not constructed. The estimated firm yield using the modified Neches WAM Run 3 is 68,850 ac-ft per year in 2030. The supply shown in Table 3.17 for Angelina and Neches River Authority is the total existing water supplies for the entities that are operated by ANRA. Additional detailed information is available in Chapter 5B.

3.6.2 Angelina-Nacogdoches Water Control Improvement District No 1

The Angelina-Nacogdoches Water Control & Improvement District No. 1 owns and operates Lake Striker in Rusk and Cherokee Counties. The firm yield from Lake Striker in 2080 is estimated at 10,500 ac-ft per year and is projected to decrease to 7,950 ac-ft per year by 2080.

3.6.3 Athens Municipal Water Authority

Athens Municipal Water Authority (AMWA) has 8,500 ac-ft per year of water rights in Lake Athens. The firm yield of the lake using the modified Neches WAM Run 3 was estimated at 4,540 ac-ft per year in 2030. AMWA has two existing groundwater wells: one near their water treatment WTP that is blended with surface water from Lake Athens and another that was recently constructed in 2023. . The City of Athens operates and maintains the WTP and groundwater wells owned by AMWA. In addition, the City of Athens owns three groundwater wells within their City limits. The AMWA also has a wastewater reuse permit for 2,677 ac-ft per year, but the infrastructure is not in place to utilize this source. The City of Athens and AMWA continue to study indirect reuse as a supplement to the yield of Lake Athens. The AMWA is also proposing to develop additional groundwater supplies to supplement the surface water, but these supplies are not available at this time.

3.6.4 City of Beaumont

The City of Beaumont water supply sources include self-supplied surface water from the Neches River, self-supplied groundwater from the Gulf Coast Aquifer, and surface water purchased from LNVA. The City is permitted to produce approximately 15 million gallons per day (MGD) of groundwater from their well field. However, considering infrastructure constraints and sustainable groundwater pumpage, the estimated reliable groundwater supply for Beaumont is limited to 5,646 ac-ft per year. The City's reliable Neches River supplies are estimated at 12,102 ac-ft per year for 2030 based on the daily analysis of the City's run-of-the-river water rights. This supply increases over time as demands increase, whereby additional surface water is utilized during periods with sufficient flows. By 2080, the amount of available run-of-the-river water is 12,969 ac-ft per year. The City also has a contract with LNVA to supplement its surface water supplies with releases from the Sam Rayburn/Steinhagen system. The current base contract the City has with LNVA is 6,000 ac-ft per year. Considering both its groundwater and surface water sources the City's currently available water supply total is approximately 23,748 ac-ft per year in 2030.

3.6.5 City of Carthage

The City of Carthage obtains its water from groundwater from the Carrizo-Wilcox Aquifer and surface water from Panola County Freshwater Supply District. The City has a contract with Panola County Freshwater Supply District for 12 MGD of water from Lake Murvaul. Considering its current water system capacities, the city of Carthage has approximately 4,891 ac-ft per year of reliable supply.

3.6.6 City of Center

The City of Center currently obtains water from Lake Center and Lake Pinkston for use within the City and for distribution to its municipal and industrial customers. The City owns and operates Lake Center, with a firm yield of 500 ac-ft per year of municipal water. The City holds rights to 3,800 ac-ft per year of water in Lake Pinkston. The firm yield from Lake Pinkston in 2030 using the modified Neches WAM Run 3 is 3,612 ac-ft per year. Water from Lake Pinkston is pumped from the Neches River Basin to the City, located in the Sabine River Basin. The total available supply for the City of Center is 4,112 ac-ft per year in 2030. The City of Center is plans to construct reuse facility serving the City's industrial customers in 1 MGD in the next 2 to 5 years.

3.6.7 Houston County Water Control Improvement District (WCID) No. 1

Houston County WCID No. 1's water rights to Houston County Lake include a right to divert 3,500 ac-ft per year at a rate not to exceed 6,300 gallons per minute. The entity originally had a right to divert 7,000 ac-ft per year, which was reduced to the current right of 3,500 ac-ft per year. Houston County WCID No. 1 applied for a water right permit to access the additional 3,500 ac-ft per year supplies in 2007 which was denied by TCEQ. Supplies to Houston County WCID No. 1 are limited to its permitted diversions. The entity plans to construct additional wells; however, the number of wells or the associated well capacities is unknown yet.

3.6.8 City of Jacksonville

The City of Jacksonville obtains water supplies from Lake Jacksonville and the Carrizo-Wilcox Aquifer. The City holds 6,200 ac-ft per year in water rights in Lake Jacksonville. The ability to use this water for municipal purposes is limited by the City's water treatment capacity (estimated at 5,173 ac-ft per year). The groundwater supplies are estimated at 2,218 ac-ft per year based on current well field production. The total supply available to Jacksonville is 7,391 ac-ft per year in 2030.

3.6.9 Lower Neches Valley Authority

The LNVA maintains water rights from Lake Sam Rayburn/Lake B.A. Steinhagen and run-of-the-river diversion from the Neches River. LNVA has an agreement to use full amount of Lufkin's share of supplies (28,000 ac-ft per year) from Lake Sam Rayburn/Lake B.A. Steinhagen through the 2020-2030 decade. LNVA's existing water rights total 1,201,876 ac-ft per year. The reliable supply from these water rights using the modified Neches WAM Run 3 is 1,201,876 ac-ft per year from 2030 to 2080. The LNVA currently possesses infrastructure to divert these water rights to its municipal, manufacturing, mining, and irrigation users.

3.6.10 City of Lufkin

The City of Lufkin presently obtains groundwater from the Carrizo-Aquifer in Angelina County and surface water from Lake Kurth. Groundwater supplies for the City of Lufkin are estimated to be 17,888 ac-ft throughout the planning horizon (2030-2080), based on its well field pumping capacity of the current 15 active wells. The City has water rights to divert from 16,200 ac-ft per year from Lake Kurth, plus run-of-river diversions. Lufkin also has a water right for 28,000 ac-ft per year of water from Lake Sam Rayburn. Currently there are no transmission facilities from Lake Sam Rayburn to use this water.

3.6.11 City of Nacogdoches

The City of Nacogdoches obtains groundwater from the Carrizo-Wilcox aquifer and surface water from Lake Nacogdoches. The groundwater supply of 6,492 ac-ft per year is based on the average annual current well field pumping capacity. The City currently has water rights to divert 22,000 ac-ft per year of water from Lake Nacogdoches. The modified Neches WAM Run 3 shows the current firm yield of this lake to be 14,335 ac-ft per year in 2030 and reducing to 12,525 ac-ft per year by 2080. The total supply to Nacogdoches in 2030 is 20,827 ac-ft per year.

3.6.12 Panola County Freshwater Supply District No. 1

The Panola County Freshwater Supply District No. 1 owns and operates Lake Murvaul in the ETRWPA. The estimated firm yield of Lake Murvaul using the modified Sabine WAM Run 3 is 20,800 ac-ft per year in year 2030, decreasing to 16,880 ac-ft per year by 2080.

3.6.13 City of Port Arthur

The City of Port Arthur receives raw water supply from the LNVA. Treated water is supplied to its citizens, as well as several industrial users. It is assumed LNVA will provide supply for all of the City's demands. The projected supply for Port Arthur and its' wholesale customers is 33,955 ac-ft per year in 2030, increasing to 37,990 ac-ft per year by 2080.

3.6.14 Sabine River Authority of Texas

The SRA owns and operates the Toledo Bend Reservoir, located in the ETRWPA, and Lakes Tawakoni and Fork, located in Region D. In addition, the SRA maintains run-of-the-river rights from the Sabine in Newton and Orange County. The SRA also provides water to municipal and industrial customers in Region C and Region D from Lake Fork and Lake Tawakoni. Some customers in the ETRWPA receive water from Lake Fork through downstream releases and riverine diversions. Most of the water in the ETRWPA from SRA is provided from Toledo Bend Reservoir and diversions from the Sabine River through the SRA Canal System. SRA holds water rights of 238,100 ac-ft per year from Lake Tawakoni, 188,660 ac-ft per year from Lake Fork, 970,067 ac-ft per year from Toledo Bend Reservoir and 147,100 ac-ft per year from the Sabine River. In 2030, the reliable supply from SRA's Lower Basin sources (Toledo Bend Reservoir and the Canal System) in the ETRWPA is 1,071,861 ac-ft per year, and the Upper Basin sources (Lake Tawakoni and Lake Fork) in Region D is 395,205 ac-ft per year.

3.6.15 City of Tyler

The City of Tyler receives raw water supply from Lake Tyler and Tyler East with a firm yield of 32,900 ac-ft per year in 2040, which is expected to decrease to 31,750 ac-ft per year in 2080. Supply from these reservoirs is limited to 19,057 ac-ft per year by the water treatment plant capacity (34 MGD). The City also has a contract with the UNRMWA for 60 MGD from Lake Palestine. The City of Tyler has constructed a 30 MGD treatment facility at the lake and currently can use 33,630 ac-ft per year from Lake Palestine. The City possesses water rights to Lake Bellwood; however, the raw water from this source is used only for irrigation. Water is not treated by the City from this source. The City plans to plug all wells and will not use groundwater. Collectively, the City has a total of 66,530 ac-ft per year of treated water and an additional 400 ac-ft per year of raw water from Lake Bellwood.

3.6.16 Upper Neches River Municipal Water Authority

The UNRMWA maintains a total water right of 238,110 ac-ft per year for diversions from Lake Palestine and a downstream location at Rocky Point Dam. The UNRMWA operates these rights as a system. Available supply for the lake Palestine System using the modified Neches WAM Run 3 is estimated at 177,110 ac-ft per year in year 2030, decreasing to 166,910 ac-ft per year by 2080.

Chapter 4: Comparison of Water Demands with Water Supplies to Determine Needs

2026 Initially Prepared Plan

Prepared for:

East Texas Regional Water Planning Group

February 2025

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Appendix 4-A: Major Water Provider First and Second-Tier Water Needs

LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AFY	acre-feet per year
ETRWPA	East Texas Regional Water Planning Area
ETRWPG	East Texas Regional Water Planning Group
FWSD	Fresh Water Supply District
MUD	Municipal Utility District
MWA	Municipal Water Authority
MWP	Major Water Provider
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SRA	Sabine River Authority
SUD	Special Utility District
TWDB	Texas Water Development Board
WCID	Water Control and Improvement District
WSC	Water Supply Corporation
WMSs	Water Management Strategies
WUG	Water User Group
WWP	Wholesale Water Provider

4 COMPARISON OF WATER DEMANDS WITH WATER SUPPLIES TO DETERMINE NEEDS

This chapter describes the comparison of estimated current water supply for drought-of-record conditions from Chapter 3 and projected water demand from Chapter 2. From this comparison, water needs (shortages) or surpluses under drought-of-record conditions have been estimated. Water shortages identified from this comparison are defined as first-tier water needs. In addition, a secondary analysis was conducted to determine needs after conservation and direct reuse strategies have been implemented. Water shortages identified from this analysis are defined as second-tier water needs. Listings of the First-Tier and Second-Tier water needs by water user group are included in the Executive Summary, Appendix ES-A Reports 05 and 06, respectively.

As discussed in Chapter 3, allocations of existing water supplies were based on the most restrictive of current water rights, contracts, water treatment capacities, available yields for surface water, and production capacities for groundwater. The allocation process did not directly address water quality issues, which were found to be minimal for the East Texas Regional Water Planning Area (ETRWPA). Water quality issues could potentially impact local usability of some water supplies, nonetheless.

The comparison of current water supply and projected water demand in the ETRWPA is evaluated on a regional basis, by county, by water user group (WUG) and by Major Water Provider (MWP). Section 4.1 presents a regional comparison of current and projected supplies, demands, and water needs. Section 4.2 presents a county-by-county comparison of current and projected First-Tier water needs. Section 4.3 presents the current and projected First-Tier water needs for each WUG. Section 4.4 discusses First-Tier water needs for the MWPs in the region. Section 4.5 discusses water needs for WUGs and MWPs, after savings from conservation and direct reuse strategies are applied (second-tier water needs).

4.1 REGIONAL COMPARISON OF SUPPLIES AND DEMANDS

As discussed in Chapter 3, it is estimated that the ETRWPA has approximately 3.2 million acre-feet (ac-ft) of freshwater supplies. However, not all of these water supplies have been developed for use by water user groups yet, i.e., no infrastructure has been developed to access these supplies. Undeveloped (or unconnected) water supplies are identified by comparing the supplies that are developed for each individual entity to use to the total regional water supply sources. In the ETRPWA, the undeveloped fresh water supplies are estimated to be around 2.2 million ac-ft per year throughout the planning period. Additional infrastructure and/or contracts are needed to utilize these sources. Additional details on supply versus demand (DB27 Report) are provided in Appendix ES-A, Report 03.

Table 4.1 and Figure 4.1 summarize and compare the total available, developed, and existing water supplies to the total projected water demands over the planning period for the ETRWPA. Available freshwater supplies are the maximum raw water supplies that could be cumulatively produced during a drought of record regardless of whether the supply is physically or legally available. While developed supplies exceed the projected WUG demands, not all developed supplies are currently accessible to water users due to constraints in their individual supply, infrastructure, or contracts with their water providers. Therefore, inaccessible developed supplies are excluded from the region's existing supplies presented. Consequently, projected demands for water users exceed the existing supplies throughout the planning horizon (2030-2080). As shown in

Table 4.2, regional water needs (shortages) are shown to be nearly 23,000 ac-ft/yr in 2030 and increase to over 205,000 ac-ft/yr in 2080. However, as shown by the undeveloped freshwater supplies, the Region is a water-rich region with adequate supply to meet projected water demands through 2080 through project and water management strategy implementation.

Table 4.1 Summary of Supply and Demand for the East Texas Regional Water Planning Area (ac-ft/yr)

	2030	2040	2050	2060	2070	2080
Available Freshwater Supplies	3,221,380	3,217,268	3,213,319	3,208,417	3,203,532	3,199,187
Undeveloped Supplies	2,262,976	2,248,461	2,238,571	2,228,481	2,216,188	2,203,629
Existing Supplies	958,404	968,807	974,748	979,936	987,344	995,558
WUG Demands	755,106	803,748	852,417	897,825	942,672	987,594
Difference between Existing Supply and Demand[a]	**203,298**	**165,059**	**122,331**	**82,111**	**44,672**	**7,964**

Note:
(a) The difference between supply and demand does not reflect the water needs within Region I, as some WUGs have surpluses and some have shortages.
Values subjected to change until the end of the planning cycle.

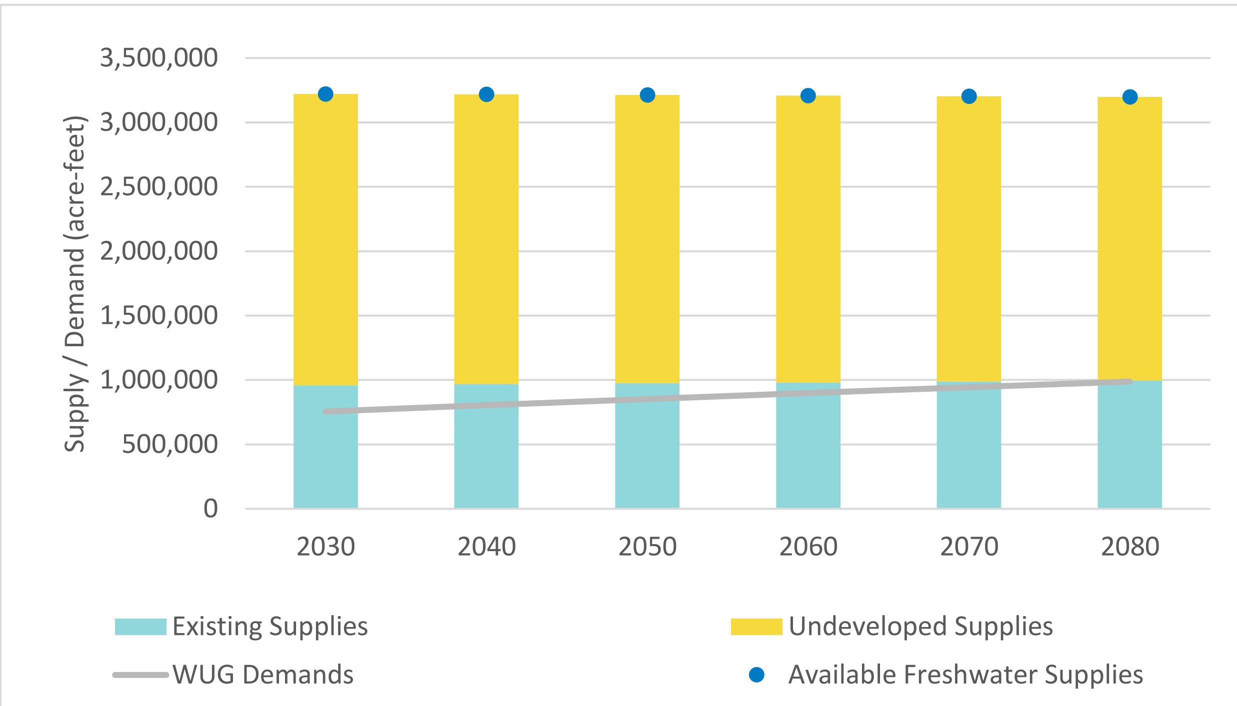
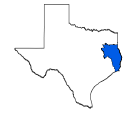


Figure 4.1 Comparison of Regional Water Supplies to Demands

Table 4.2 and Figure 4.2 summarize regional water needs by category of water use. These needs only reflect portions of WUGs that are within the ETRWPA. Some WUGs may have additional needs shown in other regional water planning areas in which they are located, including regions C, D, or H. These needs are expected to be marginal. On a regional basis, there are needs for each water use type. By far, the greatest needs are identified for manufacturing. Lesser needs are identified for municipal, livestock,



steam electric power, mining, and irrigation categories. Most of the manufacturing needs are the result of considerable growth in demand and supplies that are limited to existing contract amounts or reported usage. Other non-municipal (mining, livestock, irrigation) needs are largely associated with demands that have not been realized to date and do not have a current water supply or are limited by modeled available groundwater in the regional water plan. The municipal needs arise from population growth and increasing demand, while the capacity of current infrastructure remains limited. It is likely that development of additional supply, additional contract water, and/or infrastructure expansions will be needed to meet the municipal demand.

Table 4.2 Summary of Projected Regional Needs by Water Use Type (ac-ft/yr)

Water Use Type	2030	2040	2050	2060	2070	2080
Municipal	9,144	9,635	10,350	10,747	11,110	11,608
Manufacturing	8,403	41,662	78,926	116,133	153,673	190,995
Mining	702	761	818	873	952	1,097
Steam-Electric Power	4,357	4,357	4,357	4,357	4,357	4,357
Irrigation	215	215	215	215	215	215
Livestock	0	0	0	156	702	871
Total	**22,821**	**56,630**	**94,666**	**132,481**	**171,009**	**209,143**

Note: Values subjected to change until the end of the planning cycle.

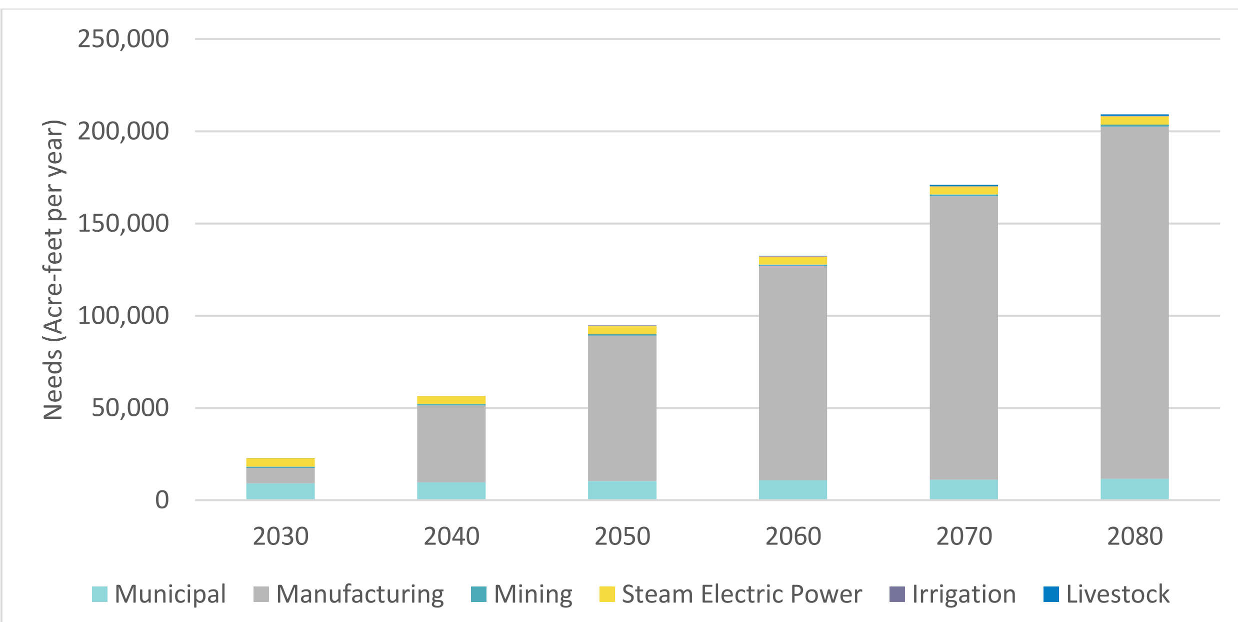


Figure 4.2 Projected Regional Needs by Water Use Type (ac-ft/yr)

4.2 FIRST-TIER WATER NEEDS BY COUNTY

First-Tier water needs are identified by comparing the current supplies allocated to water users from Chapter 3 to the projected demands from Chapter 2, in accordance with TWDB rules. Table 4.3 shows the projected First-Tier water needs by county for each decade of the planning period in acre-feet per year and Table 4.4 shows the First-Tier water needs as a percentage of demand. In general, some shortages exist throughout the region. Eleven of the twenty counties in the ETRWPA are identified with needs over the planning horizon, with Jefferson, Jasper, and Henderson counties having the largest projected needs by volume in 2080. As discussed previously, the region has sufficient developed supplies to meet these shortages, however, some of these supplies are unallocated due to either existing constraints of individual entities or contracts that are not yet in place to supply water. Figure 4.3 shows the amount of unallocated supplies by county in the region.

Table 4.3 Summary of Projected First-Tier Water Needs by County (ac-ft/yr)

County	2030	2040	2050	2060	2070	2080
Anderson	2,296	2,296	2,296	2,296	2,296	2,296
Angelina	2,518	2,726	2,936	3,151	3,367	3,588
Cherokee	124	209	306	414	533	665
Hardin	0	0	0	0	0	0
Henderson [a]	2,097	2,101	2,148	2,394	3,043	3,673
Houston	113	111	111	170	396	396
Jasper	455	2,589	4,802	7,097	9,476	11,943
Jefferson	13,497	44,861	80,228	114,786	149,161	183,389
Nacogdoches	0	30	62	115	167	218
Newton	0	0	0	0	0	0
Orange	0	0	0	0	0	0
Panola	0	0	0	0	0	0
Polk [a]	0	0	0	0	0	0
Rusk	0	0	0	0	26	58
Sabine	0	0	0	97	96	96
San Augustine	0	0	0	0	0	0
Shelby	841	934	1,053	1,148	1,239	1,325
Smith [a]	587	476	422	506	897	1,179
Trinity [a]	215	215	215	215	215	215
Tyler	78	82	87	92	97	102
Total	**22,821**	**56,630**	**94,666**	**132,481**	**171,009**	**209,143**

Note:
(a) County is split across more than one regional water planning area. The values shown only reflect the needs identified in the ETRWPA portion of these counties.
Values subjected to change until the end of the planning cycle.

Table 4.4 Summary of Projected First-Tier Water Needs by County (Percentage of Demand)

County	2030	2040	2050	2060	2070	2080
Anderson	11%	11%	11%	11%	11%	11%
Angelina	13%	14%	15%	15%	16%	17%
Cherokee	1%	2%	3%	4%	5%	7%
Hardin	0%	0%	0%	0%	0%	0%
Henderson [a]	23%	23%	23%	25%	31%	36%
Houston	1%	1%	1%	2%	4%	4%
Jasper	1%	3%	6%	9%	12%	14%
Jefferson	4%	12%	20%	27%	32%	37%
Nacogdoches	0%	0%	0%	1%	1%	1%
Newton	0%	0%	0%	0%	0%	0%
Orange	0%	0%	0%	0%	0%	0%
Panola	0%	0%	0%	0%	0%	0%
Polk [a]	0%	0%	0%	0%	0%	0%
Rusk	0%	0%	0%	0%	0%	0%
Sabine	0%	0%	0%	4%	4%	4%
San Augustine	0%	0%	0%	0%	0%	0%
Shelby	7%	7%	8%	8%	9%	9%
Smith [a]	1%	1%	1%	1%	1%	2%
Trinity [a]	27%	28%	29%	30%	31%	32%
Tyler	2%	2%	2%	3%	3%	3%
Total	**3%**	**7%**	**11%**	**15%**	**18%**	**21%**

Note:
(a) County is split across more than one regional water planning area. The values shown only reflect the needs identified in the ETRWPA portion of these counties.
Values subjected to change until the end of the planning cycle.

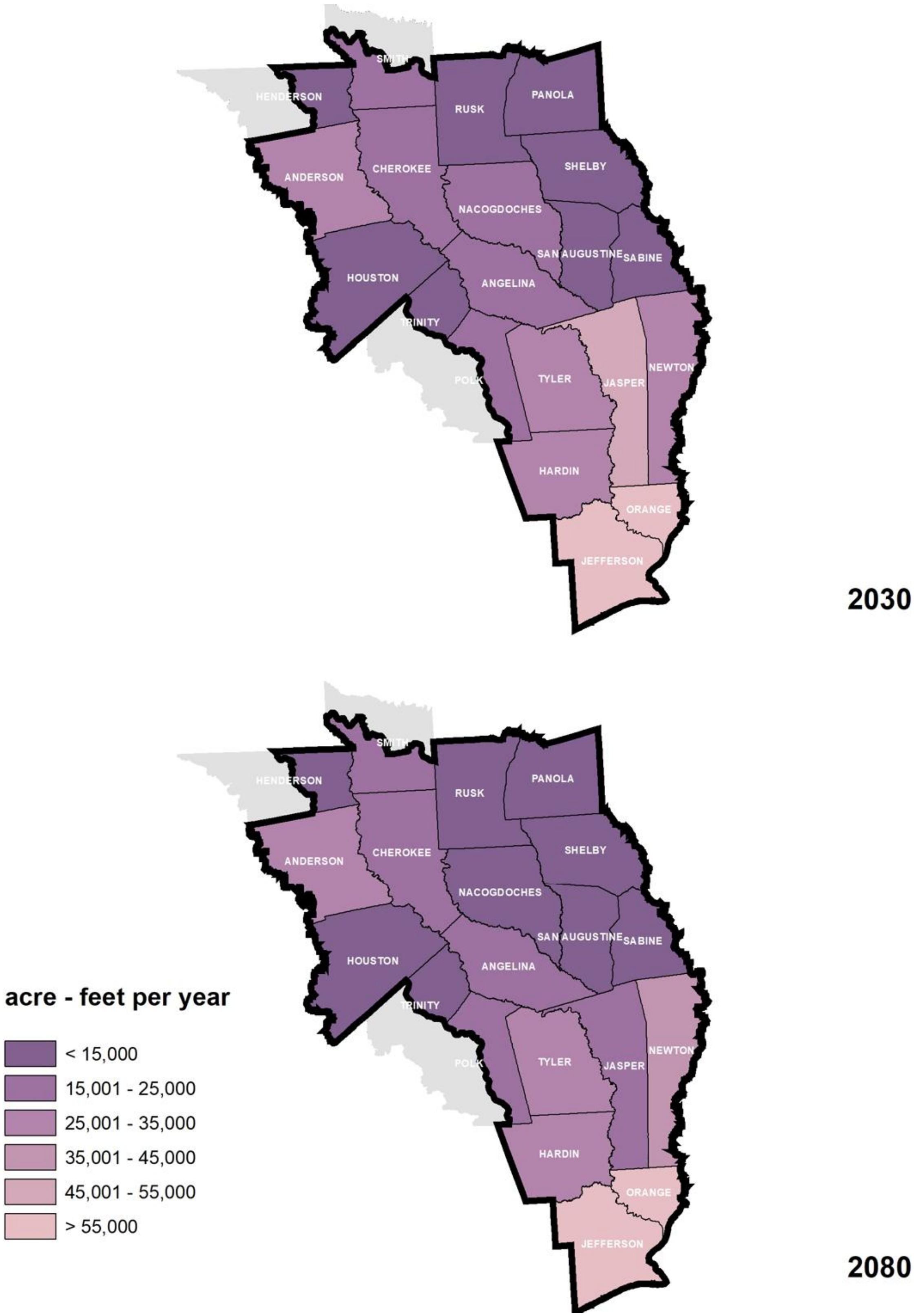


Figure 4.3 Unallocated Supplies

4.3 FIRST-TIER WATER NEEDS BY WATER USER GROUP

The comparison of First-Tier water needs by water user group is presented in Table 4.5. There are 27 different WUGs across 11 counties in the ETRWPA with identified needs that cannot be met by existing infrastructure and supply. The needs by the WUGs below range from 2% to 100% of their respective total demands. These projected needs total approximately 23,000 ac-ft per year in 2030 and 210,000 ac-ft per year by 2080. The 2070 needs are similar to the projected needs identified in the 2021 East Texas Regional Water Plan. However, the needs in the early decades of the 2021 Plan were significantly higher, primarily due to the manufacturing demands in Jefferson County. Specific needs are addressed in subsequent subsections.

Table 4.5 Water User Groups with Projected Needs (ac-ft/yr)

Water User Group	County	2030	2040	2050	2060	2070	2080	Percent Need Compared to 2080 Demand [b]
Steam Electric Power	Anderson	2,296	2,296	2,296	2,296	2,296	2,296	100%
Manufacturing	Angelina	2,145	2,314	2,488	2,671	2,859	3,055	45%
Mining	Angelina	373	412	448	480	508	533	57%
Alto Rural WSC	Cherokee	124	209	306	414	533	665	45%
Athens [a]	Henderson	0	0	4	9	15	18	43%
Chandler	Henderson	0	0	43	281	573	934	49%
Edom WSC [a]	Henderson	21	24	23	24	26	27	68%
Mining [a]	Henderson	15	16	17	19	47	143	44%
Steam Electric Power [a]	Henderson	2,061	2,061	2,061	2,061	2,061	2,061	48%
Livestock [a]	Henderson	0	0	0	0	321	490	13%
Livestock	Houston	0	0	0	59	285	285	12%
TDCJ Eastham Unit	Houston	113	111	111	111	111	111	10%
Manufacturing	Jasper	455	2,589	4,802	7,097	9,476	11,943	17%
Beaumont	Jefferson	8,613	9,118	9,768	9,793	9,648	9,374	31%
Manufacturing	Jefferson	4,884	35,743	70,460	104,993	139,512	174,012	50%
Trinity Bay Conservation District [a]	Jefferson	0	0	0	0	1	3	9%
D & M WSC	Nacogdoches	0	30	62	115	167	218	17%
Jacobs WSC	Rusk	0	0	0	0	26	58	14%
Livestock	Sabine	0	0	0	97	96	96	14%
Manufacturing	Shelby	841	934	1,053	1,148	1,239	1,325	59%
Liberty Utilities Silverleaf Water [a]	Smith	0	0	0	0	10	22	8%
Southern Utilities [a]	Smith	0	0	0	0	0	178	1%
County-Other [a]	Smith	273	143	33	0	0	0	0%
Manufacturing [a]	Smith	0	0	36	132	490	558	16%
Mining	Smith	314	333	353	374	397	421	79%
Irrigation [a]	Trinity	215	215	215	215	215	215	39%
Manufacturing	Tyler	78	82	87	92	97	102	72%
Total		**22,821**	**56,630**	**94,666**	**132,481**	**171,009**	**209,143**	-

Note:

(a) County is split across more than one regional water planning area. The values shown only reflect the needs identified in the ETRWPA portion of these counties.

Values subjected to change until the end of the planning cycle.

(b) The values presented here show the needs as a percentage of the WUG's total projected 2080 demand. A higher percentage suggests a greater portion of unmet needs.

4.3.1 Identified Needs for Municipal

A total of 12 municipal water user groups are shown to have a water need at some point during the planning horizon. Among the WUGs with needs, the cities of Beaumont and Chandler, Alto Rural WSC, and D & M WSC are projected to have the largest needs by volume. The needs for Beaumont, Chandler, and Alto Rural WSC represent as much as 32%, 49%, and 45% of their projected demands over the planning horizon, respectively. Needs for D & M WSC represent up to 17% of their projected demand by 2080. Municipal water needs over 100 ac-ft per year are also identified for TDCJ Eastham Unit, Southern Utilities, and Smith County-Other. All other municipal WUGS that show water shortages are below 100 ac-ft per year.

4.3.2 Identified Needs for Manufacturing

Manufacturing water needs in are projected to comprise around 40 percent of the region's First-Tier water needs in 2030 and 91 percent of the region's First-Tier water needs by 2080. Identified needs range from around 8,400 ac-ft per year in 2030 to over 190,000 ac-ft per year in 2080, as shown in

Table 4.2. The majority of the manufacturing need in the region is in Jefferson County, ranging from approximately 5,000 ac-ft in 2030 to approximately 174,000 ac-ft in 2080. The projected increase in needs is associated with potential future industrial facilities in Jefferson County that do not currently have contracts or infrastructure in place for water supply. Water needs are also shown for manufacturing entities in Angelina, Jasper, Shelby, Smith, and Tyler counties due to increasing demands that are projected to exceed existing supplies.

4.3.3 Identified Needs for Mining

Mining water needs ranging from 370 to 530 ac-ft per year are identified in Angelina County from 2030 to 2080, representing approximately 50 to 60% of its projected demand.[1] Additionally, mining needs are projected in two other counties (Henderson and Smith). Most of these mining needs are projected to increase over time. Mining needs are largely due to growth of demands beyond historical use and lack of remaining available groundwater supply (i.e., Modeled Available Groundwater) in their respective counties.

4.3.4 Identified Needs for Livestock

Livestock water needs are projected to occur by 2060, when Houston and Sabine counties are identified to have needs. By 2070, livestock in Henderson County is projected to have a need. The total projected livestock water needs for Henderson, Houston, and Sabine counties range from nearly 160 ac-ft per year to approximately 870 ac-ft per year, representing at most 15% of their respective projected demands through 2080.

4.3.5 Identified Needs for Steam Electric Power

Steam electric power water needs are identified in Anderson and Orange counties, with needs exceeding 2,000 ac-ft per year in each county. Steam electric power water supply needs in these counties are due

[1] Ongoing investigation is being conducted to evaluate the existing supply for the mining demand in Angelina County as part of the regional water planning effort, and it is expected the needs shown in this section will reduce.

to new, proposed facilities that do not yet have existing water supply sources.

4.3.6 Identified Needs for Irrigation

Trinity County is the only county in the ETRWPA with an identified need for irrigation. The projected irrigation water needs for Trinity County are estimated to be around 200 ac-ft, representing no more than 40% of their respective prospective demand over the planning horizon (2030-2080). Irrigation needs are primarily due to limited groundwater availability.

4.4 FIRST-TIER WATER NEEDS BY MAJOR WATER PROVIDER

The comparison of First-Tier water needs for each MWP is presented in Appendix 4-A. Five MWPs were identified with projected needs in the ETRWPA over the planning cycle, while the rest of the MWPs have either no needs or a surplus of water above their demands. The MWPs with needs within the region are shown in Table 4.6 and discussed below. MWPs with surpluses within the region are shown in Table 4.7. The table values were determined by comparing existing supplies to customer contracts and/or projected demands.

In addition to these providers, several MWPs are planning WMSs to increase the reliability of their supplies and to meet the needs of potential future customers. These providers and the recommended strategies are discussed in Chapter 5B.

Table 4.6 Major Water Providers with Projected Regional Needs (ac-ft/yr)

Water Provider	2030	2040	2050	2060	2070	2080
Angelina & Neches River Authority [a, b]	1	(45,318)	(45,318)	(45,318)	(75,479)	(75,399)
Athens Municipal Water Authority	757	164	(890)	(1,972)	(3,342)	(4,145)
Beaumont	(9,508)	(10,221)	(11,096)	(11,336)	(11,388)	(11,289)
Center [c]	(1,139)	(1,261)	(1,380)	(1,475)	(1,566)	(1,652)
Upper Neches River Municipal Water Authority [b]	(33,137)	(35,184)	(37,232)	(39,234)	(41,239)	(43,259)

Notes:

(a) Includes the potential demand of Region C contracted customers.

(b) The needs shown represent projected contractual needs for these MWPs.

(c) The City of Center noted that their demand projection is likely overestimated, and they have sufficient supply to meet the anticipated demand.

Values subjected to change until the end of the planning cycle.

Table 4.7 Major Water Providers with Projected Regional Surpluses or No Water Supply Needs (ac-ft/yr)

Water Provider	2030	2040	2050	2060	2070	2080
Angelina-Nacogdoches WCID No. 1	8,422	7,705	6,967	6,205	5,419	4,605
Carthage	1,854	1,840	1,832	1,826	1,817	1,806
Jacksonville	2,221	2,112	2,067	2,035	2,005	1,980
Lufkin	7,028	6,928	6,856	6,768	6,680	6,590
Nacogdoches	9,797	9,128	8,453	7,668	6,881	6,089
Port Arthur	0	0	0	0	0	0
Tyler	26,955	22,574	17,598	14,759	11,767	8,615
Houston Co. WCID 1	322	333	366	349	346	350
Lower Neches Valley Authority	762,924	728,706	728,711	728,756	728,801	728,844
Panola Co. FWSD 1	5,980	5,196	4,662	3,628	2,844	2,060
Sabine River Authority of Texas (ETRPWA Portion)	938,420	938,103	937,750	937,469	937,152	936,835

Notes: Values subjected to change until the end of the planning cycle

4.1.1 Angelina and Neches River Authority (ANRA)

ANRA has contractual demands for water from Lake Columbia that are estimated to begin by 2040 assuming Lake Columbia is completed by 2040. ANRA is projected to have a water supply need of approximately 45,300 ac-ft per year from 2040 to 2060 based on the contractual demands from Region I entities for Lake Columbia. In 2070, potential future contractual demands outside of Region I for Lake Columbia are projected to increase the water supply need to approximately 75,400 ac-ft per year. ANRA has limited currently available water supply to meet these contractual demands. The potential water management strategy to meet these needs is the construction of Lake Columbia.

4.4.1 Athens Municipal Water Authority (AMWA)

The maximum projected need for AMWA is 4,145 ac-ft per year in Year 2080. Most of this need is associated with operational constraints of Athens MWA's existing infrastructure, paired with increasing demand growth projected for the City of Athens and existing contractual demand for the Athens Fish Hatchery. Several water management strategies are being considered for AMWA to meet this need, including municipal conservation, reuse of return flows into Lake Athens from the Athens Fish Hatchery, upgrading their water treatment plant infrastructure, and developing groundwater supplies from the Carrizo-Wilcox aquifer.

4.4.2 Beaumont

The City of Beaumont is projected to have a water supply need of approximately 9,500 ac-ft per year by 2030, which grows to over 11,300 ac-ft per year by 2070. These needs are a result of limitations of Beaumont's current water supply infrastructure, such as capacities of their canals, surface water treatment plant, and groundwater well field, as well as their existing base contract with LNVA. To address these needs, several water management strategies and projects are considered for Beaumont, such as municipal conservation, improvements to their groundwater well field, amending their existing contract with LNVA, and expanding their conveyance canals and water treatment plant capacities.

4.4.3 Center

The City of Center is projected to have a water supply need of 1,139 ac-ft per year by 2030 and 1,652 ac-ft per year by 2080. Center noted that their demand projection is likely overestimated, and they have sufficient supply to meet the anticipated demand. Center is considering municipal conservation, a reuse pipeline to an industrial customer, and a pipeline from Toledo Bend Reservoir to diversify its supply portfolio.

4.4.4 Upper Neches River Municipal Water Authority (UNRMWA)

The UNRMWA has current contractual demands that exceed the reliable supply from its Lake Palestine system. The long-term strategy to meet these contractual demands and other potential future demands is to develop additional supplies in the Neches River Basin.

4.5 SECOND-TIER WATER NEEDS ANALYSIS

The Second-Tier water needs analysis compares the currents and projects supplies and demands after reductions from conservation and direct reuse. Conservation and direct reuse are both characterized as water management strategies (WMS), which will be further discussed in Chapter 5B and Chapter 5C. Appendix ES-A, Report 06 contains listings of the Second-Tier water needs by water user group and Major Water Provider. A summary of Second-Tier water needs for each MWP is also presented in Appendix 4-A.

Figure 4.4 illustrates the reduction of water needs for WUGs within the region after applying conservation and direct reuse strategies. Conservation was applied to all municipal WUGs, whether there was a need or not, therefore, needs were only reduced if an entity had a need. Overall, conservation decreased the total WUG needs within the region by over 2,100 ac-ft per year (~9.3 percent) in 2030 and nearly 7,700 ac-ft per year (~3.7 percent) by 2080. A large portion of this reduction is attributed to the water loss mitigation strategies.

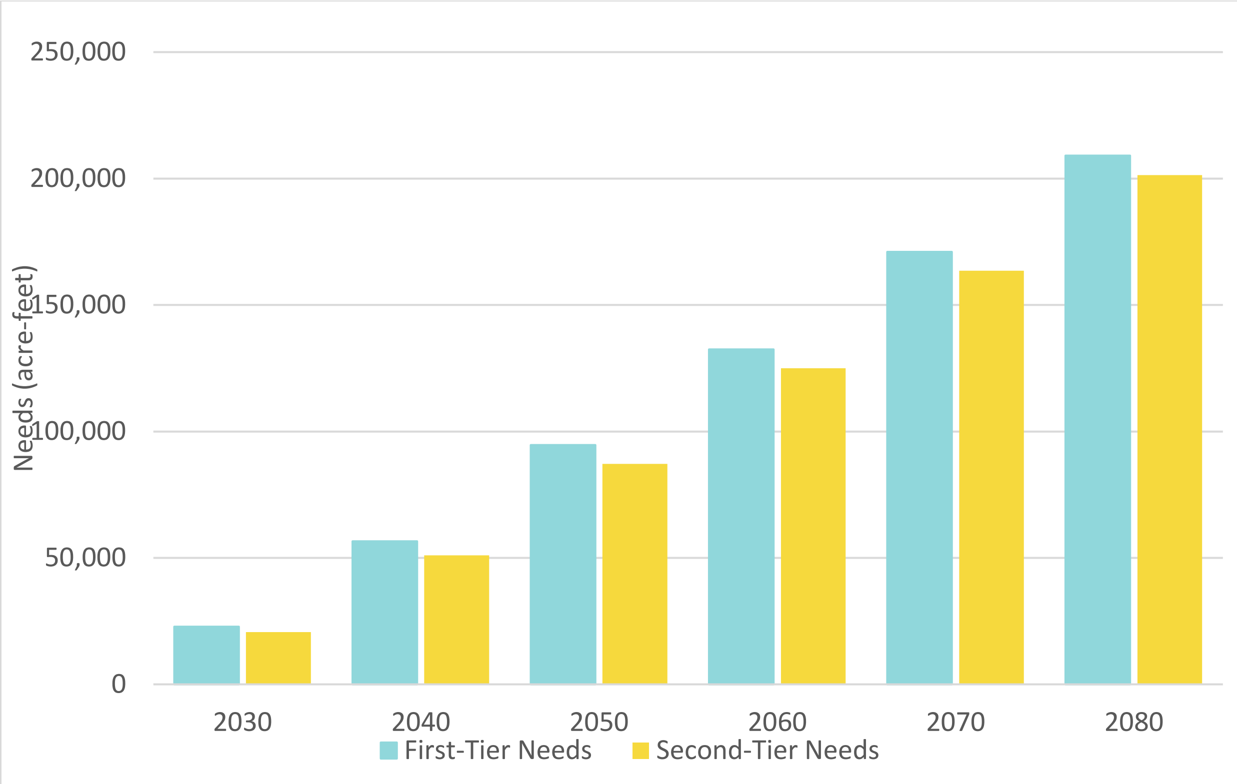


Figure 4.4 Regional Secondary Needs Comparison

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Chapter 5A: Identification of Potentially Feasible Water Management Strategies

Prepared for:

East Texas Regional Water Planning Group

February 2025

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Appendix 5A-A: Screening Criteria for Potentially Feasible Water Management Strategies

Appendix 5A-B: Potentially Feasible Water Management Strategies

LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AFY	acre-feet
BMPs	best management practices
cfs	cubic feet per second
CWA	Clean Water Act
ETRWPA	East Texas Regional Water Planning Area
ETRWPG	East Texas Regional Water Planning Group
ft	foot
ft/yr	foot per year
GPCPD	gallons per connection per day
GCDs	Groundwater Conservation Districts
GMAs	groundwater management areas
GPCD	gallons per capita daily
LNG	liquefied natural gas
MSA	Metropolitan Statistical Areas
MUD	Municipal Utility District
MWA	Municipal Water Authority
MWP	Major Water Provider
NRCS	National Resources Conservation Service
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SRA	Sabine River Authority
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TCF	trillion cubic feet
TPWD	Texas Parks and Wildlife Department
TTWP	Trans-Texas Water Program
TWDB	the Texas Water Development Board
USA	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMSs	Water Management Strategies
WUG	Water User Group
WWP	Wholesale Water Provider

5A IDENTIFICATION OF POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES

This chapter reviews the types of water management strategies (WMS) considered for the East Texas Regional Water Planning Area (ETRWPA) and the approach for identifying potentially feasible water management strategies for Water User Groups (WUGs) and Major Water Providers (MWPs) with a water need, as identified in Chapter 4. In addition, evaluation criteria are considered, and the viability of each WMS type is assessed. Once a list of potentially feasible strategies has been identified, the most feasible strategies are recommended for implementation. An alternative strategy may also be identified as potentially feasible in the event a recommended strategy becomes infeasible.

The recommended and alternative water management strategies identified for individual WUGs and MWPs are presented in Chapter 5B. Chapter 5C discusses the conservation strategies and the application of each strategy to meet ETRWPA needs. WMSs to meet potential future demands that are not presently approved by the Texas Water Development Board (TWDB) are not included in this chapter.

Identification of a supply source for a potentially feasible strategy depends on the availability of the source, the accessibility of the source to the WUG or MWP developing the WMS, and the feasibility of developing a strategy from the source of supply. It should be noted that there can be potentially feasible strategies that are not identified as recommended or alternative WMS for an entity.

The types of WMSs considered in this chapter include water conservation, wastewater reuse, expanded use of existing supplies, new supply development, and drought management. A comprehensive list of the potentially feasible strategy types identified is included below:

- Water conservation
  - Water use reduction
  - Water loss control
- Drought Management
  - Demand management
- Wastewater reuse
- Management of existing supplies
  - Conjunctive use of groundwater and surface water
  - Acquisition of available existing supplies
  - Development of regional water supply or regional management of water supply facilities
  - Voluntary transfer/redistribution of water resources (regional water banks, sales, leases, options, subordination agreements, and financing agreements)
  - Interbasin transfers
  - Emergency transfer of water under Texas Administrative Code §11.139
  - System optimization, reallocation of reservoir storage to new uses, contracts, water marketing, enhancement of yield, improvement of water quality
- New supply development
  - Surface water resources

- Groundwater resources
- Brush control; precipitation enhancement
- Rainwater harvesting
- Desalination of marine seawater or brackish groundwater
- Aquifer storage and recovery
- Cancellation of water rights

Drought management measures provide a safety factor for water users during drought, but are generally not a reliable, firm source of additional supplies to meet growing demands. Drought measure efficacy varies across utilities and even across drought events and it is difficult to depend upon them for meeting demands on a firm basis. For this reason, the East Texas Regional Water Planning Group (ETRWPG) does not recommend using drought management measures as potentially feasible WMSs for regional water planning. However, the ETRWPG views drought management measures as a vital factor of safety for a drought worse than the drought of record. Chapter 7 includes an analysis and summary of drought response data, activities, and drought management recommendations in the ETRWPA.

Desalination (marine seawater or brackish groundwater) and aquifer storage and recovery (ASR) were considered WMSs by the ETRWP on a case-by-case basis. For the 2026 ETRWP, no Major Water Providers (MWPs), Water User Groups (WUGs), or other entities in Region I are planning on sponsoring desalination or ASR as a recommended or alternative strategy. In future planning cycles, if any Region I entities would like to include a desalination or ASR project in the East Texas Regional Water Plan (ETRWP), the ETRWPG will evaluate these project(s) in accordance with the categories identified in Texas Administrative Code Title 31 Chapter 357.34.

While several strategy types were considered by the ETRWPA, not all were determined as viable options for addressing water needs in the region. The subcategories within each strategy type that were determined as potentially feasible strategies for entities within the ETRWPA for this round of regional water planning include: 1) water conservation 2) wastewater reuse 3) expanded use of existing supplies (e.g., voluntary redistributions, regional water supply facilities, interbasin transfers), and 4) new supply development (new groundwater and surface water supply development). More detailed information regarding the process for screening potentially feasible water management strategies in the ETRPWA is included in Appendix 5A-A.

The sections below include a detailed discussion of each one of these four main strategy types, their subtypes, and consideration of the potential feasibility of these strategies to WUGs and MWPs in the ETRWPA.

5A.1 WATER CONSERVATION

Water conservation is defined as methods and practices that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses. Water conservation is typically viewed as long-term changes in water use that are incorporated into daily activities.

Water conservation is a valued water management strategy in the ETRPWA because it helps extend the timeline for the need for additional water management strategies in the region. A new requirement from the 2026 RWP distinguishes water conservation into two separate categories: water use reduction and water loss mitigation. Water use reduction is recommended only for municipal WUGs with baseline GPCDs above their associated thresholds based on their population group. On the other hand, water loss mitigation is recommended for all municipal WUGs, as it is considered a best management practice by the ETRWPG. Although the ETRWPG does not prescribe specific conservation measures for non-municipal WUGs, it strongly recommends that these WUGs implement water conservation measures. Doing so can contribute to the sustainability of water resources and ensure long-term availability, especially as water scarcity becomes more severe.

5A.2 WASTEWATER REUSE

Wastewater reuse utilizes effluent from a wastewater treatment facility as either a supplement for potable water supply or for non-potable uses, such as irrigation, landscaping, or industrial use. Water reuse can be conducted directly from a wastewater treatment facility (direct reuse) or indirectly through discharge to a water supply resource (rivers, lakes) that is later extracted for further use (indirect reuse).

Water reuse is most feasible for larger municipal water users or industrial users that have access to a source of municipal effluent. In the ETRWPA, small quantities of wastewater are currently being reused where it is economically viable. The ETRWPG identified only a few additional reuse opportunities within the region because the generators of the wastewater effluent were not generally interested in developing this type of project due to the lack of need or higher cost compared to other alternatives.

Currently, there are two potentially feasible wastewater reuse strategies identified in the ETRWPA for the 2026 Plan: (1) a transmission system transferring the City of Center's wastewater return flows from their wastewater treatment plant to an industrial customer; (2) Athens Municipal Water Authority (AMWA) reusing water returned from the Texas Parks and Wildlife (TPWD) Texas Freshwater Fisheries Center (TFFC) to Lake Athens.

AMWA's water right permit allows the City of Athens to convey and discharge wastewater effluent into Lake Athens. The City and the AMWA have decided not to pursue this strategy at this time due to the cost. However, AMWA is pursuing entering into a contract with the TFFC to return water that is passed through its facility back to Lake Athens. Currently, the TFFC fish hatchery returns this water as part of its operations, but it is under no contractual obligation to do so. For the purposes of regional water planning, water returned to Lake Athens from the TFFC fish hatchery is not considered an existing supply, so it is considered as a potentially feasible strategy.

5A.3 MANAGEMENT OF EXISTING SUPPLIES

As a water-rich region, the water needs experienced by WUGs and MWPs within the ETRWPA can often be addressed by the management of existing sources of supplies (both groundwater and surface water), adding or updating infrastructure to access an existing source of supply, and through voluntary transfers of existing supplies. As a result, many of the potentially feasible strategies for the ETRWPA are associated with the management of existing supplies. The introduction to this chapter includes a comprehensive list of subcategories identified within the management of existing supplies strategy type. However, not all subcategories were deemed viable as potentially feasible strategy types for the 2026 ETRWP. The primary subcategories within this strategy type determined to have potentially feasible strategies for entities within the ETRWPA for this round of planning are: 1) voluntary redistribution (transfer), 2) regional water supply facilities and management of facilities; and 3) interbasin transfers. Subsections 5A.3.1 – 5A.3.3 include a detailed discussion on each one of the subcategories.

5A.3.1 Voluntary Redistribution

For purposes of this Plan, "voluntary redistribution" is defined as an entity in possession of water rights or water purchase contracts freely selling, leasing, giving, or otherwise providing water to another entity. Typically, the entity providing the water has determined it does not need the water to meet its own demand for the duration of the transfer. The transfer of water could be for a set period of years or a permanent transfer. Voluntary transfer is essentially a purchase of water.

Voluntary redistribution have many benefits over other supply options, like new supply development, because it can be easier than implementing a new water supply project and it avoids implementation issues of large projects like reservoirs that can have substantial environmental and local impacts. Most importantly, the redistribution of water makes use of existing resources and provides a more immediate source of water.

Entities were identified that have the potential to meet demands through voluntary redistribution, either by having available supplies or currently providing needs through voluntary transfers and having the ability to obtain new supplies. It should be noted the ETRWPA region is a relatively water rich region. The water needs for the WUGs and MWPs in the region primarily exist due to infrastructure limitations or due to lack of water supply availability for the WUG with the need. There are other MWPs and WUGs in the region with excess supplies that can be used to address the water needs in the region. Due to this, voluntary redistribution of water is an important strategy type used for identifying WMSs for the ETRWPA. It is important to remember that transfer of water is voluntary. No group or individual is required to participate. Therefore, voluntary redistribution strategies should be identified where the supply transfer would not place a burden on the water provider (seller).

Table 5A.1 includes a list of entities considered as potential suppliers of voluntary redistribution(s) as a strategy and the estimated existing amount of supply they have available to distribute to other entities. This does not consider potential supplies from future water management strategies that could be voluntarily redistributed. The amounts shown represent the minimum amount of supply available during the planning period for voluntary redistribution after all other obligations from existing customer contracts and/or demands are met. Water providers may wish to keep a safety factor of supply above their projected needs and may be able to provide less than what is shown in Table 5A.1. Additionally, this table includes a list of WUGs and MWPs that are identified to receive water through these voluntary redistributions. Most of these WUGs and MWPs identified as recipients of voluntary redistributions are identified to have water supply needs across the planning period. There are other potential suppliers in the ETRWPA with surplus existing supplies that could be considered for voluntary redistributions, but those suppliers are generally located further from where water needs were identified in the region.

Table 5A.1 Entities with Voluntary Redistribution Identified as a Water Management Strategy

Water Provider (Supply Source)	Water Provider Existing Supply Available for Voluntary Transfer [a] (ac-ft/yr)	Entities Receiving Water from Provider (County)
City of Lufkin (Lake Kurth, Carrizo-Wilcox Groundwater)	23,612	Manufacturing (Angelina)
Lower Neches Valley Authority (Sam Rayburn/B.A. Steinhagen Reservoir System, Neches Run-of-River)	756,884	Manufacturing (Jasper)
		Manufacturing (Jefferson)
		Beaumont (Jefferson)
		Trinity Bay Conservation District (Jefferson)
Sabine River Authority of Texas (Toledo Bend Reservoir, Sabine Run-of-River)	889,745	Lower Neches Valley Authority
City of Tyler (Lake Tyler, Lake Palestine)	8,615	Chandler (Henderson)
		Southern Utilities (Henderson)
		County-Other (Smith)
		Manufacturing (Smith)
		Mining (Smith)

(a) Estimated existing supply available over the planning period (2030 to 2080) after accounting for existing contracts and/or demands from customers.

An issue facing a voluntary transfer is proper compensation for the entity or individual that owns the water right or contract for water. If an entity has arranged through contracts to have more water than they currently need or may need in the study period, they should be compensated for the expense and upkeep of any facilities already in place. The following issues should be considered when negotiating a voluntary transfer agreement:

- Quantity of water to be transferred;
- Location of excess water supply;
- Location of buyer with water need;
- Necessary water treatment and distribution facilities;
- Determination of fair market value;
- Consideration of how existing contracts will affect the sale or lease;
- Length of agreement;
- Expiration dates of agreement;
- Drought contingencies;

- Protections needed by entity providing water;
- Protections needed by entity needing water;
- Enforcement of protections, and
- Other conditions specific to buyer and seller.

5A.3.2 Regional Water Supply Facilities

The ETRWPA contains several Major Water Providers (MWPs) that manage regional water supply facilities to serve their customers. Many of these MWPs have existing water supply sources (e.g., reservoirs, run-of-river, groundwater) that they own and have permits to use, but need to develop either new or additional regional facilities to tap into these sources. In addition, due to the ETRWPA being a water rich region, there may also be opportunities for one or more entities to develop regional water facilities to utilize existing supply sources that have not yet been fully developed. Given these considerations, development and management of regional water supply facilities is identified as a viable, potentially feasible water management strategy in the ETRWA.

For this strategy type, potentially feasible water supply options were primarily identified based on information provided by specific sponsors. For example, several sponsors identified new regional facilities (e.g., water treatment plants, pump stations, distribution systems, etc.) that they plan to develop during the planning period. Table 5A.2 includes a list of entities and the associated regional facility strategies/projects identified in the ETRWPA.

Table 5A.2 Regional Water Supply Facilities Identified as a Water Management Strategy

Sponsor	Regional Water Supply Facility Strategy/Project
Athens MWA	Water Treatment Plant Booster Pump Station Expansion
Angelina Neches River Authority	Lake Columbia Treatment and Distribution System
Beaumont	New Westside Surface Water Treatment Plant
Lower Neches Valley Authority	Devers Pump Station Relocation (Region H)
	Neches Pump Station Upgrades and Fuel Diversification
Lufkin	Facilities to Transfer from Sam Rayburn to Lake Kurth
Tyler	Lake Palestine Infrastructure Expansion
Nacogdoches County	Lake Naconiche Regional Water Supply System

5A.3.3 Interbasin Transfer

The ETRWPA spans three major river basins: the Neches, Trinity, and Sabine. In each river basin in the ETRWPA, particularly the Sabine and Neches, there are several major supply reservoirs and run-of-river diversions with supplies that have not yet been fully utilized. Interbasin transfers may be a potentially feasible water management strategy for water suppliers with sufficient water supplies to transfer outside of their basin and users in other basins that have water supply needs.

An interbasin transfer requires a permit through the Texas Commission on Environmental Quality (TCEQ). Recommended water management strategies that involve an IBT are administered under Section 11.085

of the Texas Water Code, which includes several requirements to obtain necessary permits such as:

- Providing the cost of water, category of use and proposed users, and cost of diverting, conveying, distributing, supplying, and treating the water for proposed users.
- Conducting required public meetings in the basin of origin and the receiving basin.
- Providing notice of an application to permit holders, county judges, city mayors, and groundwater conservation districts in the basin of origin, and state legislators in both basins.
- Publishing notice of application in newspapers of general circulation in each county in both basins.
- Consideration of comments received through the permit application's public process.

In granting the permit, consideration will be given to:

- The need for water in the basin of origin and receiving basin.
- The availability of alternative water supplies to the receiving basin.
- The purpose of use for the water in the receiving basin.
- Proposed methods for avoiding waste and implementing water conservation and drought contingency measures.
- Proposed methods to put transferred water to beneficial use.
- The projected economic impacts.
- Impacts to existing water rights, instream uses, water quality, aquatic and riparian habitat, and bays and estuaries.
- The proposed mitigation to the basin of origin.
- The continued need to use the water for purposes under the existing water right, if an amendment to an existing water right is sought.

Finally, the commission may grant the application only to the extent that:

- The detriments to the basin of origin are less than the benefits to the receiving basin.
- The applicant has prepared a drought contingency plan and has developed and implemented a water conservation plan that will result in the highest practicable level of conservation and efficiency.

Additional environmental permitting may also be required for the development of infrastructure, including but not limited to:

- U.S. Army Corps of Engineers Section 404 Permit and mitigation plan.
- National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS).
- Cultural Resources Survey and National Register of Historic Places (NRHP) testing.
- Ancillary studies as directed by the Texas Parks and Wildlife (TPWD) and U.S. Fish and Wildlife Service (USFWS).

Table 5A.3 summarizes the interbasin transfer of surface water strategies sponsored by entities in the ETRWPA that are identified as potentially feasible. Some of these strategies involve development of new surface water supplies, which are described in Section 5A.4.2.

Table 5A.3 Interbasin Transfers Identified as a Water Management Strategy

Sponsor	Strategy	Originating Basin	Receiving Basin
Angelina Neches River Authority	Lake Columbia	Neches	Sabine, (Potentially Trinity)[a]
Lower Neches Valley Authority	Neches-Trinity Interconnect	Neches	Trinity
	Purchase from SRA	Sabine	Neches
Upper Neches River Municipal Water Authority	Neches Run-of-River with Lake Palestine	Neches	Trinity

(a) New London is a contracted customer of Lake Columbia, who is located in the Sabine Basin. A few WUGs in Trinity Basin in Region C are potential customers.

As illustrated in Chapter 3 and 4, several Major Water Providers in the ETRWPA have substantial surpluses of water supply. Other water planning regions have identified interbasin transfer of surface water supplies originating from sources in the ETRWPA as potentially feasible water management strategies. These strategies would be sponsored by entities outside of the ETRWPA and these sponsors would need to enter into an agreement with the MWPs in the ETRWPA that own the right to the originating source. Since these are not strategies sponsored by entities in the ETRPWA, they are not identified or evaluated as strategies in the 2026 ETRWP. Discussion of these water management strategies can be found in the respective regional water plans where the receiving sponsor entity is located.

5A.4 NEW SUPPLY DEVELOPMENT

Development of new water supplies is a viable water management strategy in the ETRWPA for entities looking to expand an existing source (e.g., groundwater) to meet their water supply needs, or entities planning to increase the quantity of their reliable supplies to meet future demands and/or serve as a buffer against uncertainty. New supply development can include sources of supply developed historically in the ETRWPA, such as surface water or groundwater, or alternative methods that have been implemented in other areas of the state but have not yet been developed in the ETRWPA like aquifer storage and recovery (ASR) or desalination (marine or brackish groundwater). Several new groundwater and surface water development strategies are identified as potentially feasible in the ETRWPA. ASR and desalination strategies would likely be large-scale projects that could serve local or regional entities. The ETRWPG will consider these strategies on a case-by-case basis as sponsors indicate plans for development. During this round of regional water planning, no entities in the ETRWPA indicated they were planning to develop either ASR or desalination strategies, so none were identified in the 2026 ETRWPG.

5A.4.1 Groundwater Development

Groundwater is a viable and cost-effective supply source for the ETRWPA. The majority of WUGs in the ETRPWA with an identified need during the planning period are expected to continue using groundwater as the source of their water supplies. The supplies established in Chapter 3 were used to evaluate the ability to meet demands for the ETRWPA.

Under the Joint Planning effort for groundwater, the Groundwater Conservation Districts (GCDs) determine the appropriate protective level through the adoption of the Desired Future Conditions (DFCs). The desired future conditions are incorporated into regional planning through the Modeled Available

Groundwater (MAG) values. In the ETRWPA, counties that are projected to be near the limit of the Modeled Available Groundwater estimates for major and/or minor aquifers are Henderson, Panola, Rusk, San Augustine, Shelby, and Smith counties. There are no recommended strategies that involve quantities that exceed the Modeled Available Groundwater values, thus providing the necessary environmental and water supply protections desired by the GCDs. Table 5A.4 below includes a region-wide summary of undeveloped groundwater supplies by aquifer that can be utilized for potential WMSs.

Table 5A.4 Summary of Undeveloped Groundwater Supplies in the East Texas Regional Water Planning Area

Source of Supply	2030	2080
Groundwater Supplies		
Carrizo Wilcox Aquifer	46,158	44,267
Gulf Coast Aquifer	139,834	140,023
Queen City Aquifer	56,971	57,187
Yegua-Jackson Aquifer	24,609	24,729
Other Aquifer	2,133	2,139
Sparta Aquifer	911	1,021

Development of additional groundwater supply was identified as a potentially feasible strategy for several WUGs with identified needs. Additionally, during outreach efforts by the ETRWPG and consultant team, some WUGs without identified needs (B C Y WSC, China, Gaston WSC, Orange County WCID 1, South Jasper County WSC) indicated that they plan to expand their groundwater supply in the future. Development of groundwater was also considered as a potentially feasible strategy for these WUGs. A summary of entities where development of additional groundwater is identified as a potentially feasible water management strategy is presented by aquifer and county in Table 5A.4.

Table 5A.5 Entities with Groundwater Development Identified as a Water Management Strategy

<table>
<tr><th>County</th><th>Carrizo Wilcox Aquifer</th><th>Gulf Coast Aquifer</th><th>Queen City Aquifer</th><th>Yegua Jackson Aquifer</th></tr>
<tr><td rowspan="2">Anderson</td><td>B C Y WSC</td><td rowspan="3">None</td><td rowspan="6">None</td><td rowspan="17">None</td></tr>
<tr><td>Steam Electric Power</td></tr>
<tr><td>Cherokee</td><td>Alto Rural WSC</td></tr>
<tr><td>Hardin</td><td>None</td><td>Beaumont</td></tr>
<tr><td rowspan="3">Henderson</td><td>Athens MWA</td><td rowspan="6">None</td></tr>
<tr><td>Chandler</td></tr>
<tr><td>None</td><td>Mining</td></tr>
<tr><td rowspan="3">Houston</td><td>Houston County WCID #1</td><td rowspan="13">None</td></tr>
<tr><td>Livestock</td></tr>
<tr><td>TDCJ Eastham Unit</td></tr>
<tr><td>Jasper</td><td>None</td><td>South Jasper WSC</td></tr>
<tr><td>Jefferson</td><td>None</td><td>China</td></tr>
<tr><td>Nacogdoches</td><td>D&M WSC</td><td>None</td></tr>
<tr><td>Orange</td><td>None</td><td>Orange County WCID 1</td></tr>
<tr><td>Panola</td><td>Elysian Fields WSC</td><td rowspan="5">None</td></tr>
<tr><td rowspan="2">Rusk</td><td>Gaston WSC</td></tr>
<tr><td>Jacobs WSC</td></tr>
<tr><td>Sabine</td><td rowspan="3">None</td><td>Livestock</td></tr>
<tr><td>Trinity</td><td>Irrigation</td></tr>
<tr><td>Tyler</td><td>Manufacturing</td><td>None</td></tr>
</table>

5A.4.2 Surface Water Development

Surface water comprises most of the existing water supply in the ETRWPA. Surface water supply sources include reservoirs and river diversions, known as run-of-river supplies. Overall, there are 13 water supply reservoirs in the Neches River Basin, six water supply reservoirs in the Sabine River Basin, one water supply reservoir in the Trinity River Basin, and numerous run-of-river diversions. Development of new surface water supplies through new reservoirs or surface water system optimization is identified to be a viable option in the ETRWPA to meet projected future demands.

5A.4.2.1 New Reservoirs

Water suppliers in the ETRWPA have performed numerous studies on locations of reservoir sites. The ETRWPA possesses many features attractive to reservoir construction. The process of implementing a new reservoir is a multi-decade task of identifying, evaluating, and resolving environmental impacts associated with the reservoir as well as evaluating the economic feasibility of the project. These studies are beyond the scope of regional water planning. The process of implementation can go beyond the 50-year planning cycle in the current water planning process. The consideration of reservoir projects in the ETRWPA is based on information provided by MWPs located in the ETRWPA and demonstrates their ability and willingness to serve needs in the 50-year planning cycle. For proposed reservoirs, justification and environmental impact analyses are the responsibility of the sponsoring water provider. Information available through other studies was used to evaluate these projects for the region.

The ETRWPA has a long history of water supply planning by means of reservoir development. Numerous sites have been identified as being hydrologically and topographically ideal for reservoir development. For a site to be considered for reservoir development, it needs to be recommended by the planning group as a unique reservoir site. Two sites in the ETRWPA are currently designated as unique reservoir sites: Lake Columbia and Lake Fastrill. Lake Fastrill was designated by the 79th Legislature through 2007 Texas Legislature Senate Bill 3. Lake Columbia received its unique designation by the State Legislature, Senate Bill 1362. Lake Columbia is currently being pursued for development. The ETRWPG recommends both Lake Columbia and Lake Fastrill retain their status as unique reservoir sites. Chapter 8 provides an additional discussion of unique reservoir sites.

Several reservoir sites in the ETRWPA have long been discussed as potential sources of water. The ETRWPG recognizes reservoirs can have major impacts on the environment and protection of the environment is already afforded through a process that is more thorough than the regional water planning effort. Other sites have been considered for water supply development in the past and may be considered again for future supplies. The potential reservoirs initially considered for water supply are presented below in Table 5A.6. Chapter 8 features a brief description of each of the potential reservoir sites.

Table 5A.6 Potential Reservoirs for Designation as Unique Reservoir Sites

Sponsor	Reservoir Site
Angelina Neches River Authority	Lake Columbia (Already Unique Site)
Lower Neches Valley Authority	Rockland Reservoir
Sabine River Authority	Big Cow Creek
	Bon Weir
	Carthage Reservoir
	Kilgore Reservoir
	Rabbit Creek
	State Hwy. 322, Stage I
	State Hwy. 322, Stage II
	Stateline
	Socagee
Upper Neches River Municipal Water Authority	Fastrill Reservoir (Already Unique Site)

For this plan, Lake Columbia is identified as the most feasible new reservoir from this list. The Lake Columbia footprint is located predominantly in Cherokee County but extends into the southern portion of Smith County. The reservoir would be formed by the construction of a dam on Mud Creek approximately 2.5 miles downstream of U.S. Highway 79 crossing. The dam is expected to impound water approximately 14 miles upstream with an estimated surface of 10,133 acres. The firm yield for the reservoir site is 75,720 ac-ft with a total storage volume at normal pool elevation of 315 feet, mean sea level (msl) or 195,500 ac-ft. This project is sponsored by Angelina and Neches River Authority.

Needs that would potentially be met by the development of Lake Columbia are provided in Table 5A.7. In addition, Lake Columbia is a recommended strategy for all participants in the project. Some participants intend to replace existing groundwater supplies with water from Lake Columbia. These users may or may not show a need in the 2026 Plan.

Table 5A.7 List of Participants for the Lake Columbia Project

Entities Participating in Lake Columbia Project	Contracted Amount (ac-ft/yr)
Currently Contracted Participants	
Afton Grove WSC, Stryker Lake WSC	3,848
Jacksonville	4,275
New Summerfield	2,565
North Cherokee WSC	4,275
Rusk	4,275
Rusk Rural WSC	855
City of Alto	428
Caro WSC	428
Nacogdoches	8,551
New London	855
Troup	4,275
Arp	428
Blackjack WSC	855
Jackson WSC	855
Whitehouse	8,551
Potential Participants	
Region C	Up to 56,050
TOTAL	75,720

Additionally, the Lower Neches Valley Authority (LNVA) is planning to construct a new 1,100 acre, off-channel reservoir located on the northwest end of Beaumont in Jefferson County. This reservoir is referred to as the West Beaumont Reservoir. The reservoir is anticipated to have an approximate capacity of 7,700 acre-feet, which could supply a minimum of 10 days of storage that could be utilized to serve LNVA's customers in case of flood inundation or loss of power at their pump stations. This reservoir is located so that stored water can be provided to customers across the LNVA system during disaster events, including the cities of Port Arthur, Groves, Nederland, Port Neches, West Jefferson County MUD, Beaumont, and other agricultural and industrial customers throughout Jefferson County. The West Beaumont Reservoir is also considered as a potentially feasible strategy in the ETRWPA.

In comparison to the reservoir sites previously listed that are on-channel impoundments, the West Beaumont Reservoir utilizes off-channel storage and has a smaller footprint. As a result, it is anticipated to have a lesser impact on the environment in comparison to the reservoir sites listed in Table 5A.6. Furthermore, filling the West Beaumont Reservoir will utilize LNVA's existing water right authorizations, which account for existing environmental flow standards.

5A.4.2.2 Other New Surface Water Development

The Upper Neches River Municipal Water Authority (UNRMWA) is identified to have water supply needs relative to the water contracted from the Lake Palestine system. UNRMWA has evaluated multiple potentially feasible water management strategies. UNRMWA was the sponsor of the proposed Lake Fastrill project. With the uncertainties surrounding the Lake Fastrill project, the UNRMWA, in conjunction with the City of Dallas, identified the need for a Lake Fastrill replacement project.

In 2013, UNRMWA and Dallas initiated the Upper Neches River Water Supply Project Feasibility Study (HDR, 2014) to evaluate potential water supply strategies to replace the Lake Fastrill project. These strategies included Neches run-of-river diversions of unappropriated water from the Upper Neches River operated in system with Lake Palestine, tributary storage, and/or operated conjunctively with groundwater. The additional water supply provided by these strategies could be used to supplement existing water supplies available to Dallas and potentially other UNRMWA customers. Compared to the Lake Fastrill project, all run-of-river diversion strategies provide lesser firm yield but avoid environmental impacts and some of the permitting challenges associated with a large, main-stem reservoir on the Neches River. Based on this study, the recommended strategy was the Neches run-of-river diversion operated as a system with Palestine. This was included as a recommended WMS/WMSP for UNRMWA and Dallas in the 2021 regional water plans. The Draft 2024 Dallas Long Range Water Supply Plan (LRWSP; Dallas Water Utilities, 2024) re-evaluated this strategy and again designated the Neches run-of-river diversion operated as a system with Lake Palestine as a recommended strategy. The re-evaluated configuration of this strategy from the Draft 2024 Dallas LRWSP is identified as a potentially feasible strategy for the 2026 ETRWP.

5A.4.3 Aquifer Storage and Recovery (ASR)

Aquifer storage and recovery (ASR) involves storing water in aquifers and retrieving this water when needed. The water to be stored can be introduced through enhanced recharge or more commonly injected through a well into the aquifer. If an injection well is used, Texas law requires that the water not degrade the quality of the receiving aquifer. Source water for ASR can include excess surface water, treated wastewater, or groundwater from another aquifer.

There are several technical considerations to determine the feasibility and applicability of ASR, specifically:

- ASR requires suitable geological conditions for implementation. Since geologic conditions vary by location, studies must be performed to determine what specific locations would be suitable for ASR.
- Raw surface water and wastewater reuse most likely will require pretreatment prior to injection.
- Operation of an ASR system could significantly impact the amount of water that is retrievable.

Recent legislation passed by the 86th Texas Legislature, and signed by the Governor on June 10, 2019, requires the regional water plans to consider ASR and provide a specific assessment of this strategy if the region has significant needs. The definition of significant need is deferred to each region. The ETRWPG defined the threshold for significant needs to be 5,000 acre-feet per year. There are five entities that meet this significant need threshold: the Angelina & Neches River Authority (ANRA), the City of Beaumont, Upper Neches River Municipal Water Authority (UNRMWA), Jasper County Manufacturing, Jefferson County Manufacturing.

Before assessing the multitude of technical considerations required for ASR, Region I developed a set of criteria to screen out the feasibility and applicability of ASR to the entities identified with significant needs. Figure 5A.1 illustrates this screening process.

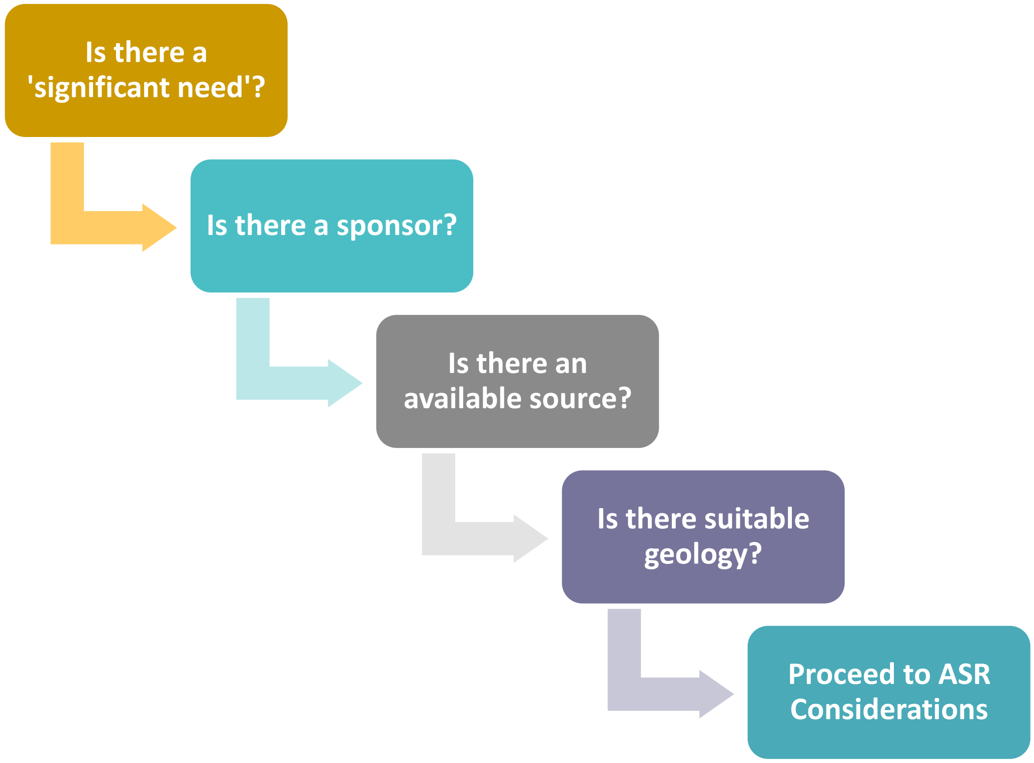

Figure 5A.1 Aquifer Storage and Recovery Screening Criteria

All five entities identified with a significant need in Region I are evaluating and implementing other feasible strategies to meet these needs (see their respective sections in Chapter 5B) and are not planning on sponsoring an ASR strategy to be included in the 2026 ETRWP. As a result, each entity identified with a significant need in Region I did not pass the second criteria assessed in the screening process and ASR was not further evaluated and recommended as a strategy for these entities.

5A.4.4 Potentially Feasible Strategies with Potential Flood Mitigation Benefits

In accordance with TWDB requirements, RWPGs must identify potentially feasible water management strategies, if any, that could potentially provide non-trivial flood mitigation benefits or that could be combined with flood mitigation features to provide both water supply and flood mitigation benefits. The ETRPWG reviewed each potentially feasible water management strategy and project identified in the ETRWPA during this planning cycle and it was determined that none could measurably provide flood mitigation benefits. Furthermore, none of these WMSs would negatively impact flood mitigation efforts.

The Texas Legislature passed Senate Bill 8 in 2019, which created Texas' first statewide regional flood planning program and tasked the TWDB with administering the process. In 2020, the TWDB established 15 regional flood planning areas (RFPAs) that correspond to major river basins across Texas. Similar to regional water planning, each region is served by regional flood planning groups (RFPGs) comprised of appointed members that represent key public interests. The ETRWPA intersects three RFPAs: the Neches (Region 5), Sabine (Region 4), and Trinity (Region 3). As part of the first round of Regional Flood Plans, adopted in March 2024, each RFPG examined whether any of their recommended flood mitigation strategies (FMSs) or flood mitigation projects (FMPs) had the potential to provide a water supply benefit. The ETRWPG reviewed relevant 2024 Regional Flood Plans and found that no FMSs or FMPs were determined to impact and/or measurable benefit to water supply, water availability, or strategies in the

ETRWPA. It is therefore determined that the potential for strategies or projects with a combined water supply and flood mitigation benefit within the ETRWPA is limited.

5A.4.5 Summary of Potentially Feasible Strategies

Potentially feasible water management strategies were identified for Water User Groups and Major Water Providers across the ETRWPA. These strategies include a wide assortment of strategy types, which were carefully reviewed for entities with identified needs. While some strategies were determined not to be potentially feasible at this time, the ETRWPG supports the research and development of new and innovative technologies for water supply. With continued research, new technologies will become more reliable and economical for future users and may be applicable for water suppliers to serve the water needs in the region.

The process for identifying potentially feasible water management strategies was presented at the ETRWPG meeting in Nacogdoches, Texas on February 15, 2024. There were no public comments and ETRPWG approved the methodology. A list of the potentially feasible water management strategies considered for the ETRWPA is included in Appendix 5A-B. The process for strategy development and evaluation is presented in the following sections.

5A.5 SELECTION AND EVALUATION OF WMS

The consideration and selection of water management strategies for water user groups with needs followed TWDB guidelines and were conducted in open meetings with the ETRWPG. Potentially feasible strategies are evaluated in accordance with state guidance. A summary of the process for selection and evaluation of the WMSs is described as follows and is illustrated in Figure 5A.2:

1) Define groupings or common areas with supply deficiencies.
2) Develop a comprehensive list of potentially feasible strategies, per screening process.
3) Contact potential suppliers/WUGs to determine current strategies under consideration.
4) Select one or more strategies as appropriate for each need or group.
5) Contact each entity with a need and confirm the selected strategies are acceptable.
6) Present proposed WMSs to the ETRWPG in a public meeting for discussion, modification, and approval.
7) Document and evaluate proposed WMSs. This evaluation includes quantitative rating-based categories including quantity, reliability, cost, environmental factors, impacts on other water resources, impacts on agricultural and natural resources, third party social and economic impacts of moving water from rural/agricultural areas, sponsorship, and political acceptability for the various strategies.

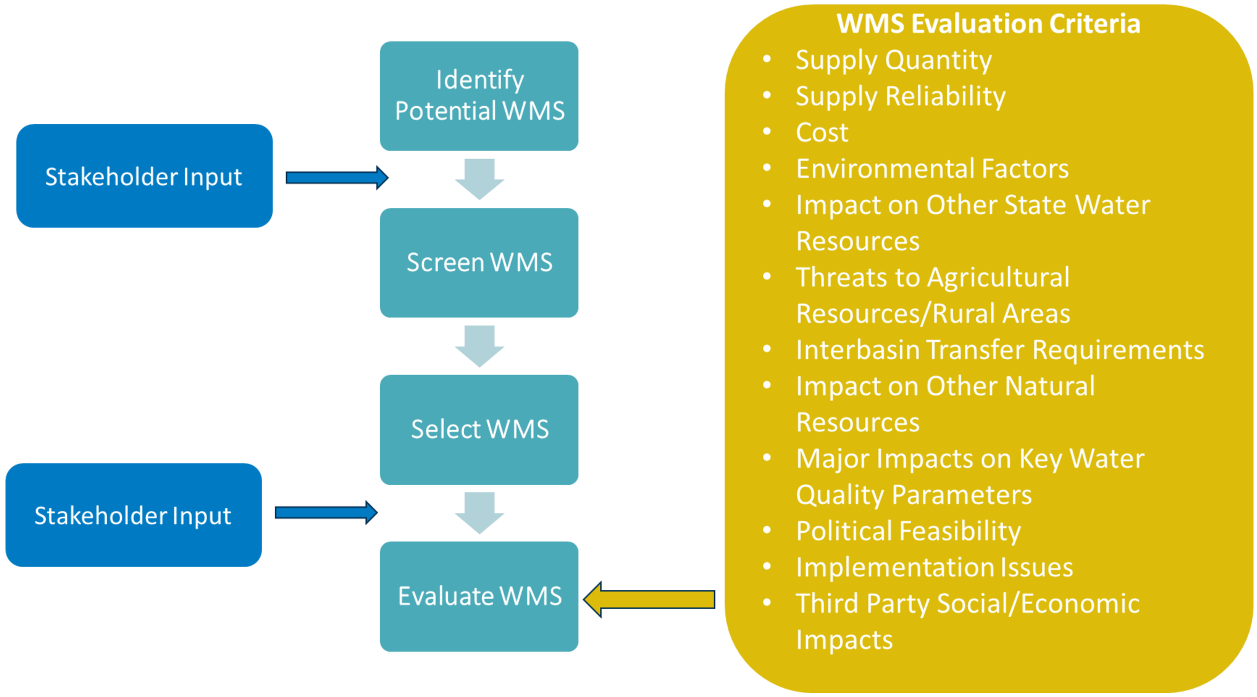

Figure 5A.2 Process to Select and Evaluate Water Management Strategies

In accordance with Texas Administrative Code Title 31 Chapter 357.34€, potentially feasible water management strategies are evaluated across the following categories:

- **Quantity:** Quantity is the amount of water the strategy would provide to the respective entity in acre-feet per year on a reliable basis. This amount is considered with respect to the user's short-term and long-term shortages.

- **Reliability:** Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower.

- **Cost:** The assessment of cost for each strategy is expressed in dollars per acre-foot per year (unit cost) for water delivered and treated for the end user requirements. Calculations of these costs follow the TWDB guidelines for cost considerations and identify total capital cost and annual costs by decade. Project capital costs are based on September 2023 price levels and include construction costs, engineering, land acquisition, mitigation, right-of-way, contingencies and other project costs associated with the respective strategy. Annual costs include power costs associated with transmission, water treatment costs, water purchase (if applicable), operation and maintenance, and other project-specific costs. Debt service for non-reservoir strategies are calculated over 20 years at a 3.5 percent interest rate and for reservoir projects are calculated over 40 years at a 3.5 percent interest rate.

- **Environmental factors:** Potential impacts to sensitive environmental factors were considered for each strategy. Environmental factors include environmental water needs, wildlife habitat, cultural resources, and bays, estuaries, and arms of the Gulf of Mexico. Unless a specific location of a strategy was identified and a previous study was conducted to assess environmental impacts, a detailed evaluation could not be completed. Therefore, a more detailed environmental assessment will be required before a strategy is implemented.

- **Impacts on other state water resources:** The impact on water resources considers the effects of the strategy on water quantity, quality, and use of other existing water resources or potential water management strategies. A water management strategy may have a positive or negative effect on other water resources.

- **Impacts to agricultural resources:** A water management strategy could potentially impact agricultural production or local natural resources. Impacts to agriculture may include reduction in agricultural acreage, reduced water supply for irrigation, or impacts to water quality as it affects crop production.

- **Impacts to natural resources**: The impacts to natural resources may consider inundation of parklands, impacts to exploitable natural resources (such as mining), recreational use of a natural resource, and other strategy-specific factors.

- **Third-party social and economic impacts of moving water**: This considers the potential third-party social and economic impacts resulting from voluntary distributions of water, including moving water from rural and agricultural areas.

- **Impacts on key parameters of water quality**: Implementation of certain water management strategies could potentially impact both physical and chemical characteristics of water resources in the region. Potential impacts to key water quality parameters in the region from a water management strategy were assessed, where applicable.

In the ETRPWA, the evaluation of strategies also considers issues associated with interbasin transfers, sponsorship, and potential implementation issues, where applicable.

Chapter 5B and its appendices include more detailed assessments of WMSs across the identified evaluation categories. For example, Appendix 5B-A contains technical memorandums for each recommended water management strategy in the ETRPWA. Each technical memorandum includes a description of the impact of WMSs and a quantitative rating with regard to the identified evaluation categories. Appendix 5B-B provides a summary of the methodology behind the quantitative rating system for each evaluation category and a matrix summarizing the ratings for each category quantified for all WMSs.

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Chapter 5B: Evaluation of Potential Feasible, Recommended, and Alternative Water Management Strategies and Projects

2026 Initially Prepared Plan

Prepared for:

East Texas Regional Water Planning Group

February 2025

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Appendix 5-A: Water Management Strategies and Projects Technical Memoranda

Appendix 5-B: Strategy Evaluation Matrix and Quantified Environmental Impacts Matrix

Appendix 5-C: Managed Supply Factor for Major Water Providers

Appendix 5-D: Implementation Status of Certain Water Management Strategies in Region I

LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AFY	acre-feet
AMWA	Athens Municipal Water Authority
ANRA	Angelina & Neches River Authority
BMPs	best management practices
cfs	cubic feet per second
CWA	Clean Water Act
ETRWPA	East Texas Regional Water Planning Area
ETRWPG	East Texas Regional Water Planning Group
ft	foot
ft/yr	foot per year
GPCPD	gallons per connection per day
GCDs	Groundwater Conservation Districts
GMAs	groundwater management areas
GPCD	gallons per capita daily
LNG	liquefied natural gas
LNVA	Lower Neches Valley Authority
MSA	Metropolitan Statistical Areas
MUD	Municipal Utility District
MWA	Municipal Water Authority
MWP	Major Water Provider
NRCS	National Resources Conservation Service
PC FWSD	Panola County Fresh Water Supply District
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SRA	Sabine River Authority
TAC	Texas Administrative Code
TBCD	Trinity Bay Conservation District
TCEQ	Texas Commission on Environmental Quality
TCF	trillion cubic feet
TPWD	Texas Parks and Wildlife Department
TTWP	Trans-Texas Water Program
TWDB	the Texas Water Development Board
UNRMWA	Upper Neches River Municipal Water Authority
USA	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMSs	Water Management Strategies
WUG	Water User Group
WWP	Wholesale Water Provider

5B EVALUATION OF POTENTIALLY FEASIBLE, RECOMMENDED, AND ALTERNATIVE WATER MANAGEMENT STRATEGIES AND PROJECTS

Water management strategies (WMSs) and water management strategy projects (WMSPs) evaluated for the East Texas Regional Water Planning Area (ETRWPA) are outlined for each water user group (WUG) by county and for each major water provider (MWP). For each WUG with one or more identified WMSs or WMSPs, a summary table is provided to summarize their projected need (if any) and the supply delivered by the WMSs and WMSPs. A second summary table provides an evaluation of the cost (capital, annual, and unit) to deliver water to the user for the various WMSs and WMSPs that were considered. Appendix 5B-A contains technical memoranda for each WMS/WMSP developed by the East Texas Regional Water Planning Group (ETRWPG), which include a summary of the project, estimated supply quantities and costs, permitting and environmental considerations, and evaluations across various criteria. Appendix 5B-B includes a memorandum summarizing the evaluation criteria and assigned scores for each WMS and WMSP and the quantification of environmental impacts of WMSs and WMSPs.

Generally, four major categories of WMS are recommended in the ETRWP: (1) water conservation and drought management, (2) wastewater reuse, (3) expanded use of existing supplies (voluntary redistribution, groundwater, local supplies), and (4) new supply development. Further discussion of how the strategies were identified and evaluated in the ETRWPA is provided in Chapter 5A.

Any needs that remain unmet after implementation of recommended WMSs included in this chapter are summarized and discussed in Chapter 6, Section 6.3 Unmet Water Need.

5B.1 WATER MANAGEMENT STRATEGY EVALUATION

Water management strategies identified to meet water needs during the planning period were evaluated based on the following criteria:

(1) Evaluation of the quantity, reliability, and cost of water delivered and treated for the end user's requirements, incorporating factors to be used in the calculation of costs as required by regional water planning;

(2) Environmental factors including the effects of the proposed water management strategy on environmental water needs, wildlife habitat, cultural resources, water quality and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico;

(3) Impacts on other water resources of the state including other WMSs and groundwater surface water interrelationships;

(4) Impacts of WMSs on threats to agricultural and natural resources of the regional water planning area;

(5) Impacts of the strategy on key water quality parameters;

(6) Any other factors as deemed relevant by the regional water planning group including political feasibility, implementation issues, and potential recreational impacts;

(7) Equitable comparison and consistent application of all WMSs the regional water planning groups determines to be potentially feasible for each water supply need;

(8) Consideration of the provisions in Texas Water Code § 11.085(k)(1) for interbasin transfers; and

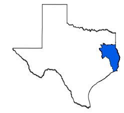
(9) Consideration of third party social and economic impacts resulting from voluntary redistribution of water.

(10) Water losses associated with transmission were assumed to be negligible for regional planning purposes.

The evaluation was undertaken through the development of a matrix to rate the above consideration from most desirable (1) to least desirable (5). Rating of the Environmental Factors (item 2 above) was evaluated using a separate matrix with consideration of eight factors; total acres impacted, wetland acres, environmental water needs, habitat, threatened and endangered species, cultural resources, bays, estuaries and Arms of the Gulf of Mexico, environmental water quality, and other noted factors. The evaluation matrices are included in Appendix 5B-A and Appendix 5B-B.

5B.2 WATER USER GROUPS WITH WATER MANAGEMENT STRATEGIES AND PROJECTS

WMSs were identified for WUGs in all 20 counties of the ETRWPA. Following is a county-by-county review of the WMSs evaluated for the 2026 Plan. It details the WUG-specific WMSs in subsections, while WUGs without a WMS or identified needs are summarized in the county summary table.



5B.2.1 Anderson County

Figure 5B.1 Anderson County

Anderson County, as shown in Figure 5B.1, is located in the northern end of the ETRWPA. It is bordered by the Trinity River on the west side and the Neches River on the east side. The county covers an area of approximately 1,000 square miles. Palestine is the county seat of Anderson County. The largest cities in Anderson County are Palestine, Elkhart, and Frankston. Oil and gas production is a significant component of the local economy.

Most of the WUG demands in Anderson County are supplied from the Carrizo-Wilcox Aquifer. Minor amounts of supplies are taken from the other aquifers, including the Sparta and Queen City Aquifers. The City of Palestine's demands are supplied from Lake Palestine and the Carrizo-Wilcox Aquifer.

The total demand in Anderson County, including both municipal and non-municipal WUGs, is 21,680 ac-ft per year in 2030 and decreases slightly to 21,663 ac-ft per year in 2080. Most of these demands are municipal. During the planning period (2030-2080), only the steam electric power WUG in Anderson County has an identified need (2,296 ac-ft per year) starting in 2030 due to two new proposed power generation facilities.

5B.2.1.1 B C Y WSC

There is no identified need for B C Y WSC across the planning period (2030–2080) based on their projected demands and currently available supply. However, during WUG outreach efforts, B C Y WSC indicated to the ETRWPG that they are considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands. Thus, a strategy is recommended for B C Y WSC that involves the development of approximately 170 acre-feet per year from the Carrizo-Wilcox Aquifer in Anderson County. The conceptual design for this strategy involves one public supply well (capacity of 200 gpm) that produces groundwater from the Carrizo-Wilcox Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. In addition, municipal conservation is also a recommended strategy for the B C Y WSC. Municipal conservation is discussed further in Chapter 5C. Table 5B.1 and Table 5B.2 summarize the yield and cost information associated with those strategies.

Table 5B.1 Recommended Water Management Strategies/Projects for B C Y WSC – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	0	0
Recommended Water Management Strategies/Projects						
Municipal Conservation	5	7	8	8	8	9
New Well(s) in Carrizo-Wilcox Aquifer	0	170	170	170	170	170
TOTAL	**5**	**177**	**178**	**178**	**178**	**179**

Table 5B.2 Recommended Water Management Strategies/Projects for B C Y WSC – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	5 - 9	$310,000	$24,200	$4,500	$13.81
New Well(s) in Carrizo-Wilcox Aquifer	170	$4,254,000	$525,000	$3,088	$9.48

5B.2.1.2 Anderson County Steam Electric Power

Two new power generation facilities with water demands have been identified in Anderson County: the Palestine Power Peaking Facility (PPPF), which is located approximately eight miles northeast of the City of Palestine, and the Apex Bethel Energy Center (ABEC), located approximately 17 miles northwest of Palestine. These plants are not constructed at this time and therefore, do not use any existing water supply (groundwater, surface water, etc.). Most groundwater use in the areas around these facilities rely on groundwater from the Carrizo-Wilcox Aquifer in Anderson County. The PPPF has an identified need of 890 acre-feet per year beginning in 2030, and the ABEC has an identified need of 1,410 acre-feet per year beginning in 2030 (approximately 2,300 ac-ft per year total in 2030). To meet these projected needs, a strategy is recommended for steam-electric power users in Anderson County that involves the development of two well fields (one at each facility) that produce groundwater from the Carrizo-Wilcox Aquifer. Table 5B.3 and Table 5B.4 summarize the need and cost information associated with those strategies.

Table 5B.3 Recommended Strategies/Projects for Anderson County Steam Electric Power – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(2,296)	(2,296)	(2,296)	(2,296)	(2,296)	(2,296)
Recommended Water Management Strategies/Projects						
New Well(s) in Carrizo-Wilcox Aquifer	2,300	2,300	2,300	2,300	2,300	2,300
TOTAL	**2,300**	**2,300**	**2,300**	**2,300**	**2,300**	**2,300**

Table 5B.4 Recommended Strategies/Projects for Anderson County Steam Electric Power – Cost Summary

Water Management Strategy	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Well(s) in Carrizo-Wilcox Aquifer	2,300	$21,908,000	$1,834,000	$757	$2.45

5B.2.1.3 County Summary

The only identified needs in Anderson County are associated with steam electric power water users. Development of groundwater supplies is recommended to meet these needs. In addition, a strategy is recommended for B C Y WSC to develop additional groundwater supplies to meet projected future demands. Although no shortages were identified for municipal WUGs in Anderson County, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.5 provides a summary of WUGs in Anderson County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.5 Anderson County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Anderson County Cedar Creek WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
B B S WSC [a, b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
B C Y WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation; New Wells (Carrizo-Wilcox Aquifer)
Brushy Creek WSC [a, b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
The Consolidated WSC [a]	Carrizo-Wilcox Aquifer, Houston County Lake (Houston Co. WCID 1)	0	Municipal Conservation
Elkhart	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Four Pines WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Frankston [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Frankston Rural WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Neches WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Norwood WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Palestine	Carrizo-Wilcox Aquifer, Lake Palestine (UNRMWA)	0	Municipal Conservation
Pleasant Springs WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Slocum WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
TDCJ Beto Gurney & Powledge Units	Carrizo-Wilcox Aquifer	0	Municipal Conservation
TDCJ Coffield Michael	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Tucker WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Walston Springs WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
County Other	Carrizo-Wilcox Aquifer, Other Aquifers	0	Municipal Conservation
Manufacturing	Carrizo-Wilcox Aquifer	0	None
Irrigation	Carrizo-Wilcox Aquifer, Other Aquifers, Run-of-River Supplies	0	None
Livestock	Carrizo-Wilcox Aquifer, Other Aquifers, Local Supplies	0	None
Mining	Carrizo-Wilcox Aquifer, Other Aquifers	0	None
Steam Electric Power	----	2,296	New Wells (Carrizo-Wilcox Aquifer)

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.2 Angelina County

Figure 5B.2 Angelina County

Angelina County, as shown in Figure 5B.2, is bounded by the Angelina River on the North and the Neches River on the South, in the central portion of the ETRWPA. The largest water body in the County is Sam Rayburn Reservoir, which extends into neighboring counties. Lufkin is the largest city and the County seat. Other major communities include Diboll, Burke, Hudson, and Huntington.

Angelina County is currently dependent on groundwater supplies for water supply; every WUG in Angelina County gets a portion, if not all, of their water from groundwater supplies. However, both the Yegua-Jackson and Carrizo-Wilcox Aquifers have limited capacity for expanded development. Although several rural communities and non-municipal water users will continue to rely on groundwater to meet their demands, the proposed construction of transmission lines and a surface water treatment plant at Lake Kurth by Lufkin will create a reliable surface water supply in the county. Manufacturing and Mining are the two WUGs with needs in Angelina County. Below is a discussion of WMSs identified for these WUGs.

5B.2.2.1 Manufacturing

Current supplies for manufacturing water users include City of Lufkin and groundwater from the Yegua-Jackson and Other-Undifferentiated aquifers. The current supplies are sufficient to meet about half of the 2080 demand. It is anticipated that growth in manufacturing will be supplied by Lufkin. Raw surface water is currently available from Lake Kurth for manufacturing use, but there is limited infrastructure.

The recommended strategy to meet the projected needs of Manufacturing in Angelina County is to contract for purchase of water from Lufkin. Lufkin's current supplies in Lake Kurth can only meet part of the demands. However, once Lufkin develops the supply from Sam Rayburn Reservoir to Lake Kurth, there would be enough supplies to meet the manufacturing demand in Angelina County. The strategy development and planning level cost estimate associated with development of the supply from Sam Rayburn Reservoir to Lufkin is discussed in the strategies for major water provider Lufkin. It should be noted that the Sam Rayburn supplies are projected to be available by 2040 and the current surplus from Lufkin are more than three times higher than the needs from Angelina County Manufacturing water users in 2030. Table 5B.6 and Table 5B.7 summarize the need and cost information associated with this strategy.

Table 5B.6 Recommended Water Management Strategies/Projects for Angelina County Manufacturing – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(2,145)	(2,314)	(2,488)	(2,671)	(2,859)	(3,055)
Recommended Water Management Strategies/Projects						
Purchase from Lufkin (Sam Rayburn)	2,150	2,320	2,490	2,680	2,860	3,060
TOTAL	**2,150**	**2,320**	**2,490**	**2,680**	**2,860**	**3,060**

The cost estimates for this strategy represent raw water purchase costs as well as the necessary conveyance infrastructure including a 5-mile transmission pipeline, storage tanks and pump stations. Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between provider and prospective buyers.

Table 5B.7 Recommended Water Management Strategies/Projects for Angelina County Manufacturing – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Purchase from Lufkin (Sam Rayburn)	2,150 - 3,060	$90,393,000	$8,493,000	$1,379	$4.2

5B.2.2.2 Mining

Current supplies are from Sparta (50% of current wells from desktop analysis), Yegua-Jackson (20%), and Other-Undifferentiated (30%) aquifers. Several private industries are under contract to purchase water from Angelina & Neches River Authority (ANRA) to meet their projected demand. In addition to ANRA, the City of Lufkin is also a MWP in Angelina County with supply surplus. Therefore, the recommended strategy for meeting the mining need projected in 2030 is to purchase raw water from the City of Lufkin.

The cost estimates for this strategy represent raw water purchase costs as well as the necessary conveyance infrastructure including a 5-mile transmission pipeline, storage tanks and pump stations. Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between provider and prospective buyers. Table 5B.8 and Table 5B.9 summarize the need and cost information associated with this strategy.

Table 5B.8 Recommended Water Management Strategies/Projects for Angelina County Mining – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(373)	(412)	(448)	(480)	(508)	(533)
Recommended Water Management Strategies/Projects						
Purchase from Lufkin	380	420	450	480	510	540
TOTAL	**380**	**420**	**450**	**480**	**510**	**540**

Table 5B.9 Recommended Water Management Strategies/Projects for Angelina County Mining – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Purchase from Lufkin	380 - 540	$13,921,000	$1,702,000	$3,152	$9.7

5B.2.2.3 Lufkin

See Section 5B.3.10 for City of Lufkin as it is a MWP in the ETRWPA.

5B.2.2.4 County Summary

Table 5B.10 is a summary of WUGs in Angelina County, their current water source(s), maximum shortages (if any), and recommended WMSs (if any).

Table 5B.10 Angelina County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Angelina WSC	Other Aquifer	0	Municipal Conservation
Central WCID of Angelina County	Carrizo-Wilcox Aquifer	0	Municipal Conservation
County-Other, Angelina	Carrizo-Wilcox Aquifer, Other Aquifer, Sparta Aquifer, Yegua-Jackson Aquifer, Purchase from City of Lufkin	0	Municipal Conservation
Diboll	Yegua-Jackson Aquifer, Purchase from City of Lufkin	0	Municipal Conservation
Hudson WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Huntington	Carrizo-Wilcox Aquifer, Yegua-Jackson Aquifer, Purchase from City of Lufkin	0	Municipal Conservation
Lufkin	Carrizo-Wilcox Aquifer, Kurth Lake/Reservoir, Sam Rayburn-Steinhagen Lake/Reservoir System	0	Municipal Conservation
M & M WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Pollok-Redtown WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Redland WSC	Carrizo-Wilcox Aquifer, Purchase from City of Lufkin	0	Municipal Conservation
Woodlawn WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Zavalla	Yegua-Jackson Aquifer	0	Municipal Conservation
Irrigation	Yegua-Jackson Aquifer, Purchase from City of Lufkin	0	none
Livestock	Neches Livestock Local Supply	0	none
Manufacturing	Other Aquifer, Yegua-Jackson Aquifer, Purchase from City of Lufkin and Four Way SUD	3,055	Purchase from Lufkin (Sam Rayburn)
Mining	Other Aquifer, Sparta Aquifer, Yegua-Jackson Aquifer,	533	Purchase from Lufkin

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.3 Cherokee County

Figure 5B.3 Cherokee County

Cherokee County, as shown in Figure 5B.3, is located in the northern portion of the ETRWPA. The county seat is Rusk. The county encompasses an area of approximately 1,049 square miles. Lake Jacksonville, Lake Palestine, and Lake Striker are located wholly or partially in the County. The larger municipal WUGs in the County are New Summerfield, Rusk, Rusk Rural WSC, Alto, Alto Rural WSC, and North Cherokee WSC. The Carrizo-Wilcox Aquifer is the primary source of supply for the needs in Cherokee County. Some WUGs in the County also receive supplies from Lake Jacksonville and Lake Acker. There is one WUG with shortages in Cherokee County; Alto Rural WSC. The WMSs for these WUGs are discussed below. There are approximately 10,000 ac-ft/year of supplies in the Carrizo-Wilcox in 2030 that are available for WMSs. Water is also available from the Queen City Aquifer and a small amount available from the Sparta Aquifer, but these aquifers do not cover the entire county. Water obtained from the Queen City Aquifer may be acidic and may have levels of iron and manganese greater than TCEQ secondary drinking water standards. Water obtained from the Sparta Aquifer may have levels of sulfates greater than the TCEQ secondary drinking water standards, especially in far southern Cherokee County. Water quality in the Sparta Aquifer is best on the outcrop. However, for planning purposes, water from the Queen City and Sparta Aquifers will be allocated primarily for livestock and irrigation uses because of the unreliable supply and quantity. No proposed strategies for municipal water shortages involve the Queen City and Sparta Aquifers.

5B.2.3.1 Alto Rural WSC

The WUG currently obtains water supply from the Carrizo-Wilcox Aquifer. The recommended strategy is to increase its supply from the Carrizo-Wilcox Aquifer. Municipal conservation is the other recommended strategy for Alto Rural WSC. Table 5B.11 and Table 5B.12 summarize the need and cost information associated with those strategies.

Table 5B.11 Recommended Water Management Strategies/Projects for Alto Rural WSC – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(124)	(209)	(306)	(414)	(533)	(665)
Recommended Water Management Strategies/Projects						
New Wells (Carrizo-Wilcox)	670	670	670	670	670	670
Municipal Conservation	18	29	34	38	45	51
TOTAL	**688**	**699**	**704**	**708**	**715**	**721**

Table 5B.12 Recommended Water Management Strategies/Projects for Alto Rural WSC – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Carrizo-Wilcox)	670	$7,612,000	$970,000	$1,448	$4.4
Municipal Conservation	18 - 51	$97,000	$14,300	$800	$2.5

5B.2.3.2 County Summary

Table 5B.13 is a summary of WUGs in Cherokee County, their current water source(s), maximum shortages (if any), and recommended WMSs (if any).

Table 5B.13 Cherokee County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Afton Grove WSC	Carrizo-Wilcox Aquifer (City of Jacksonville), Jacksonville Lake/Reservoir (City of Jacksonville)	0	Municipal Conservation
Alto	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Alto Rural WSC	Carrizo-Wilcox Aquifer	665	New Wells (Carrizo-Wilcox), Municipal Conservation
Blackjack WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Bullard [a]	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (City of Jacksonville), Jacksonville Lake/Reservoir (City of Jacksonville)	0	Municipal Conservation
County-Other, Cherokee	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (Rusk Rural WSC), Other Aquifer, Queen City Aquifer, Sparta Aquifer	0	Municipal Conservation
Craft Turney WSC	Jacksonville Lake/Reservoir (City of Jacksonville), Carrizo-Wilcox Aquifer (City of Jacksonville)	0	Municipal Conservation
Gum Creek WSC	Carrizo-Wilcox Aquifer (City of Jacksonville), Jacksonville Lake/Reservoir (City of Jacksonville)	0	Municipal Conservation
Jacksonville	Carrizo-Wilcox Aquifer, Jacksonville Lake/Reservoir	0	Municipal Conservation
New Summerfield	Carrizo-Wilcox Aquifer	0	Municipal Conservation
North Cherokee WSC	Carrizo-Wilcox Aquifer (City of Jacksonville), Jacksonville Lake/Reservoir (City of Jacksonville)	0	Municipal Conservation
Pollok-Redtown WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Rusk	Carrizo-Wilcox Aquifer, Rusk City Lake/Reservoir	0	Municipal Conservation
Rusk Rural WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Southern Utilities [a,b]	Carrizo-Wilcox Aquifer, Palestine Lake/Reservoir (Upper Neches River Municipal Water Authority), Tyler Lake/Reservoir (City of Tyler)	401	Amendment to Supplemental Contract with City of Tyler; Municipal Conservation
Troup [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Wells	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Walnut Grove WSC [a]	Carrizo-Wilcox Aquifer, Palestine Lake/Reservoir (Upper Neches River Municipal Water Authority), Tyler Lake/Reservoir (City of Tyler)	0	Municipal Conservation
West Jacksonville WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Wright City WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Irrigation	Carrizo-Wilcox Aquifer, Neches Run-of-River, Queen City Aquifer, Palestine Lake/Reservoir (Upper Neches River Municipal Water Authority), Sparta Aquifer	0	None
Livestock	Carrizo-Wilcox Aquifer, Neches Livestock Local Supply, Queen City Aquifer	0	None
Manufacturing	Carrizo-Wilcox Aquifer (City of Jacksonville), Jacksonville Lake/Reservoir (City of Jacksonville)	0	None
Mining	Neches Other Local Supply, Other Aquifer	0	None
Steam-Electric Power	Striker Lake/Reservoir (Angelina Nacogdoches WCID 1)	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.4 Hardin County

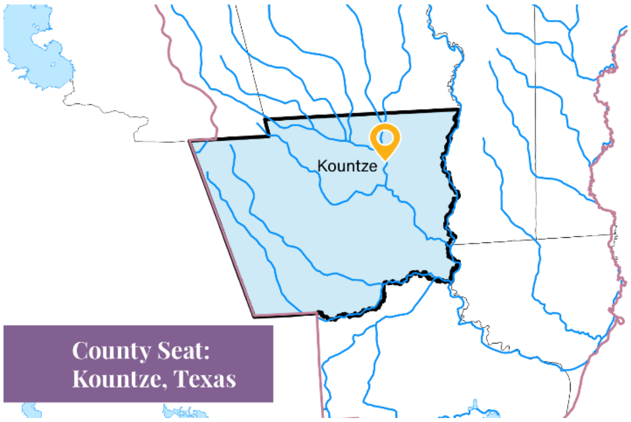


Figure 5B.4 Hardin County

Hardin County, as shown in Figure 5B.4, is located in the southern portion of the ETRWPA and is part of the timberlands region in East Texas. The county covers an area of approximately 900 square miles. The county seat is Kountze and other major cities in the county are Lumberton, Sour Lake, and Silsbee.

WUGs in Hardin County obtain the majority of their water supply from groundwater supplies produced from the Gulf Coast Aquifer. Based on the Modeled Available Groundwater (MAG) used in this round of planning, the Gulf Coast Aquifer supplies in Hardin County are limited to approximately 37,700 ac-ft per year. Other sources of supply in this county include Neches River run-of-river supplies, and local supplies.

The total demand in Hardin County, including both municipal and non-municipal, is 8,422 ac-ft per year in 2030 growing to a maximum of 9,726 ac-ft per year in 2050 and decreasing slightly to 9,130 ac-ft per year in 2080. The majority of these demands are municipal. There is no projected need for any WUG located within Hardin County across the planning period.

5B.2.4.1 County Summary

Although no WUGs with needs were identified in Hardin County, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.14 provides a summary of WUGs in Hardin County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.14 Hardin County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
County Other	Gulf Coast Aquifer	0	Municipal Conservation
Hardin County WCID #1	Gulf Coast Aquifer	0	Municipal Conservation
Kountze	Gulf Coast Aquifer	0	Municipal Conservation
Lake Livingston WSC [a, b]	Gulf Coast Aquifer	0	Region H WMS/WMSP
Lumberton MUD	Gulf Coast Aquifer	0	Municipal Conservation
North Hardin WSC	Gulf Coast Aquifer	0	Municipal Conservation
Silsbee	Gulf Coast Aquifer	0	Municipal Conservation
Sour Lake	Gulf Coast Aquifer	0	Municipal Conservation
West Hardin WSC [a, b]	Gulf Coast Aquifer	0	Municipal Conservation
Wildwood POA [a]	Gulf Coast Aquifer	0	Municipal Conservation
Manufacturing	Gulf Coast Aquifer	0	None
Mining	Gulf Coast Aquifer, Sam Rayburn Reservoir (LNVA)	0	None
Irrigation	Gulf Coast Aquifer, Run-of-River	0	None
Livestock	Gulf Coast Aquifer, Local Supply	0	None
Steam Electric Power	----	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.5 Henderson County

Figure 5B.5 Henderson County

Henderson County, as shown in Figure 5B.5, is located between the Neches and Trinity Rivers in the northern end of the region. Henderson County is split between both Region C and the ETRWPA. The portion of the county in the Neches River Basin is in the ETRWPA. Lake Palestine is located partially within the county. Athens Lake is also located within Henderson County.

Athens is the largest city and also the county seat for Henderson County. The county encompasses approximately 950 square miles. Athens, Bethel Ash WSC, Brownsboro, Chandler, and Berryville are the largest WUGs in the County. Much of the water supplied to users in the ETRWPA is obtained from groundwater, with water also supplied from Lake Athens and Lake Palestine.

In the ETRWPA, water supply needs are identified for municipal WUGs including the cities of Athens and Chandler, and Edom WSC. Water supply needs are also identified for mining, livestock, and steam electric power WUGs in Henderson County.

5B.2.5.1 Athens

The City of Athens is supplied water by Athens Municipal Water Authority (MWA) from Lake Athens and groundwater from the Carrizo-Wilcox Aquifer. Additionally, the City of Athens has some self-supplied groundwater from the Carrizo-Wilcox Aquifer. Athens is identified to have water supply needs across both Region C and I, particularly in later decades, due to growing demands and existing water supply infrastructure constraints. Needs will be met through municipal conservation for the City of Athens and WMSs/WMSPs sponsored by Athens MWA, including reuse of fish hatchery return flows to Lake Athens and upgrades to the booster pump station at Athens MWA's water treatment plant. A WMS/WMSP is also identified for Athens MWA to develop additional Carrizo-Wilcox groundwater supplies in Henderson County; however, due to modeled available groundwater (MAG) limitations, this is included as an alternative WMS/WMSP. The WMSs and WMSPs included for Athens MWA and Athens are discussed in further detail under the Athens MWA major water provider (MWP) section of Chapter 5B and in the 2026 Region C regional water plan. Table 5B.15 and Table 5B.16 summarize the need and cost information associated with those strategies.

Table 5B.15 Recommended Water Management Strategies/Projects for Athens – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	(364)	(1,053)	(2,076)	(2,701)
Recommended Water Management Strategies/Projects						
Municipal Conservation	122	325	687	904	1,112	1,226
Athens MWA Strategies & Projects	0	0	364	1,222	2,055	1,989
TOTAL	**122**	**325**	**1,051**	**2,126**	**3,167**	**3,215**

Table 5B.16 Recommended Water Management Strategies/Projects Athens – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	122 - 1,226	$310,000	$24,200	$4,500	$13.81
Athens MWA Strategies/Projects	364 - 2,055	Discussed under Athens MWA section			

5B.2.5.2 Chandler

The City of Chandler is currently supplied solely by groundwater from the Carrizo-Wilcox Aquifer. Beginning in the 2050 decade, the City is projected to have a need of approximately 43 ac-ft per year that increases to 934 ac-ft per year by 2080. In order to meet this need, a recommended WMS and WMSP for the City of Chandler is to purchase treated water from the City of Tyler and develop associated conveyance infrastructure (e.g., transmission pipeline, pump station, storage) to deliver water to their service area. In addition, municipal conservation is also a recommended strategy for the City of Chandler. Municipal conservation is discussed further in Chapter 5C. A WMS/WMSP is also identified for Chandler to develop additional Carrizo-Wilcox groundwater supplies in Henderson County; however, due to MAG limitations, this is included as an alternative WMS/WMSP. Table 5B.17 and Table 5B.18 summarize the need and cost information associated with those strategies.

Table 5B.17 Recommended Water Management Strategies/Projects for Chandler – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	(43)	(281)	(573)	(934)
Recommended Water Management Strategies/Projects						
Municipal Conservation	13	23	30	40	52	77
Purchase from Tyler (Lake Palestine)	0	0	50	290	580	940
*New Well(s) in Carrizo-Wilcox Aquifer**	*0*	*0*	*50*	*290*	*580*	*940*
TOTAL	**13**	**23**	**80**	**330**	**632**	**1,017**

*Alternative water management strategy/project. Supply quantity not included in total.

Table 5B.18 Recommended Water Management Strategies/Projects Chandler – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	13 - 77	$38,000	$9,700	$700	$2.15
Purchase from Tyler (Lake Palestine)	50 - 940	$15,028,000	$2,774,000	$3,000	$9.06
*New Well(s) in Carrizo-Wilcox Aquifer**	*50 - 940*	*$10,727,000*	*$1,387,000*	*$1,476*	*$4.53*

*Alternative water management strategy/project.

5B.2.5.3 County-Other

There are no identified needs for the County-Other WUG in Henderson County in Region I, but there are some needs identified in the Region C portion of the Henderson County. A discussion of the WMSs and WMSPs developed to meet this need is included in the 2026 Region C Regional Water Plan.

5B.2.5.4 Edom WSC

Edom WSC is located in both Region D and the ETRWPA. Edom WSC provides water service in Van Zandt and Henderson Counties. Edom WSC supplies its customers with groundwater from the Carrizo-Wilcox Aquifer in Van Zandt County. Across both Region D and the ETRWPA, Edom WSC is projected to have a need of 67 ac-ft per year in 2030 and 87 ac-ft per year by 2080. To meet this need, a WMS and WMSP for Edom WSC was developed by Region D. A discussion of the WMS and WMSP developed to meet this need is included in the 2026 Region D regional water plan. The ETRWPG supports and approves the WMS and WMSP developed to meet the water supply need in both regions.

5B.2.5.5 R P M WSC

R P M WSC is located in both Region D and the ETRWPA. There are no identified needs for this WUG located in ETRWPA, but there are some needs identified in the Region D portion. A discussion of the WMS and WMSP developed to meet this need is included in the Region D regional water plan. The ETRWPG supports and approves the WMS and WMSP developed to meet the water supply need in both regions.

5B.2.5.6 Henderson County Mining

Mining users in Henderson County primarily use groundwater from the Carrizo-Wilcox Aquifer or other undifferentiated aquifers for their water supply. A water supply need is identified for mining water users in Henderson County ranging from 15 to 143 ac-ft per year from 2030 through 2080. A recommended strategy to meet these needs is to develop new wells that produce groundwater from the Queen City Aquifer in Henderson County. Table 5B.19 and Table 5B.20 summarize the need and cost information associated with this strategy.

Table 5B.19 Recommended Water Management Strategies/Projects for Henderson County Mining – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(15)	(16)	(17)	(19)	(47)	(143)
Recommended Water Management Strategies/Projects						
New Well(s) in Queen City Aquifer	150	150	150	150	150	150
TOTAL	**150**	**150**	**150**	**150**	**150**	**150**

Table 5B.20 Recommended Water Management Strategies/Projects Henderson County Mining – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Well(s) in Queen City Aquifer	150	$471,000	$40,000	$267	$0.82

5B.2.5.7 Henderson County Livestock

Livestock water users in Henderson County are identified to have a need of 321 ac-ft per year beginning in 2070, which increases to 490 acre-feet per year by 2080. Current supplies for livestock users in Henderson County (Region I portion) include surface water from Lake Athens, groundwater from the Carrizo-Wilcox and Queen City Aquifers, and other local supplies. The recommended strategy to meet the livestock water user needs in Henderson County is to use supply from the indirect reuse WMS in Lake Athens through Athens MWA. Table 5B.21 and Table 5B.22 summarize the need and cost information associated with this strategy.

Table 5B.21 Recommended Water Management Strategies/Projects for Henderson County Livestock – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	(321)	(490)
Recommended Water Management Strategies/Projects						
Athens MWA Indirect Reuse WMS	0	0	507	884	1,216	1,385
TOTAL	**0**	**0**	**507**	**884**	**1,216**	**1,385**

Table 5B.22 Recommended Water Management Strategies/Projects Henderson County Mining – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Athens MWA Indirect Reuse WMS	1,385	$0	$0	$0	$0

5B.2.5.8 Henderson County Steam Electric Power

The water demand projections adopted for the 2026 regional water plans include projected water use for a proposed power generation facility in the Region I portion of Henderson County: the Halyard Henderson Energy Center. This facility had a projected demand of 2,061 ac-ft per year from 2030 to 2080. This plant has not been constructed and does not use any existing water supply (groundwater, surface water, etc.), so it is shown to have a need of 2,061 ac-ft per year in the ETRWP across the planning horizon. Since water demand projections were adopted for the 2026 regional water plans, the U.S. Energy Information Administration (EIA) annual database, EIA-860, indicated that plans to develop the Halyard Henderson Energy Center were cancelled. Therefore, there is no water demand and need associated with this facility and no WMS and/or WMSP were identified for this WUG. The most recent version of the U.S. EIA-860 database (2023) indicates that there may be other proposed power generation facilities in Henderson County; however, their locations and potential water demands were not evaluated as part of the 2026 regional water plans.

5B.2.5.9 County Summary

Water supply needs in Henderson County were identified for the cities of Athens and Chandler, Edom WSC, and livestock, mining, and steam electric power WUGs. Various WMSs and WMSPs are recommended to meet these needs, including expanded use of surface water, groundwater, and reuse. Additionally, conservation strategies were recommended for all municipal WUGs. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.23 provides a summary of WUGs in Henderson County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs.

Table 5B.23 Henderson County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Athens [a]	Carrizo-Wilcox Aquifer, Lake Athens (Athens MWA)	2,701	Municipal Conservation, Athens MWA WMS/WMSPs (discussed under Athens MWA WWP section)
Berryville [b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Bethel Ash WSC [a, b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Brownsboro	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Brushy Creek WSC [a, b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Chandler	Carrizo-Wilcox Aquifer	934	Municipal Conservation, New Wells (Carrizo-Wilcox), Municipal Conservation
County-Other [a]	Carrizo-Wilcox, Other Undifferentiated Aquifer	0	Region C WMS/WMSP
Edom WSC [a, b]	Carrizo-Wilcox Aquifer	87	Region D WMS/WMSP
Frankston [b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Moore Station WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Murchison	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Leagueville WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
R P M WSC [a, b]	Carrizo-Wilcox Aquifer	0	Region D WMS/WMSP
Virginia Hill WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Manufacturing [a]	Carrizo-Wilcox Aquifer	0	Region C WMS/WMSP
Mining	Carrizo-Wilcox, Other Undifferentiated Aquifer	143	New Wells (Queen City)
Livestock	Carrizo-Wilcox Aquifer, Local Supply, Lake Athens (Athens MWA)	490	Athens MWA indirect reuse WMS
Irrigation [a]	Carrizo-Wilcox Aquifer, Lake Athens (Athens MWA), Lake Palestine (UNRMWA), Run-of-River	0	Region C WMS/WMSP
Steam Electric Power [a, c]	None	2,061	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

[c] The demand/need associated with this WUG is no longer proposed and therefore, no strategies were evaluated in the 2026 ETRWP to meet this need.

5B.2.6 Houston County

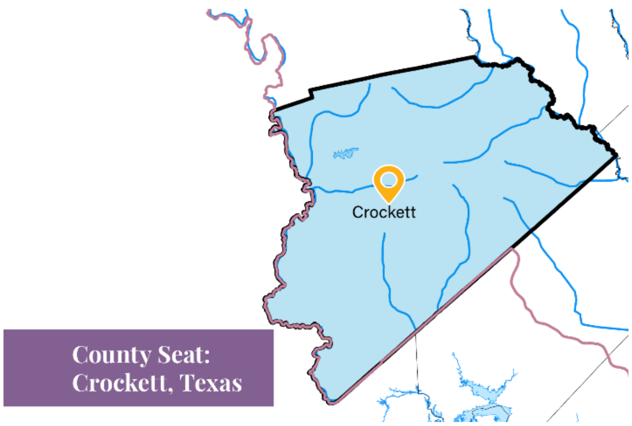


Figure 5B.6 Houston County

Water supplies in Houston County, as shown in Figure 5B.6, include surface water from Houston County Lake (through Houston County WCID #1), run-of-river supplies for irrigation, and groundwater from the Carrizo-Wilcox, Yegua-Jackson, Sparta, Queen City and Other-Undifferentiated aquifers. There are projected water shortages in Houston County for TDCJ Eastham Unit and livestock use. The Carrizo-Wilcox Aquifers have adequate capacity for expanded development in this county.

5B.2.6.1 TDCJ Eastham Unit

The TDCJ Eastham Unit is a Texas Department of Criminal Justice (TDCJ) prison facility located near Lovelady, in Houston County, East Texas. Their current water supply source is the groundwater from Sparta Aquifer, with limited groundwater availability in the next 50-year planning horizon. The WMS to meet its need is to install a new well in the Carrizo-Wilcox Aquifer. Table 5B.24 and Table 5B.25 summarize the need and cost information associated with those strategies.

Table 5B.24 Recommended Water Management Strategies/Projects for TDCJ Eastham Unit – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(113)	(111)	(111)	(111)	(111)	(111)
Recommended Water Management Strategies/Projects						
New Wells (Carrizo-Wilcox)	120	120	120	120	120	120
Municipal Conservation	**20**	**30**	**32**	**34**	**36**	**37**
TOTAL	**140**	**150**	**152**	**154**	**156**	**157**

Table 5B.25 Recommended Water Management Strategies/Projects for TDCJ Eastham Unit – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Carrizo-Wilcox)	120	$5,018,000	$583,000	$4,858	$14.9
Municipal Conservation	20 - 37	$134,000	$15,100	$700	$2.1

5B.2.6.2 Livestock

The demand for Livestock is met from local supply, groundwater supplies from Carrizo Wilcox Aquifer, Sparta Aquifer, Queen City Aquifer, And Other-Undifferentiated Aquifer. The shortages are met by developing a groundwater supply strategy in the Yegua-Jackson Aquifer. Table 5B.26 and Table 5B.27 summarize the need and cost information associated with this strategy.

Table 5B.26 Recommended Water Management Strategies/Projects for Houston County Livestock – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	(59)	(285)	(285)
Recommended Water Management Strategies/Projects						
New Wells (Carrizo-Wilcox)	0	0	0	290	290	290
TOTAL	**0**	**0**	**0**	**290**	**290**	**290**

Table 5B.27 Recommended Water Management Strategies/Projects for Houston County Livestock– Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Carrizo-Wilcox)	290	$969,000	$87,000	$300	$0.9

5B.2.6.3 County Summary

Table 5B.28 is a summary of WUGs in Houston County, their current water source(s), maximum shortages (if any), and recommended WMSs (if any).

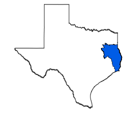
Table 5B.28 Houston County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
County-Other, Houston	Carrizo-Wilcox Aquifer, Sparta Aquifer, Other Aquifer, Queen City Aquifer, Yegua-Jackson Aquifer	0	Municipal Conservation
Crockett	Carrizo-Wilcox Aquifer, Houston County Lake/Reservoir (Houston County WCID 1)	0	Municipal Conservation
Grapeland	Carrizo-Wilcox Aquifer, Houston County Lake/Reservoir (Houston County WCID 1)	0	Municipal Conservation
Lovelady	Houston County Lake/Reservoir (Houston County WCID 1), Yegua-Jackson Aquifer	0	Municipal Conservation
TDCJ Eastham Unit	Sparta Aquifer	113	New Wells (Carrizo-Wilcox); Municipal Conservation
The Consolidated WSC [a]	Carrizo-Wilcox Aquifer, Houston County Lake/Reservoir (Houston County WCID 1)	0	Municipal Conservation
Pennington WSC [a, b]	Yegua-Jackson Aquifer (Pennington WSC)	0	Municipal Conservation
Irrigation, Houston	Neches Run-of-River, Trinity Run-of-River	0	None
Livestock, Houston	Carrizo-Wilcox Aquifer, Neches Livestock Local Supply, Queen City Aquifer, Trinity Livestock Local Supply, Sparta Aquifer	285	New Wells (Carrizo-Wilcox)
Manufacturing, Houston	Carrizo-Wilcox Aquifer, Houston County Lake/Reservoir (Houston County WCID 1)	0	None
Mining, Houston	Other Aquifer	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.



5B.2.7 Jasper County

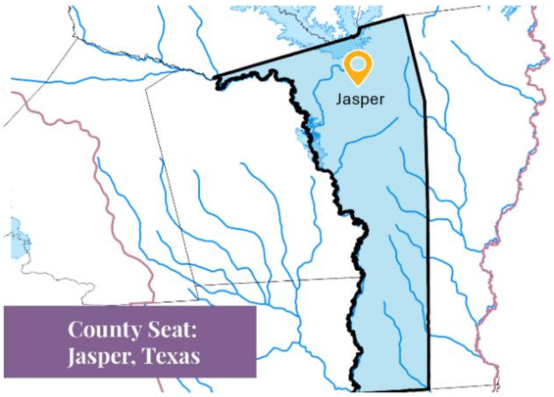


Figure 5B.7 Jasper County

Jasper County, as shown in Figure 5B.7, is located in the southeastern portion of the ETRWPA. The county covers approximately 970 square miles and is divided between the Neches and Sabine River Basins. The largest cities in Jasper County include the cities of Jasper, Buna, and Kirbyville.

WUGs in Jasper County utilize surface water from the Sam Rayburn Reservoir The ETRWPG supports and approves the WMS and WMSP developed to meet the water supply need in both regions.

5B.2.7.1 South Jasper County WSC

There is no identified need for South Jasper County WSC across the planning period (2030–2080) based on their projected demands and currently available supply. However, during WUG outreach efforts, South Jasper County WSC indicated to the ETRWPG that they are considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands. Thus, a strategy is recommended for South Jasper County WSC that involves the development of approximately 330 acre-feet per year from the Gulf Coast Aquifer in Jasper County. The conceptual design for this strategy involves one public supply well (capacity of 400 gpm) that produces groundwater from the Gulf Coast Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. In addition, municipal conservation is also a recommended strategy for the South Jasper County WSC. Municipal conservation is discussed further in Chapter 5C. Table 5B.29 and Table 5B.30 summarize the need and cost information associated with those strategies.

Table 5B.29 Recommended Water Management Strategies/Projects for South Jasper County WSC – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	0	0
Recommended Water Management Strategies/Projects						
Municipal Conservation	1	1	1	1	1	1
New Well(s) in Gulf Coast Aquifer	0	330	330	330	330	330
TOTAL	**1**	**331**	**331**	**331**	**331**	**331**

Table 5B.30 Recommended Water Management Strategies/Projects for South Jasper County WSC – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	1	$14,000	$1,300	$1,200	$3.68
New Well(s) in Gulf Coast Aquifer	330	$6,553,000	$812,000	$2,461	$7.55

5B.2.7.2 Jasper County Manufacturing

Manufacturing demands are projected to grow across the planning horizon (2030-2080). As a result, manufacturing is shown to have a water supply need of 447 ac-ft per year in 2030 and 11,935 ac-ft per year by 2080. Current water supplies used by manufacturing users in Jasper County include groundwater from the Gulf Coast Aquifer and surface water from the Sam Rayburn Reservoir (purchased from the Lower Neches Valley Authority [LNVA]) and Neches River. To meet their identified need, a recommended WMS and WMSP is included for individual manufacturers to enter into a contract with the Lower Neches Valley Authority (LNVA) for raw water from their Sam Rayburn Reservoir system, as their permit allows. Generalized estimates of infrastructure needed to access supplies from LNVA are included as part of this WMS and WMSP. Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between the provider and prospective buyers. Table 5B.31 and Table 5B.32 summarize the need and cost information associated with this strategy.

Table 5B.31 Recommended Strategies/Projects for Jasper County Manufacturing – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(455)	(2,589)	(4,802)	(7,097)	(9,476)	(11,943)
Recommended Water Management Strategies/Projects						
Purchase Water from LNVA (Sam Rayburn)	460	2,590	4,810	7,100	9,480	11,950
TOTAL	**460**	**2,590**	**4,810**	**7,100**	**9,480**	**11,950**

Table 5B.32 Recommended Strategies/Projects for Jasper County Manufacturing – Cost Summary

Water Management Strategy	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Purchase Water from LNVA (Sam Rayburn)	460 – 11,950	$159,597,000	$17,386,000	$1,074	$3.30

5B.2.7.3 County Summary

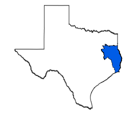
The only identified needs in Jasper County are associated with manufacturing water users. To meet these needs, a WMS and WMSP is recommended for these manufacturers to purchase water from LNVA. In addition, a WMS and WMSP is recommended for South Jasper County WSC to develop additional groundwater supplies to meet projected future demands. Although no shortages were identified for municipal WUGs in Jasper County, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.33 provides a summary of WUGs in Jasper County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.33 Jasper County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Brookeland FWSD [a]	Gulf Coast Aquifer	0	Municipal Conservation
County Other	Gulf Coast Aquifer	0	Municipal Conservation
Jasper	Gulf Coast Aquifer	0	Municipal Conservation
Jasper County WCID 1	Gulf Coast Aquifer	0	Municipal Conservation
Kirbyville	Gulf Coast Aquifer	0	Municipal Conservation
Mauriceville SUD [a]	Gulf Coast Aquifer	0	Municipal Conservation
Rayburn Country MUD	Yegua-Jackson Aquifer	0	Municipal Conservation
Rural WSC	Gulf Coast Aquifer	0	Municipal Conservation
South Jasper County WSC	Gulf Coast Aquifer	0	Municipal Conservation, New Wells (Gulf Coast Aquifer)
South Kirbyville Rural WSC [a]	Gulf Coast Aquifer	0	Municipal Conservation
Upper Jasper County Water Authority [a]	Gulf Coast Aquifer	0	Municipal Conservation
Irrigation	Gulf Coast Aquifer, Run-of-River	0	None
Livestock	Gulf Coast Aquifer, Local Supply, Rayburn/Steinhagen Reservoir System (LNVA)	0	None
Manufacturing	Gulf Coast Aquifer, Neches Run-of-River, Rayburn/Steinhagen Reservoir System (LNVA)	11,935	Purchase from LNVA (Sam Rayburn)
Mining	Gulf Coast Aquifer	0	None
Steam Electric Power	None	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.



5B.2.8 Jefferson County

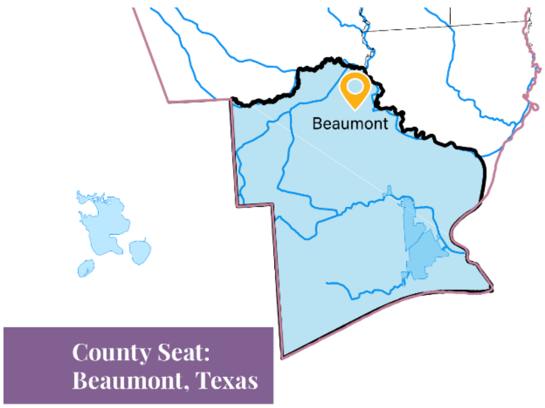


Figure 5B.8 Jefferson County

Jefferson County, as shown in Figure 5B.8, is located in the southern portion of the ETRWPA. The northeastern border of the county is the Neches River. Jefferson County has the second largest population of the twenty counties in the ETRPWA. The largest cities in the county include Beaumont, Port Arthur, Nederland, Groves, and Port Neches. In addition to their municipal water demands, Jefferson County contains a wide range of industries that use a substantial volume of water supply. Water demands from industry are anticipated to grow as industries continue to target development of their facilities in Jefferson County and the economic base diversifies.

Water supply in Jefferson County is largely provided by the Lower Neches Valley Authority (LNVA) with surface water from the Sam Rayburn/BA Steinhagen system and the Neches River. The exception to this is Beaumont, which has a supply from their own water rights on the Neches River in Jefferson County and Hardin County groundwater wells in the Gulf Coast Aquifer. There are three WUGs with a projected need during the planning period: Beaumont, Trinity Bay Conservation District, and manufacturing water users. Beaumont's needs are anticipated to be met through conservation, groundwater, and additional surface water from LNVA, which will require new infrastructure projects. Needs for Trinity Bay Conservation District, which is located largely in Region H, are anticipated to be met through water conservation. Manufacturing water needs are anticipated to be met through purchasing additional water from LNVA.

5B.2.8.1 Beaumont

The current supply sources for the City of Beaumont are self-supplied surface water from the Neches River, self-supplied groundwater from the Gulf Coast Aquifer, and purchased surface water from the Sam Rayburn/BA Steinhagen system (LNVA). Beaumont's supply is constrained by several infrastructure limitations, including their canal conveyance capacity, surface water treatment plant capacity, and groundwater well field capacity. As a result of these infrastructure constraints, Beaumont has an identified need across the planning horizon (2030-2080) of approximately 9,500 ac-ft per year by 2030, which grows to nearly 11,400 ac-ft per year by 2070. To meet this need, several WMSs were recommended for Beaumont, including water conservation, improvements to their well field, and amending their contract with LNVA for additional surface water supply. To access the additional supply from LNVA, recommended WMSPs for Beaumont include rehabilitation of one of their surface water conveyance canals and a new water treatment plant on the west side of their system.

Beaumont is a Major Water Provider (MWP) in the ETRWP. Section 5B.3 contains a more detailed summary of each MWP in the ETRWPA and their recommended WMSs and WMSPs. Beaumont is discussed in more detail in Section 5B.3.4.

5B.2.8.2 China

There is no identified need for China across the planning period (2030–2080) based on their projected demands and currently available supply. However, during WUG outreach efforts, China indicated to the ETRWPG that they are considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands. Thus, a strategy is recommended for China that involves the development of approximately 250 acre-feet per year from the Gulf Coast Aquifer in Jefferson County. The conceptual design for this strategy involves one public supply well (capacity of 300 gpm) that produces groundwater from the Gulf Coast Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. In addition, municipal conservation is also a recommended strategy for China. Municipal conservation is discussed further in Chapter 5C. Table 5B.34 and Table 5B.35 summarize the need and cost information associated with those strategies.

Table 5B.34 Recommended Water Management Strategies/Projects for China – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	0	0
Recommended Water Management Strategies/Projects						
Municipal Conservation	3	5	6	6	6	7
New Well(s) in Gulf Coast Aquifer	0	250	250	250	250	250
TOTAL	**3**	**255**	**256**	**256**	**256**	**257**

Table 5B.35 Recommended Water Management Strategies/Projects for China – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	3 – 7	$13,000	$2,200	$800	$2.46
New Well(s) in Gulf Coast Aquifer	250	$6,182,000	$525,000	$2,967	$9.09

5B.2.8.3 Port Arthur

Port Arthur is a MWP in the ETRWP. Based on their projected demands and existing supplies, Port Arthur has no identified needs across the planning horizon (2030-2080). However, conservation strategies are recommended for Port Arthur.

Section 5B.3 contains a more detailed summary of each MWP in the ETRWPA and their recommended WMSs and WMSPs. Port Arthur is discussed in more detail in Section 5B.3.13.

5B.2.8.4 Trinity Bay Conservation District

Trinity Bay Conservation District (TBCD) is a WUG located in both Region H and the ETRWPA. Trinity Bay Conservation provides water service in both Chambers and Jefferson counties. They obtain their supply from LNVA and the Chambers-Liberty Counties Navigation District (CLCND). Across both Region H and the ETRWPA, Trinity Bay Conservation District is projected to have a need of 71 ac-ft per year in 2070 and 207 ac-ft per year by 2080. To meet this need, the recommended WMS/WMSP by Region H is municipal conservation. A discussion of this WMS and WMSP is included in the 2026 Region H regional water plan. The ETRWPG supports and approves the WMS and WMSP developed to meet the water supply need in both regions.

5B.2.8.5 Jefferson County Manufacturing

Manufacturing demands in Jefferson County are projected to grow substantially across the planning horizon (2030-2080). As a result, manufacturing is shown to have a water supply need of 6,037 ac-ft per year in 2030 and 175,165 ac-ft per year by 2080. Current water supplies used by manufacturing users in

Jasper County include groundwater from the Gulf Coast Aquifer and surface water from the Sam Rayburn Reservoir (purchased from the Lower Neches Valley Authority [LNVA]) and Neches River. To meet their identified need, a recommended WMS and WMSP is included for individual manufacturers to enter into a contract with the Lower Neches Valley Authority (LNVA) for raw water from their Sam Rayburn Reservoir system, as their permit allows. Generalized estimates of infrastructure needed to access supplies from LNVA are included as part of this WMS and WMSP. The volume estimated for this WMS was based on the identified need excluding potential reuse or recycled water supply. Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between the provider and prospective buyers. Table 5B.36 and Table 5B.37 summarize the need and cost information associated with this strategy.

Table 5B.36 Recommended Strategies/Projects for Jefferson County Manufacturing – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(4,884)	(35,743)	(70,460)	(104,993)	(139,512)	(174,012)
Recommended Water Management Strategies/Projects						
Purchase Water from LNVA (Sam Rayburn)	6,100	36,900	71,700	106,200	140,700	175,200
TOTAL	**6,100**	**36,900**	**71,700**	**106,200**	**140,700**	**175,200**

Table 5B.37 Recommended Strategies/Projects for Jefferson County Manufacturing – Cost Summary

Water Management Strategy	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Purchase Water from LNVA (Sam Rayburn)	6,100 – 175,200	$698,989,000	$117,584,000	$558	$1.71

5B.2.8.6 County Summary

Water supply needs in Jefferson County are identified for the City of Beaumont, Trinity Bay Conservation District, and manufacturing water users. Various WMSs and WMSPs (e.g., conservation, groundwater, surface water, infrastructure expansions) are recommended to address these needs. A WMS and WMSP is also recommended for China to develop additional groundwater supplies to meet projected future demands. Additionally, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.38 provides a summary of WUGs in Jefferson County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.38 Jefferson County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Beaumont	Gulf Coast Aquifer, Run-of-River, Rayburn/Steinhagen Reservoir System (LNVA)	9,648	Municipal Conservation, Well Field Infrastructure Improvements, Amendment to Supplemental Contract with LNVA, Bunn's Canal Rehabilitation, New Westside Surface Water Treatment Plant
Bevil Oaks	Gulf Coast Aquifer	0	Municipal Conservation
China	Gulf Coast Aquifer	0	Municipal Conservation, New Well(s) in Gulf Coast Aquifer
County Other	Gulf Coast Aquifer, Run-of-River, Rayburn/Steinhagen Reservoir System (LNVA)	0	Municipal Conservation
Groves	Rayburn/Steinhagen Reservoir System (LNVA)	0	Municipal Conservation
Federal Correctional Complex Beaumont	Sales from Beaumont	0	Municipal Conservation
Jefferson County WCID 10	Carrizo-Wilcox, Houston County Lake	0	Municipal Conservation
Meeker MWD	Run-of-River, Gulf Coast Aquifer	0	Municipal Conservation
Nederland	Rayburn/Steinhagen Reservoir System (LNVA)	0	Municipal Conservation
Nome	Rayburn/Steinhagen Reservoir System (LNVA)	0	Municipal Conservation
Port Arthur	Rayburn/Steinhagen Reservoir System (LNVA)	0	Municipal Conservation
Port Neches	Rayburn/Steinhagen Reservoir System (LNVA)	0	Municipal Conservation
Trinity Bay Conservation District [a, b]	Rayburn/Steinhagen Reservoir System (LNVA), Trinity Run-of-River (CLCND)	207	Region H WMS/WMSP
West Jefferson County MWD	Rayburn/Steinhagen Reservoir System (LNVA), Sales from Beaumont	0	Municipal Conservation

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Irrigation	Gulf Coast Aquifer, Run-of-River, Rayburn/Steinhagen Reservoir System (LNVA)	0	None
Livestock	Gulf Coast Aquifer, Local Supply	0	None
Manufacturing	Rayburn/Steinhagen Reservoir System (LNVA), Gulf Coast Aquifer, Run-of-River, Toledo Bend Reservoir (SRA)	174,012	Purchase from LNVA (Sam Rayburn)
Mining	Gulf Coast Aquifer, Local Supply, Run-of-River	0	None
Steam Electric Power	None	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.9 Nacogdoches County

Figure 5B.9 Nacogdoches County

Surface water, groundwater and local livestock supplies provide water to users in Nacogdoches County, as shown in Figure 5B.9. Lake Nacogdoches and Striker Lake provide the majority of surface water, while groundwater is the primary source for rural water supplies. Lake Naconiche has recently been completed. This lake was built by NRCS for flood storage and recreation, but there are plans to develop water supply from the lake for rural communities. A 1992 study evaluated a potential regional water system using water from Lake Naconiche. This regional system is a recommended strategy to provide water to Nacogdoches County-Other users and several rural WSCs. A brief description of the proposed strategy is presented below.

5B.2.9.1 County Other – Lake Naconiche Regional Water Supply System

Lake Naconiche is located in northeast Nacogdoches County on Naconiche Creek. The lake is permitted to store 9,072 ac-ft of water. To use water from Lake Naconiche for water supply, the County must seek a permit amendment to allow diversions for municipal use. It is assumed that the regional water system would serve Appleby WSC, Lily Grove WSC, Swift WSC, and County-Other entities in Nacogdoches County (including Caro WSC, Lilbert-Looneyville WSC, Libby WSC, and others). Nacogdoches County is the current sponsor of this water management strategy.

The project is initially sized for 3.0 MGD and an average yield of 1,700 ac-ft/yr. This includes a lake intake, new water treatment plant located near Lake Naconiche, pump station and a distribution system of pipelines in the northeast part of the county. Costs are summarized below. The costs for each participant are based on the unit cost of water for the strategy and capital costs are proportioned by strategy amounts. Actual costs would be negotiated as the project is developed. Table 5B.39 and Table 5B.40 summarize the need and cost information associated with this strategy.

Table 5B.39 Recommended Water Management Strategies/Projects for Couty Other, Nacogdoches County – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	0	0
Recommended Water Management Strategies/Projects						
Lake Naconiche Regional Water Supply System	0	1,700	1,700	1,700	1,700	1,700
TOTAL	**0**	**1,700**	**1,700**	**1,700**	**1,700**	**1,700**

Table 5B.40 Recommended Water Management Strategies/Projects for Couty Other, Nacogdoches County– Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Lake Naconiche Regional Water Supply System	1700	$105,317,000	$8,346,000	$4,909	$15.1

5B.2.9.2 D & M WSCI

D & M WSC currently relies on groundwater from the Carrizo-Wilcox Aquifer. The recommended strategy is to expand development of supplies from Carrizo-Wilcox and municipal conservation. Table 5B.41 and Table 5B.42 summarize the need and cost information associated with those strategies.

Table 5B.41 Recommended Water Management Strategies/Projects for D & M WSC – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	(30)	(62)	(115)	(167)	(218)
Recommended Water Management Strategies/Projects						
New Wells (Carrizo-Wilcox)	0	220	220	220	220	220
Municipal Conservation	**20**	**30**	**34**	**38**	**40**	**44**
TOTAL	**20**	**250**	**254**	**258**	**260**	**264**

Table 5B.42 Recommended Water Management Strategies/Projects for D & M WSC – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Carrizo-Wilcox)	220	$5,542,000	$652,000	$2,964	$9.1
Municipal Conservation	20 - 44	$131,000	$21,800	$1,100	$3.4

5B.2.9.3 County Summary

Table 5B.43 is a summary of WUGs in Nacogdoches County, current water supply sources, and recommended WMSs (if any).

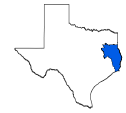


Table 5B.43 Nacogdoches County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Appleby WSC	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (City of Nacogdoches), Nacogdoches Lake/Reservoir (City of Nacogdoches)	0	Municipal Conservation
Caro WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
County-Other, Nacogdoches	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (City of Nacogdoches), Nacogdoches Lake/Reservoir (City of Nacogdoches), Other Aquifer, Queen City Aquifer, Sparta Aquifer, Yegua-Jackson Aquifer	0	Municipal Conservation, Lake Naconiche Regional Water Supply System
Cushing	Carrizo-Wilcox Aquifer	0	Municipal Conservation
D & M WSC	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (City of Nacogdoches), Nacogdoches Lake/Reservoir (City of Nacogdoches)	218	New Wells (Carrizo-Wilcox), Municipal Conservation
Etoile WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Garrison [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Lilly Grove SUD	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Melrose WSC	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (City of Nacogdoches), Nacogdoches Lake/Reservoir (City of Nacogdoches)	0	Municipal Conservation
Nacogdoches	Carrizo-Wilcox Aquifer, Lake/Reservoir	0	Municipal Conservation
Swift WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Woden WSC	Carrizo-Wilcox Aquifer (City of Nacogdoches), Carrizo-Wilcox Aquifer, Nacogdoches Lake/Reservoir (City of Nacogdoches)	0	Municipal Conservation
Irrigation	Carrizo-Wilcox Aquifer, Neches Run-of-River	0	None
Livestock	Carrizo-Wilcox Aquifer, Neches Livestock Local Supply, Other Aquifer, Queen City Aquifer, Sparta Aquifer	0	None
Mining	Neches Other Local Supply, Other Aquifer	0	None
Steam-Electric Power	Striker Lake/Reservoir (Angelina Nacogdoches WCID 1)	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.10 Newton County

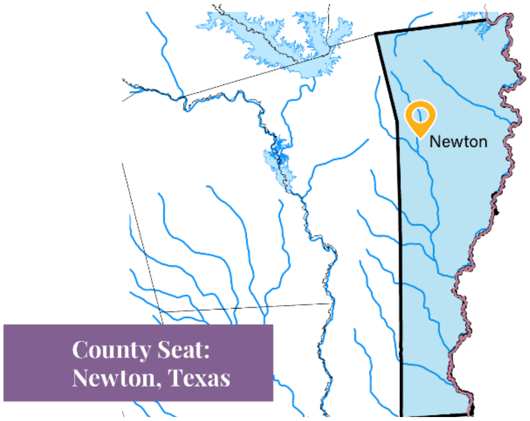


Figure 5B.11 Newton County

Newton County, as shown in Figure 5B.11, is located on the eastern side of the ETRWPA. The county has a total area of approximately 940 square miles. The County seat and largest city is Newton.

Most of the municipal WUGs in Newton County use localized groundwater from the Gulf Coast Aquifer. According to the Groundwater Availability Model estimates, there is approximately 37,500 ac-ft/year of groundwater available from the Gulf Coast Aquifer in Newton County. As a part of this round of planning, approximately 2,500 ac-ft per year has been allocated to WUGs in Newton County in 2030. There is also a significant amount of surface water available from the SRA through the Toledo Bend Reservoir and Sabine run-of-river supplies. Some of this water is contracted for steam electric power. Based on the available groundwater and proximity of surface water to users in Newton County, there is substantial water available for development to meet projected demands. There is no projected need for any WUG located within Newton County throughout the planning period (2030-2080).

5B.2.10.1 County Summary

Although no WUGs with needs were identified, conservation strategies were recommended for all municipal WUGs in Newton County. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.44 provides a summary of WUGs in Newton County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.44 Newton County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Bon Wier WSC	Gulf Coast Aquifer	0	Municipal Conservation
Brookeland FWSD [a]	Gulf Coast Aquifer	0	Municipal Conservation
County Other	Gulf Coast Aquifer	0	Municipal Conservation
Mauriceville SUD [a]	Gulf Coast Aquifer	0	Municipal Conservation
Newton	Gulf Coast Aquifer	0	Municipal Conservation
South Kirbyville Rural WSC [a]	Gulf Coast Aquifer	0	Municipal Conservation
South Newton WSC [a]	Gulf Coast Aquifer	0	Municipal Conservation
Irrigation	Gulf Coast Aquifer, Run-of-River	0	None
Manufacturing	Gulf Coast Aquifer, Run-of-River	0	None
Livestock	Gulf Coast Aquifer, Local Supplies	0	None
Mining	Gulf Coast Aquifer, Local Supplies	0	None
Steam Electric Power	SRA Canal System	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.11 Orange County

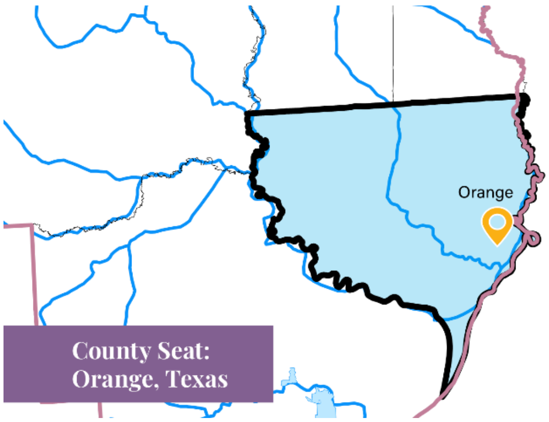


Figure 5B.12 Orange County

Orange County, as shown in Figure 5B.12, is located in the very southeastern corner of the ETRWPA bordering Louisiana. The county seat and largest city, Orange, forms the eastern corner of the Golden Triangle with Beaumont and Port Arthur (located in Jefferson County). The county is bordered on the west by the Neches River, on the east by the Sabine River, and on the southeast by Sabine Lake.

The majority of the water currently used in Orange County comes from the Gulf Coast Aquifer and the Sabine River, with a very small portion coming from the Neches River. According to the Groundwater Availability Model estimates, the total long-term sustainable groundwater availability from the Gulf Coast Aquifer in Orange County is estimated at approximately 25,000 ac-ft per year. Considering historical use, existing infrastructure, and projected demands, projected groundwater use in Orange County is estimated to between 22,000 to 22,500 acre-ft per year across the planning horizon (2030-2080). Considering existing supplies and projected demands, there is no projected need for any WUG located within Orange County across the planning period.

Due to most of the long-term sustainable groundwater availability being used in Orange County, it is recommended that any new large-scale water needs in the county be met with surface water supplies. Otherwise, it is recommended that entities currently using groundwater be allowed to remain on groundwater to meet their future growth, until such a time that a salt-water intrusion or subsidence problem is encountered.

There is a significant amount of surface water available in the Sabine River in Orange County. The SRA canal system, which is located in Orange County, has a conveyance capacity of 346,000 ac-ft per year. SRA has water rights of 147,100 ac-ft per year associated with the canal system (100,400 ac-ft per year for municipal and industrial use and 46,700 ac-ft per year for irrigation). There is a significant amount of supplies in the canal system available for future demands. SRA also has a large amount of uncontracted water in Toledo Bend Reservoir that could potentially be released through the dam and carried by the Sabine River for downstream use from the canal.

5B.2.11.1 Orange County WCID 1

There is no identified need for Orange County WCID 1 across the planning period (2030–2080) based on their projected demands and currently available supply. However, during WUG outreach efforts, South Orange County WCID 1 indicated to the ETRWPG that they are considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands. Thus, a strategy is recommended for Orange County WCID 1 that involves the development of approximately 1,610 acre-feet per year from the Gulf Coast Aquifer in Jasper County. The conceptual design for this strategy involves one public supply well (capacity of 2,000 gpm) that produces groundwater from the Gulf Coast Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. In addition, municipal conservation is also a recommended strategy for the Orange County WCID 1. Municipal conservation is discussed further in Chapter 5C. Table 5B.45 and Table 5B.46 summarize the need and cost information associated with those strategies.

Table 5B.45 Recommended Water Management Strategies/Projects for Orange County WCID 1 – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	0	0
Recommended Water Management Strategies/Projects						
Municipal Conservation	53	118	148	141	134	122
New Well(s) in Gulf Coast Aquifer	1,610	1,610	1,610	1,610	1,610	1,610
TOTAL	**1,663**	**1,728**	**1,758**	**1,751**	**1,744**	**1,732**

Table 5B.46 Recommended Water Management Strategies/Projects for Orange County WCID 1 – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	53 - 148	$212,000	$41,500	$800	$2.46
New Well(s) in Gulf Coast Aquifer	1,610	$9,364,000	$1,512,000	$939	$2.88

5B.2.11.2 County Summary

No WUGs with needs were identified in Orange County. However, a strategy is recommended for Orange County WCID 1 to develop additional groundwater supplies to meet projected future demands. Additionally, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.47 provides a summary of WUGs in Orange County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.47 Orange County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Bridge City	Gulf Coast Aquifer	0	Municipal Conservation
County Other	Gulf Coast Aquifer	0	Municipal Conservation
Kelly G Brewer	Gulf Coast Aquifer	0	Municipal Conservation
Mauriceville SUD [a]	Gulf Coast Aquifer	0	Municipal Conservation
Orange	Gulf Coast Aquifer	0	Municipal Conservation
Orange County WCID 1	Gulf Coast Aquifer	0	Municipal Conservation; New Wells (Gulf Coast Aquifer)
Orange County WCID 2	Gulf Coast Aquifer	0	Municipal Conservation
Orangefield WSC	Gulf Coast Aquifer	0	Municipal Conservation
Pinehurst	Gulf Coast Aquifer	0	Municipal Conservation
South Newton WSC [a]	Gulf Coast Aquifer	0	Municipal Conservation
Irrigation	Run-of-River, SRA Canal	0	None
Livestock	Local Supply, Gulf Coast Aquifer	0	None
Manufacturing	Run-of-River, Gulf Coast Aquifer	0	None
Mining	Local Supply, Gulf Coast Aquifer	0	None
Steam Electric Power	SRA Canal, Gulf Coast Aquifer	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.12 Panola County

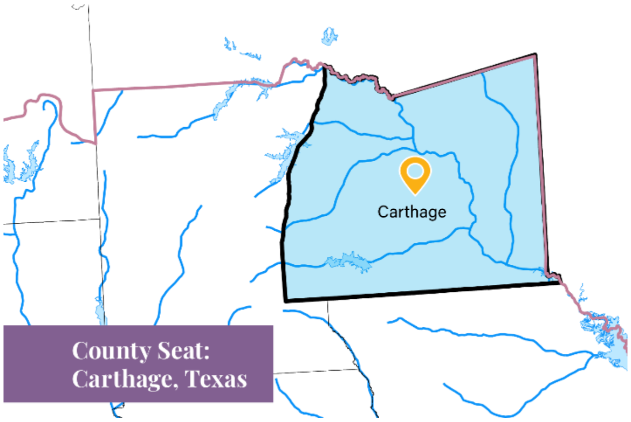


Figure 5B.13 Panola County

Panola County, as shown in Figure 5B.13, is located in the far northeastern corner of the ETRWPA. The county has a total area of approximately 820 square miles. The County seat and largest city is Carthage.

Demands in Panola County are projected to be relatively consistent across the planning horizon (9,436 ac-ft per year in 2030 and 9,191 ac-ft per year by 2080) and can be met through existing supplies. Both groundwater from the Carrizo-Wilcox Aquifer and surface water supplies, mostly from Lake Murvaul, are used in Panola County. According to the Groundwater Availability Model estimates, the Carrizo-Wilcox Aquifer has a long-term availability of approximately 5,000 ac-ft/year in Panola County. Considering existing supplies and projected demands, there is no projected need for any WUG located within Panola County across the planning period.

Considering historical use, existing infrastructure, and projected demands, fresh groundwater supplies from the Carrizo-Wilcox Aquifer in the county are mostly developed. Because the long-term sustainable availability of the Carrizo-Wilcox Aquifer in Panola County has largely been reached, it is recommended that any new (not currently identified) large-scale water needs be met with surface water. It is recommended that entities that currently use groundwater remain on groundwater to meet their future growth until such time as groundwater is no longer a reliable supply. Any entities that are willing to convert to surface water should be encouraged to do so.

5B.2.12.1 County Summary.

Although no WUGs with needs were identified in Panola County, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.48 provides a summary of WUGs in Panola County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.48 Panola County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Beckville	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Carthage	Carrizo-Wilcox Aquifer, Lake Murvaul (Panola Co. FWSD)	0	Municipal Conservation
Clayton WSC	Carrizo-Wilcox Aquifer, Sales from Carthage	0	Municipal Conservation
County Other	Carrizo-Wilcox Aquifer, Sales from Carthage	0	Municipal Conservation
Deberry WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Elysian Fields WSC [a, b]	Carrizo-Wilcox Aquifer	0	Region D WMS/WMSP
Gill WSC [a, b]	Carrizo-Wilcox Aquifer, Sales from Marshall	0	Region D WMS/WMSP
Hollands Quarter WSC	Carrizo-Wilcox Aquifer, Sales from Carthage	0	Municipal Conservation
Minden Brachfield WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Panola-Bethany WSC [a, b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Rehobeth WSC	Sales from Carthage	0	Municipal Conservation
Tatum [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Irrigation	Carrizo-Wilcox Aquifer, Run-of-River	0	None
Livestock	Local Supply, Carrizo-Wilcox Aquifer	0	None
Manufacturing	Run-of-River, Carrizo-Wilcox Aquifer, Sales from Carthage	0	None
Mining	Run-of-River, Carrizo-Wilcox Aquifer, Lake Murvaul (Panola Co. FWSD), Toledo Bend Reservoir (SRA)	0	None
Steam Electric Power	None	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.13 Polk County

Figure 5B.14 Polk County

Polk County, as shown in Figure 5B.14, is partially located in the ETRWPA and partially in Region H. Every WUG in the county uses water from groundwater supplies. The groundwater supplies are from the Gulf Coast, Yegua-Jackson, and Other-Undifferentiated aquifers. Local surface water supplies are also used to meet demands in Polk County. There is no projected need for any WUG located within Polk County during the planning period. Based on the groundwater availability estimates included in this plan, the Gulf Coast Aquifer is sufficient to provide water to future demands that are projected to develop in Polk County.

5B.2.13.1 County Summary

Although no WUGs with needs were identified in Polk County, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.49 provides a summary of WUGs in Polk County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.49 Polk County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Chester WSC [a]	Gulf Coast Aquifer System	0	Municipal Conservation
County-Other [b]	Other Aquifer, Gulf Coast Aquifer System, Yegua-Jackson Aquifer	0	Region H WMS/WMSP
Lake Livingston WSC [b]	Other Aquifer, Gulf Coast Aquifer System	0	Region H WMS/WMSP
Leggett WSC [b]	Region H RWP	0	Region H WMS/WMSP
Soda WSC [b]	Gulf Coast Aquifer System	0	Region H WMS/WMSP
Corrigan	Gulf Coast Aquifer System	0	Municipal Conservation
Damascus-Stryker WSC	Yegua-Jackson Aquifer	0	Municipal Conservation
Moscow WSC [a, b]	Gulf Coast Aquifer System	0	Municipal Conservation
Manufacturing [b]	Gulf Coast Aquifer System (City of Corrigan), Gulf Coast Aquifer System	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.14 Rusk County

Figure 5B.15 Rusk County

Rusk County, as shown in Figure 5B.15, is located in the northern end of the ETRWPA and is split between the Neches and Sabine River Basins. The county has a total area of approximately 920 square miles. The county seat and largest city in the county is Henderson.

Surface water and groundwater are used for water supply in Rusk County. The water sources used by most WUGs in Rusk County include the Neches and Sabine Rivers, the Carrizo-Wilcox, Queen City, and Other-Undifferentiated aquifers, and local supplies. Otherwise, the City of Henderson receives water from Lake Fork (SRA), while steam electric power users have a permit to use Martin Lake and receive water from the Toledo Bend Reservoir (SRA). During the duration of the planning horizon, there are projected water needs identified for Jacobs WSC; however, there are sufficient supplies available to meet these identified needs.

Rusk County Refinery is a potential manufacturing water user that has approached Angelina & Neches River Authority for a water supply contract. The contract amount for this entity is approximately 5,600 ac-ft/year. It should be noted that the overall projections for manufacturing demand in Rusk County are at a maximum amount of 34 ac-ft/year. It is believed that the Rusk County Refinery demands were not accounted for the regional water planning demand projections. WMSs for Rusk County Refinery are not discussed in this section because the demand is not included in the regional water planning demand projections. However, Angelina & Neches River Authority is identified as the seller to this entity and a WMS is discussed in the WMS discussion for major water providers.

5B.2.14.1 Jacobs WSC

All current water supplies for Jacobs WSC are from groundwater in the Carrizo-Wilcox Aquifer. Beginning in 2070, there is an identified need of 26 ac-ft/year shown due to slightly increasing demands over the planning horizon compared to their existing infrastructure constraints. The recommended strategy for Jacobs WSC to meet its need is to develop additional groundwater in the Carrizo-Wilcox Aquifer. Since the need is relatively minimal (less than 10 percent of demand), rather than drilling new wells, this WUG could also consider increasing the pumping rate of their current well system to meet their future demands if there are no infrastructure limitations. Table 5B.50 and Table 5B.51 summarize the need and cost information associated with those strategies.

Table 5B.50 Recommended Water Management Strategies/Projects for Jacobs WSC – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	(26)	(58)
Recommended Water Management Strategies/Projects						
Municipal Conservation	2	2	2	2	2	2
New Well(s) in Carrizo-Wilcox Aquifer	0	0	0	0	60	60
TOTAL	**2**	**2**	**2**	**2**	**62**	**62**

Table 5B.51 Recommended Water Management Strategies/Projects for Jacobs WSC – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	2	$24,000	$2,200	$1,400	$4.30
New Well(s) in Carrizo-Wilcox Aquifer	60	$5,975,000	$738,000	$12,300	$37.74

5B.2.14.2 Gaston WSC

There is no identified need for Gaston WSC across the planning period (2030–2080) based on their projected demands and currently available supply. However, during WUG outreach efforts, Gaston WSC indicated to the ETRWPG that they are considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands. Thus, a strategy is recommended for Gaston WSC that involves the development of approximately 130 acre-feet per year from the Carrizo-Wilcox Aquifer in Rusk County. The conceptual design for this strategy involves one public supply well (capacity of 150 gpm) that produces groundwater from the Carrizo-Wilcox Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. In addition, municipal conservation is also a recommended strategy for the Gaston WSC. Municipal conservation is discussed further in Chapter 5C. Table 5B.52 and Table 5B.53 summarize the need and cost information associated with those strategies.

Table 5B.52 Recommended Water Management Strategies/Projects for Gaston WSC – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	0	0
Recommended Water Management Strategies/Projects						
Municipal Conservation	1	1	1	1	1	1
New Well(s) in Carrizo-Wilcox Aquifer	0	130	130	130	130	130
TOTAL	**1**	**131**	**131**	**131**	**131**	**131**

Table 5B.53 Recommended Water Management Strategies/Projects for Gaston WSC – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	1	$10,000	$900	$1,200	$3.68
New Well(s) in Carrizo-Wilcox Aquifer	130	$3,700,000	$525,000	$3,492	$10.72

5B.2.14.3 Southern Utilities

There are no identified needs for Southern Utilities in the Rusk County portion of the WUG in Region I, but there are some needs identified in the portion in Smith County. A discussion of the WMSs and WMSPs developed to meet this need is described in the Smith County section of this chapter (Section 5B.2.18).

5B.2.14.4 County Summary

The only identified needs in Rusk County are associated with Jacobs WSC. Development of additional groundwater supplies is recommended to meet these needs. A strategy is also recommended for Gaston WSC to develop additional groundwater supplies to meet projected future demands. Additionally, conservation strategies were recommended for all municipal WUGs in the 2026 ETRWP. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.54 provides a summary of WUGs in Rusk County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.54 Rusk County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Chalk Hill SUD [a, b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
County Other	Carrizo-Wilcox, Other Undifferentiated Aquifers	0	Municipal Conservation
Cross Roads SUD [a, b]	Carrizo-Wilcox Aquifer, Sales from Kilgore	0	Municipal Conservation
Crystal Farms WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Ebenezer WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Elderville WSC [a,b]	Carrizo-Wilcox Aquifer, Sales from Longview	0	Region D WMS/WMSP
Gaston WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation, New Wells (Carrizo-Wilcox Aquifer)
Garrison [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Goodsprings WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Henderson	Carrizo-Wilcox Aquifer, Sales from SRA (Lake Fork) and AN WCID 1 (Striker Lake)	0	Municipal Conservation
Jacobs WSC	Carrizo-Wilcox Aquifer	58	Municipal Conservation, New Wells (Carrizo-Wilcox Aquifer)
Kilgore [a, b]	Carrizo-Wilcox Aquifer, Sales from SRA (Lake	0	Region D WMS/WMSP

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
	Fork)		
Minden Brachfield WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
MT Enterprise WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
New London	Carrizo-Wilcox Aquifer	0	Municipal Conservation
New Prospect WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Overton [a, b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
South Rusk County WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Southern Utilities Inc. [a, b]	Carrizo-Wilcox Aquifer, Sales from Tyler (Carrizo-Wilcox Aquifer, Lake Tyler, Lake Palestine)	0	Municipal Conservation
Tatum [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
West Gregg SUD [a, b]	Carrizo-Wilcox Aquifer	0	Region D WMS/WMSP
Wright City WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Irrigation	Carrizo-Wilcox Aquifer, Run-of-River, Other Undifferentiated	0	None
Manufacturing	Carrizo-Wilcox Aquifer, Run-of-River	0	None
Livestock	Carrizo-Wilcox, Queen City Aquifers, Local Supply	0	None
Mining	Carrizo-Wilcox, Other Undifferentiated Aquifers, Run-of-River	0	None
Steam Electric Power	Carrizo-Wilcox, Martin Lake, Toledo Bend Reservoir (SRA)	1,103	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.15 Sabine County

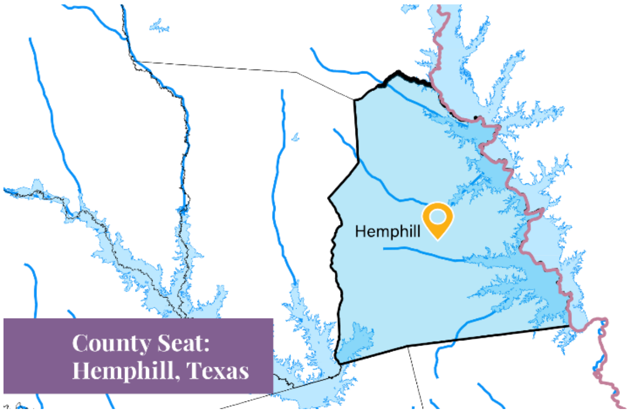


Figure 5B.16 Sabine County

Water supply sources currently used in Sabine County, shown in Figure 5B.16, include the Carrizo-Wilcox, Yegua-Jackson and Other-Undifferentiated aquifers, Toledo Bend Reservoir, and local surface supplies. The total available supply from groundwater in Sabine County is 6,100 ac-ft/year. Of this amount, about 1,400 ac-ft/year is currently being used. This leaves considerable groundwater for future supplies. In addition, Toledo Bend Reservoir, which is located along the eastern border of Sabine County, has available supply (through contracts with SRA). Currently, the only WUG with projected shortages in Sabine County is livestock use.

5B.2.15.1 Livestock

The current water supply sources for livestock in Sabine County are local surface water supply and groundwater from Yegua-Jackson, Carrizo-Wilcox, Sparta, and Other-Undifferentiated aquifers. Identified needs for this WUG stem from increasing demand beyond historical use. The WMS recommended to meet the needs is to install new wells at Yegua-Jackson Aquifer. Table 5B.55 and Table 5B.56 summarize the need and cost information associated with those strategies.

Table 5B.55 Recommended Water Management Strategies/Projects for Sabine County Livestock – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	(97)	(96)	(96)
Recommended Water Management Strategies/Projects						
New Wells (Yegua-Jackson)	0	0	0	100	100	100
TOTAL	**0**	**0**	**0**	**100**	**100**	**100**

Table 5B.56 Recommended Water Management Strategies/Projects for Sabine County Livestock – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Yegua-Jackson)	100	$601,000	$47,000	$470	$1.44

5B.2.15.2 County Summary

Table 5B.57 provides a summary of WUGs in Sabine County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.57 Sabine County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Brookeland FWSD [a]	Carrizo-Wilcox Aquifer, Gulf Coast Aquifer System, Yegua-Jackson Aquifer	0	Municipal Conservation
County-Other, Sabine	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (County-Other, Shelby), Other Aquifer, Sparta Aquifer, Toledo Bend Lake/Reservoir (Sabine River Authority)	0	Municipal Conservation
G M WSC [a]	Carrizo-Wilcox Aquifer, Toledo Bend Lake/Reservoir (Sabine River Authority), Yegua-Jackson Aquifer (City of Pineland)	0	Municipal Conservation
Hemphill	Toledo Bend Lake/Reservoir (Sabine River Authority)	0	Municipal Conservation
Pineland	Yegua-Jackson Aquifer	0	Municipal Conservation
Livestock, Sabine	Carrizo-Wilcox Aquifer, Neches Livestock Local Supply, Sabine Livestock Local Supply, Sparta Aquifer, Yegua-Jackson Aquifer	97	New Wells (Yegua-Jackson)
Manufacturing, Sabine	Direct Reuse, Neches Run-of-River, Other Aquifer, Yegua-Jackson Aquifer (City of Pineland)	0	None
Mining, Sabine	Other Aquifer, Toledo Bend Lake/Reservoir (Sabine River Authority)	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.16 San Augustine County

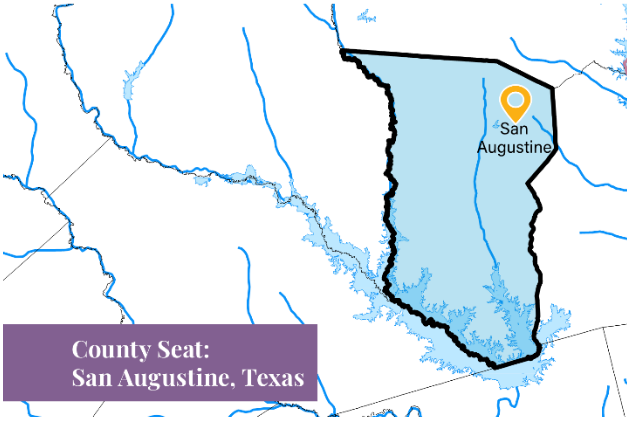


Figure 5B.17 San Augustine County

San Augustine County, as shown in Figure 5B.17, is located in the northeast of the ETRWPA and is split between the Neches and Sabine River Basins. The county has a total area of approximately 590 square miles. The County seat and largest city is San Augustine.

Current water supplies for the county include groundwater from the Carrizo-Wilcox, Sparta, and Yegua-Jackson aquifers and surface water from San Augustine Lake and local supplies. Considering existing supplies and projected demands, there is no projected need for any WUG located within Panola County across the planning period.

5B.2.16.1 <u>County Summary</u>

Although no WUGs with needs were identified in San Augustine County, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.58 provides a summary of WUGs in San Austine County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.58 San Augustine County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
County Other	All Aquifers, San Augustine Lake	0	Municipal Conservation
Denning WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
G-M WSC [a]	Carrizo-Wilcox Aquifer, Toledo Bend Reservoir (SRA)	0	Municipal Conservation
New WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
San Augustine	Carrizo-Wilcox Aquifer, San Augustine Lake	0	Municipal Conservation
San Augustine Rural WSC	Carrizo-Wilcox Aquifer, Sales from San Augustine	0	Municipal Conservation
Irrigation	Carrizo-Wilcox Aquifer	0	None
Livestock	Carrizo-Wilcox Aquifer	0	None
Manufacturing	Carrizo-Wilcox Aquifer	0	None
Mining	All Aquifers, San Augustine Lake (San Augustine)	0	None
Steam Electric Power	None	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.17 Shelby County

Figure 5B.18 Shelby County

Shelby County, which is located in the northeastern part of the region and shown in Figure 5B.18, uses groundwater from the Carrizo-Wilcox aquifer and surface water from Toledo Bend Reservoir, Lake Pinkston, and Center Lake. The two largest water use categories in the county are municipal and livestock, and this livestock demand is projected to nearly double by 2080 with a projected growth rate less than the projected growth rate from the 2021 RWP. The other major demand center is the City of Center and its customers. The only WUG with a projected need is the manufacturing water users. The Carrizo-Wilcox Aquifer has a long-term availability of 6,300 ac-ft/year, and its estimated current use is approximately 5,200 ac-ft/year. There is some groundwater available for development and considerable supply available from Toledo Bend Reservoir. However, a Toledo Bend Reservoir strategy would require infrastructure development to treat and deliver the water to areas with needs. A long-term shift of water supply to surface water may be needed to address future water needs.

5B.2.17.1 Manufacturing

Current supplies for manufacturing water users include water purchased from the City of Center and groundwater from the Carrizo-Wilcox and Tenaha Aquifers. Current supplies for water users are insufficient to meet the projected demand in 2030. It is anticipated that growth in manufacturing will be supplied by City of Center. The recommended strategy to meet the projected needs of manufacturing water users in in Shelby County is to contract to purchase additional water from Center. Table 5B.59 and Table 5B.60 summarize the need and cost information associated with this strategy.

Table 5B.59 Recommended Water Management Strategies/Projects for Shelby County Manufacturing – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(841)	(934)	(1,053)	(1,148)	(1,239)	(1,325)
Recommended Water Management Strategies/Projects						
Purchase from Center	850	940	1,060	1,150	1,240	1,330
TOTAL	**850**	**940**	**1,060**	**1,150**	**1,240**	**1,330**

The cost estimates for this strategy represent raw water purchase costs as well as the necessary conveyance infrastructure including a 5-mile transmission pipeline, storage tanks and pump stations. Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between provider and prospective buyers.

Table 5B.60 Recommended Water Management Strategies/Projects for Shelby County Manufacturing – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Purchase from Center	850 - 1,330	$13,000	$2,200	$800	$2.46

5B.2.17.2 County Summary

Table 5B.61 is a summary of WUGs in Shelby County, current water supply sources, and recommended WMSs (if any).

Table 5B.61 Shelby County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Center	Center Lake/Reservoir, Pinkston Lake/Reservoir	0	Municipal Conservation
Choice WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
County-Other, Shelby	Carrizo-Wilcox Aquifer, Center Lake/Reservoir (City of Center), Pinkston Lake/Reservoir (City of Center), Timpson Lake/Reservoir, Toledo Bend Lake/Reservoir (City of Joaquin)	0	Municipal Conservation
East Lamar WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Flat Fork WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Huxley	Toledo Bend Lake/Reservoir (Sabine River Authority)	0	Municipal Conservation
Joaquin	Toledo Bend Lake/Reservoir (Joaquin)	0	Municipal Conservation
McClelland WSC	Carrizo-Wilcox Aquifer (McClelland WSC)	0	Municipal Conservation
Sand Hills WSC [a]	Carrizo-Wilcox Aquifer (Sand Hills WSC), Center Lake/Reservoir (City of Center), Pinkston Lake/Reservoir (City of Center)	0	Municipal Conservation
Tenaha	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Timpson	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Irrigation	Carrizo-Wilcox Aquifer	0	None
Livestock	Carrizo-Wilcox Aquifer, Neches Livestock Local Supply, Sabine Livestock Local Supply	0	None

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Manufacturing	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (City of Tenaha), Center Lake/Reservoir (City of Center), Direct Reuse, Pinkston Lake/Reservoir (City of Center)	1,325	Purchase from Center
Mining	Carrizo-Wilcox Aquifer, Toledo Bend Lake/Reservoir (Sabine River Authority)	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.18 Smith County

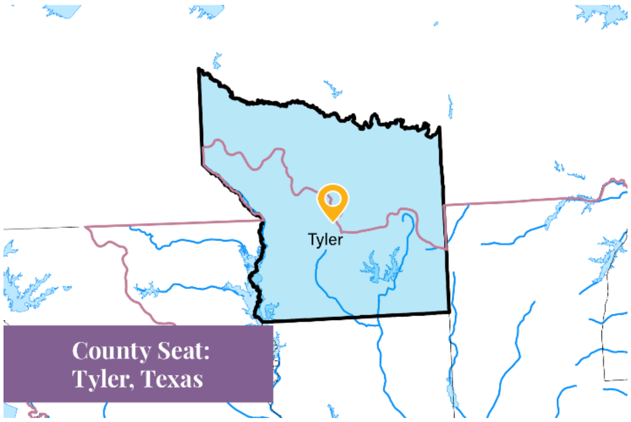


Figure 5B.19 Smith County

Smith County, as shown in Figure 5B.19, is located partially in the ETRWPA and partially in Region D. Almost all of the supplies in Smith County in the ETRWPA come from City of Tyler sources and from groundwater supplies. A small amount of water is supplied from Lake Jacksonville through the Cherokee WSC. The City of Tyler currently utilizes surface water from Lakes Tyler and Tyler East, Bellwood Lake and Lake Palestine. About half of Tyler's current supply is from the Carrizo-Wilcox aquifer.

The groundwater in Smith County is heavily used for water supply. Current combined well capacity from the Carrizo-Wilcox aquifer, the county's largest groundwater supply, is about 96% to 98% the Modeled Available Groundwater (MAG).

5B.2.18.1 County-Other

The County-other entities in Smith County are currently supplied with groundwater from the Carrizo-Wilcox and Queen City Aquifers and water purchase from the City of Tyler. Based on available data, it is estimated that there is not sufficient water to meet the demand of these entities in 2030, though the demand projection is decreasing in the 50-year planning horizon. The WMSs to close the supply gap is to purchase additional water from the City of Tyler and municipal conservation. Table 5B.62 and Table 5B.63 summarize the need and cost information associated with those strategies.

Table 5B.62 Recommended Water Management Strategies/Projects for County Other, Smith County – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(273)	(143)	(33)	0	0	0
Recommended Water Management Strategies/Projects						
Purchase from Tyler	280	150	40	0	0	0
Municipal Conservation	7	6	6	5	5	4
TOTAL	**287**	**156**	**46**	**5**	**5**	**4**

The cost estimates for this strategy represent raw water purchase costs as well as the necessary conveyance infrastructure including a 10-mile transmission pipeline, storage tanks and pump stations. Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between provider and prospective buyers.

Table 5B.63 Recommended Water Management Strategies/Projects for County Other, Smith County – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	40 - 280	$16,362,000	$1,797,000	$6,418	$19.70
Purchase from Tyler (Lake Palestine)	4 - 7	$216,000	$17,400	$2,400	$7.37

5B.2.18.2 Liberty Utilities Silverleaf Water

Liberty Utilities Silverleaf Water is located in both Region D and the ETRWPA. Liberty Utilities Silverleaf Water provides water service in Smith and Wood Counties, and supplies its customers with groundwater from the Carrizo-Wilcox Aquifer. Liberty Utilities Silverleaf Water is primary located in Region D, with maximum projected needs of 524 ac-ft across both Region D and the ETRWPA. To meet this need, a WMS and WMSP for Liberty Utilities Silverleaf Water was developed by Region D. A discussion of the WMS and WMSP developed to meet this need is included in the 2026 Region D regional water plan. The ETRWPG supports and approves the WMS and WMSP developed to meet the water supply need in both regions.

5B.2.18.3 Southern Utilities

The current supply for the Southern Utilities is the Carrizo-Wilcox aquifer and Lake Tyler. The Southern Utilities' supply is limited by well capacities as well as groundwater availability informed by MAG limits, and water shortages are projected to begin in 2030. The recommended WMSs for Southern Utilities are amendment to supplemental contract with City of Tyler and municipal conservation. Notably, Southern Utilities has a recent real water loss of 31%, thus, it is highly economical and effective for Southern Utilities to manage its real water loss through main replacement and ongoing leak detection and management. See Chapter 5C for additional information on water conservation. Table 5B.64 and Table 5B.65 summarize the need and cost information associated with those strategies.

Table 5B.64 Recommended Water Management Strategies/Projects for Southern Utilities – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	68	401
Recommended Water Management Strategies/Projects						
Amendment to Supplemental Contract with City of Tyler	0	0	0	0	70	410
Municipal Conservation	680	1,815	2,438	2,552	2,668	2,786
TOTAL	**680**	**1,815**	**2,438**	**2,552**	**2,738**	**3,196**

The cost estimates for the contract amendment represent raw water purchase costs only. Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between provider and prospective buyers.

Table 5B.65 Recommended Water Management Strategies/Projects for Southern Utilities– Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Amendment to Supplemental Contract with City of Tyler	70 - 410	$0	$670,000	$1,634	$5.02
Municipal Conservation	680 - 2,786	$931,000	$313,100	$500	$1.53

5B.2.18.4 Manufacturing

Manufacturing water users in Smith County, which are located in both Region D and the ETRWPA, is projected to have shortages beginning in 2050 at 43 ac-ft/year and increasing to 567 ac-ft/year by 2080. It is recommended that the manufacturing shortage be met through the purchase of additional supplies from the City of Tyler. This strategy will address the shortages for the manufacturing WUG both in ETRWPA and Region D Regional Water Planning Area.

Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between provider and prospective buyers. It is assumed that the potential manufacturing customers will construct a raw water transmission system to transfer supplies from the City of Tyler supply sources. Cost estimates include capital cost for a 5-mile transmission pipeline, pump stations, and storage tanks. Table 5B.66 and Table 5B.67 summarize the need and cost information associated with this strategy.

Table 5B.66 Recommended Water Management Strategies/Projects for Smith County Manufacturing – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	(43)	(413)	(497)	(567)
Recommended Water Management Strategies/Projects						
Purchase from Tyler	0	0	50	420	500	570
TOTAL	**0**	**0**	**50**	**420**	**500**	**570**

Table 5B.67 Recommended Water Management Strategies/Projects for Smith County Manufacturing – Supply Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Purchase from Tyler	50 - 570	$50,202,000	$4,295,000	$5,461	$16.76

5B.2.18.5 Mining

Mining water users in Smith County, which are located in both Region D and the ETRWP is projected to have shortages beginning in 2030 of 314 ac-ft/year and increasing to 421 ac-ft/year by 2080. It is recommended that the mining shortage be met through the purchase of additional supplies from the City of Tyler. This strategy will address the shortages for the mining WUG both in the ETRWPA and Region D Regional Water Planning Area.

Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between provider and prospective buyers. It is assumed that the potential manufacturing customers will construct a raw water transmission system to transfer supplies from the City of Tyler supply sources. Cost estimates include capital cost for a 10-mile transmission pipeline, pump stations, and storage tanks. Table 5B.68 and Table 5B.69 summarize the need and cost information associated with this strategy.

Table 5B.68 Recommended Water Management Strategies/Projects for Smith County Mining – Supply Summary

	Quantity (ac-ft/year)					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Need (Demand – Supply)	(314)	(333)	(353)	(374)	(397)	(421)
Recommended Water Management Strategies/Projects						
Purchase from Tyler	320	340	360	380	400	430
TOTAL	**320**	**340**	**360**	**380**	**400**	**430**

Table 5B.69 Recommended Water Management Strategies/Projects for Smith County Mining – Supply Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Purchase from Tyler	320 - 430	$17,996,000	$1,890,000	$4,395	$13.49

5B.2.18.6 County Summary

Table 5B.70 is a summary of WUGs in Smith County, current water supply sources, and recommended WMSs (if any).

Table 5B.70 Smith County Summary

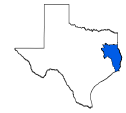
Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Carroll WSC [a, b]	Refer to the Region D RWP	98	Region D WMS/WMSP
Crystal Systems Texas [b]	Refer to the Region D RWP	443	Region D WMS/WMSP
Lindale [b]	Refer to the Region D RWP	158	Region D WMS/WMSP
Lindale Rural WSC [b]	Refer to the Region D RWP	756	Region D WMS/WMSP
Arp	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Bullard [a]	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (City of Jacksonville), Jacksonville Lake/Reservoir (City of Jacksonville)	0	Municipal Conservation
County-Other, Smith [a]	Carrizo-Wilcox Aquifer, Gladewater Lake/Reservoir (City of Gladewater), Palestine Lake/Reservoir (City of Tyler), Queen City Aquifer, Tyler Lake/Reservoir (City of Tyler)	273	Purchase from Tyler (Lake Palestine); Municipal Conservation
Dean WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Emerald Bay MUD	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Jackson WSC b	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Southern Utilities [a,b]	Carrizo-Wilcox Aquifer, Palestine Lake/Reservoir (City of Tyler), Tyler Lake/Reservoir (City of Tyler)	401	Amendment to Supplemental Contract with City of Tyler; Municipal Conservation
Troup [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Tyler [b]	Palestine Lake/Reservoir (City of Tyler), Tyler Lake/Reservoir	0	Municipal Conservation
Walnut Grove WSC [a]	Carrizo-Wilcox Aquifer, Palestine Lake/Reservoir (City of Tyler), Tyler Lake/Reservoir (City of Tyler)	0	Municipal Conservation
Whitehouse	Carrizo-Wilcox Aquifer, Palestine Lake/Reservoir (City of Tyler), Tyler Lake/Reservoir (City of Tyler)	0	Municipal Conservation
Wright City WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Irrigation, Smith	Bellwood Lake/Reservoir (City of Tyler), Carrizo-Wilcox Aquifer, Neches Run-of-River, Palestine Lake/Reservoir (City of Tyler), Queen City Aquifer	0	None
Livestock, Smith	Neches Livestock Local Supply, Queen City Aquifer	0	None
Manufacturing, Smith	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (Southern Utilities), Other Aquifer, Palestine Lake/Reservoir (City of Tyler), Queen City Aquifer, Tyler Lake/Reservoir (City of Tyler)	567	Purchase from Tyler
Mining, Smith	Carrizo-Wilcox Aquifer, Other Aquifer	421	Purchase from Tyler

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.



5B.2.19 Trinity County

Figure 5B.20 Trinity County

The county, as shown in Figure 5B.20, is partially located in the ETRWPA and partially in Region H. Supplies include surface water from local supplies and the Neches River as well as groundwater from the Carrizo-Wilcox, Queen City, Sparta, Yegua-Jackson, and Other-Undifferentiated aquifers. Municipal demands in Trinity County are less than a tenth of one percent of the ETRWPA's total municipal demand. There is only one non-municipal WUG with a projected shortage, which is the irrigation WUG.

5B.2.19.1 Irrigation

Irrigation water users in Trinity County, located in both Region H and the ETRWPA, are projected to have shortages beginning in 2030 at 215 ac-ft/year. It is recommended that the mining shortage be met through installing new wells in the Yegua-Jackson Aquifer. This strategy will address the shortages for the irrigation WUG both in the ETRWPA and Region H Regional Water Planning Area.

The cost of this strategy includes the construction of well fields and the necessary conveyance infrastructure. Table 5B.71 and Table 5B.72 summarize the need and cost information associated with this strategy.

Table 5B.71 Recommended Water Management Strategies/Projects for Trinity County Irrigation – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(215)	(215)	(215)	(215)	(215)	(215)
Recommended Water Management Strategies/Projects						
New Wells (Yegua-Jackson)	220	220	220	220	220	220
TOTAL	**220**	**220**	**220**	**220**	**220**	**220**

Table 5B.72 Recommended Water Management Strategies/Projects for Trinity County Irrigation – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Yegua-Jackson)	220	$646,000	$52,000	$236	$0.73

5B.2.19.2 County Summary

Table 5B.73 is a summary of WUGs in Trinity County, current water supply sources, and recommended WMSs (if any).

Table 5B.73 Trinity County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Groveton [b]	Yegua-Jackson Aquifer	0	Region H WMS/WMSP
Centerville WSC	Yegua-Jackson Aquifer	0	Municipal Conservation
County-Other, Trinity	Gulf Coast Aquifer System, Livingston-Wallisville Lake/Reservoir System (Trinity River Authority), Other Aquifer, Yegua-Jackson Aquifer	0	Municipal Conservation
Pennington WSC [a, b]	Yegua-Jackson Aquifer	0	Municipal Conservation
Irrigation	Neches Run-of-River, Yegua-Jackson Aquifer	215	New Wells (Yegua-Jackson)
Livestock	Neches Livestock Local Supply, Yegua-Jackson Aquifer	0	None
Mining	Yegua-Jackson Aquifer	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.20 Tyler County

Figure 5B.21 Tyler County

Current supplies in Tyler County, shown in Figure 5B.21, include groundwater from the Gulf Coast aquifer and surface water from Sam Rayburn Reservoir (LNVA), the Neches River, and local supplies. Tyler County represents approximately one percent of the total municipal demand in the ETRWPA and has a total county demand of approximately 4,000 ac-ft/year in 2030. There is no projected need for any WUG located within Tyler County during the planning period except the manufacturing water users. Based on the water availability estimates included in this plan, there is sufficient water to provide projected future demands in Tyler County with the recommended WMS.

5B.2.20.1 Manufacturing

Current supplies of manufacturing water users in Tyler County is groundwater from the Gulf Coast aquifer, and the projected shortage is due the potential infrastructure constraint informed by historical pumpage. The projected shortage is projected to begin in 2030 at 78 ac-ft/year. It is recommended that the mining shortage be met through installing new wells in the Gulf Coast aquifer.

The cost of this strategy includes the construction of well fields and the necessary conveyance infrastructure. Table 5B.74 and Table 5B.75 summarize the need and cost information associated with this strategy.

Table 5B.74 Recommended Water Management Strategies/Projects for Tyler County Manufacturing – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(78)	(82)	(87)	(92)	(97)	(102)
Recommended Water Management Strategies/Projects						
New Wells (Gulf Coast)	110	110	110	110	110	110
TOTAL	**110**	**110**	**110**	**110**	**110**	**110**

Table 5B.75 Recommended Water Management Strategies/Projects for Tyler County Manufacturing – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Gulf Coast)	110	$607,000	$49,000	$445	$1.37

5B.2.20.2 County Summary

Table 5B.76 is a summary of WUGs in Tyler County, current water supply sources, and recommended WMSs (if any).

Table 5B.76 Tyler County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Chester WSC [a]	Gulf Coast Aquifer System	0	Municipal Conservation
Colmesneil	Gulf Coast Aquifer System	0	Municipal Conservation
County-Other, Tyler	Gulf Coast Aquifer System	0	Municipal Conservation
Cypress Creek WSC	Gulf Coast Aquifer System	0	Municipal Conservation
Moscow WSC [a, b]	Gulf Coast Aquifer System	0	Municipal Conservation
Seneca WSC	Gulf Coast Aquifer System	0	Municipal Conservation
Tyler County SUD	Gulf Coast Aquifer System	0	Municipal Conservation
Warren WSC	Gulf Coast Aquifer System	0	Municipal Conservation
Woodville	Gulf Coast Aquifer System, Sam Rayburn-Steinhagen Lake/Reservoir System (Lower Neches Valley Authority)	0	Municipal Conservation
Irrigation	Gulf Coast Aquifer System, Neches Run-of-River	0	Municipal Conservation
Livestock	Gulf Coast Aquifer System, Neches Livestock Local Supply	0	Municipal Conservation
Manufacturing	Gulf Coast Aquifer System	102	New Wells (Gulf Coast Aquifer)
Mining	Gulf Coast Aquifer System, Neches Other Local Supply	0	None
Steam-Electric Power	Gulf Coast Aquifer System	0	None

Notes:

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.3 MAJOR WATER PROVIDERS

This section provides discussions for all sixteen Major Water Providers (MWPs) located in the ETRWPA. Additional discussion is provided for MWPs that meet one of the following criteria:

- The entity has a projected shortage in supplies based on either demands or contracts of current customers and current reliable supplies. These MWPs include Athens MWA, Beaumont, Center, and Upper Neches River Municipal Water Authority (UNRMWA).

- The entity has supply sources in the ETRWPA that are listed as WMSs for WUGs outside the Region. LNVA and UNRMWA are included under this criterion.

- The entity is currently pursuing WMSs to increase the reliability and/or distribution of their supplies. These include Athens MWA, Beaumont, Center, Houston County WCID #1, Jacksonville, LNVA, Lufkin, Nacogdoches, and Tyler.

A management supply factor (MSF) is the ratio of an entities total volume of existing water supplies plus total volume of recommended WMS supplies to the total decadal water demand. A value over 1.0 represents an entity with a surplus of projected supplies while a value less than 1.0 represents an entity with a deficit of projected supplies, or an unmet need. Appendix 5B-C presents the MSF for each MWP for each decade in the planning period. All MWPs have an MSF of at least 1.0 every decade except UNRMWA whose supply shortage in early decades is due to contract needs rather than demand-driven and will be met by the recommended WMSs in the 2026 RWP. By later decades, all MWPs will have an MSF of at least 1.

5B.3.1 Angelina & Neches River Authority

Angelina & Neches River Authority is the sponsor for the Lake Columbia project on Mud Creek in Cherokee and Rusk Counties. Lake Columbia is a recommended strategy in the 2021 and 2026 Plan. Angelina & Neches River Authority has been granted a water right permit (Permit No. 4228) by the TCEQ to impound 195,500 ac-ft and to divert 85,507 ac-ft/yr (76.3 MGD) for municipal and industrial purposes. Angelina & Neches River Authority currently has contracted customers for 53 percent of the 85,507 ac-ft/yr permitted supply of the proposed Lake Columbia. Additionally, potential customers from Region C are expected to begin utilizing water from Lake Columbia in 2070. In addition to Lake Columbia, ANRA also operates a few smaller entities in Region I that fall under the county-other WUGs and serves mining customers in Nacogdoches and San Augustine Counties.

The water suppliers currently under contract with Angelina & Neches River Authority for water from Lake Columbia are listed with current participation percentage in Table 5B.77. Also included is Table 5B.78 showing additional contracted customers Angelina & Neches River Authority and the corresponding demand. The WMSs for Angelina & Neches River Authority were developed to address the total customer demand.

There are two recommended strategies for Angelina & Neches River Authority in the 2026 Plan. They are 1) construction of Lake Columbia and 2) Angelina & Neches River Authority treatment plant and distribution system.

5B.3.1.1 <u>Construction of Lake Columbia (Recommended)</u>

Lake Columbia is currently projected to be online by 2040. To develop Lake Columbia, ANRA has:

- Secured a water right. Permit 4228, issued in June 1985, allows ANRA to impound up to 195,500 acre-feet in Lake Columbia and to divert up to 85,507 acre-feet per year for municipal, industrial, and recreation purposes.
- Applied for a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers (USACE) in 2000 but was withdrawn in 2020 for insufficient purpose and need definition per USACE. ANRA continues to seek stakeholders who can satisfy the USACE purpose and need criteria requirements and the funding to complete the Section 404 permitting process. As part of the 404 permitting process, ANRA has:
    - Completed a downstream impact analysis.
    - Completed an archaeological field survey.
    - Completed a proposed mitigation plan.
    - Worked toward completion of a draft Environmental Impact Statement (EIS).

Angelina & Neches River Authority and participating entities will share the costs associated with the Lake Columbia water management strategy. For reservoir construction, unit costs are based on the WAM Run 3 yield estimate of 75,720 ac-ft/yr in 2040.

5B.3.1.2 Angelina & Neches River Authority Treatment Plant and Distribution System (Recommended)

The cities of Nacogdoches, Jacksonville, and Rusk are assumed to purchase raw water from Lake Columbia and develop their own raw water transmission and treatment facilities. Most of the municipal water users (and current customers of Angelina & Neches River Authority) in Cherokee, Rusk, and Smith Counties will be purchasing treated water from Angelina & Neches River Authority. Costs for water treatment and the transmission system are shared among currently contracted entities that are assumed to buy treated water from Angelina & Neches River Authority. This project will not supply any additional raw water. Rather, this project will provide treatment capacity for 22,232 ac-ft/yr of raw water from Lake Columbia.

A comparison of the water supplies versus the demands and the recommended strategies to be implemented is shown in Table 5B.79. A summary of the strategy costs is also provided below. The cost estimate reported in this section is the cost for developing the total 2040 yield of Lake Columbia, 75,720 ac-ft/yr. It is assumed Angelina & Neches River Authority will share the cost with potential project participants who yet to be determined. Capital costs for the dam and relocations were extracted from the cost estimates developed for the EIS (based on March 2012 dollars) and updated to reflect September 2023 dollars. Included in the relocation costs are estimates for relocating the four state highways and one railway that will be impacted by the reservoir. Annual costs for the reservoir were developed assuming a 40-year debt service with 3.5% interest rate. Annual costs for the non-reservoir infrastructure was developed for a 20-year debt service with 3.5% interest rate.

5B.3.1.3 Angelina & Neches River Authority Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for ANRA is presented in Table 5B.83, Table 5B.79, Table 5B.80, and Figure 5B.22.

Table 5B.77 Customers for Lake Columbia

Recipient	County	Basin	Percent Participation in Columbia	Contract Amount (ac-ft/yr)
Current Contracted Customers				
Afton Grove WSC, Stryker Lake WSC	Cherokee	Neches	4.5%	3,848
Jacksonville	Cherokee	Neches	5.0%	4,275
New Summerfield	Cherokee	Neches	3.0%	2,565
North Cherokee WSC	Cherokee	Neches	5.0%	4,275
Rusk	Cherokee	Neches	5.0%	4,275
Rusk Rural WSC	Cherokee	Neches	1.0%	855
City of Alto	Cherokee	Neches	0.5%	428
Caro WSC	Nacogdoches	Neches	0.5%	428
Nacogdoches	Nacogdoches	Neches	10%	8,551
New London	Rusk	Sabine	1.0%	855
Troup	Smith	Neches	5.0%	4,275
Arp	Smith	Neches	0.5%	428
Blackjack WSC	Smith	Neches	1.0%	855
Jackson WSC	Smith	Neches	1.0%	855
Whitehouse	Smith	Neches	10%	8,551
Potential Customers				
City of Dallas (Region C)	Dallas	Trinity		
NTMWD (Region C)	Collin, Dallas, Denton, Fannin, Hunt, Kaufman, Rains, and Rockwall	Trinity, Red River	Up to 70%	Up to 56,050
San Jacinto River Authority (Region H)	Montgomery, Harris	San Jacinto		

Table 5B.78 Additional Customer Demand for ANRA

Recipient	2030	2040	2050	2060	2070	2080
Holmwood Utility [a]	1,137	1,049	948	851	748	636
Angelina County Fresh Water Supply District #1 [b]	47	47	47	47	47	47
Central Heights Utilities [c]	81	81	81	81	81	81
Prairie Grove Water Supply Corporation [d]	39	39	39	39	39	39
Mining - Nacogdoches	891	891	891	891	891	891
Mining – San Augustine	1,411	1,411	1,411	1,411	1,411	1,411
Total Current Customer Demand	3,606	3,518	3,417	3,320	3,217	3,105

Notes:

[a] Assume to be the demand from County Other, Jasper; met by Jasper Aquifer.

[b] Demand data is based on the 2022 Water Use Survey, which also indicates that Angelina County Fresh Water Supply District #1 is served by the City of Lufkin, drawing from the Carrizo-Wilcox Aquifer.

[c] ANRA acquired Central Heights Utilities in September 2023. Recent data shows an average monthly demand of 2.2 million gallons, with Central Heights Utilities sourcing its water from the City of Nacogdoches.

[d] Data from September 2023 through July 2024 indicates an average monthly demand of 1.06 million gallons. Prairie Grove WSC sources approximately half of its water from the City of Diboll, with the remaining portion supplied by groundwater from the Other Aquifer in Angelina County.

Table 5B.79 ANRA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Jasper Aquifer, Angelina County	1,137	1,049	948	851	748	636
City of Lufkin	47	47	47	47	47	47
Purchase from City of Nacogdoches	81	81	81	81	81	81
Purchase from City of Diboll	20	20	20	20	20	20
Other Aquifer, Angelina County	19	19	19	19	19	19
ROR (Nacogdoches County)	891	891	891	891	891	891
ROR (San Augustine)	1,411	1,411	1,411	1,411	1,411	1,411
Total Existing Supplies	**3,606**	**3,518**	**3,417**	**3,320**	**3,217**	**3,105**
Demands (ac-ft per year)						
Total Existing Demands	3,606	3,518	3,417	3,320	3,217	3,105
Total Future Contracted Demand	0	45,319	45,319	45,319	45,319	45,319
Total Future Potential Demand Outside of Region I	0	0	0	0	30,161	30,081
Total Potential Demand	**3,606**	**48,837**	**48,736**	**48,639**	**78,697**	**78,505**
Surplus or (Shortage) with Existing Supplies	**0**	**(45,318)**	**(45,318)**	**(45,318)**	**(75,479)**	**(75,399)**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Lake Columbia	0	75,720	75,640	75,560	75,480	75,400
ANRA Treatment and Distribution System [a]	0	22,232	22,232	22,232	22,232	22,232
Total Increase in Supplies from Recommended WMSs/WMSPs	**0**	**75,720**	**75,640**	**75,560**	**75,480**	**75,400**
Surplus or (Shortage) with Recommended WMSs/WMSPs without Non-Region I Demand	**0**	**30,401**	**30,321**	**30,241**	**30,161**	**30,081**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**0**	**30,401**	**30,321**	**30,241**	**0**	**0**

Notes:

[a] Gray indicates a strategy that involves expansion of infrastructure to access existing and/or future supplies. These should not be included in the total to avoid double counting.

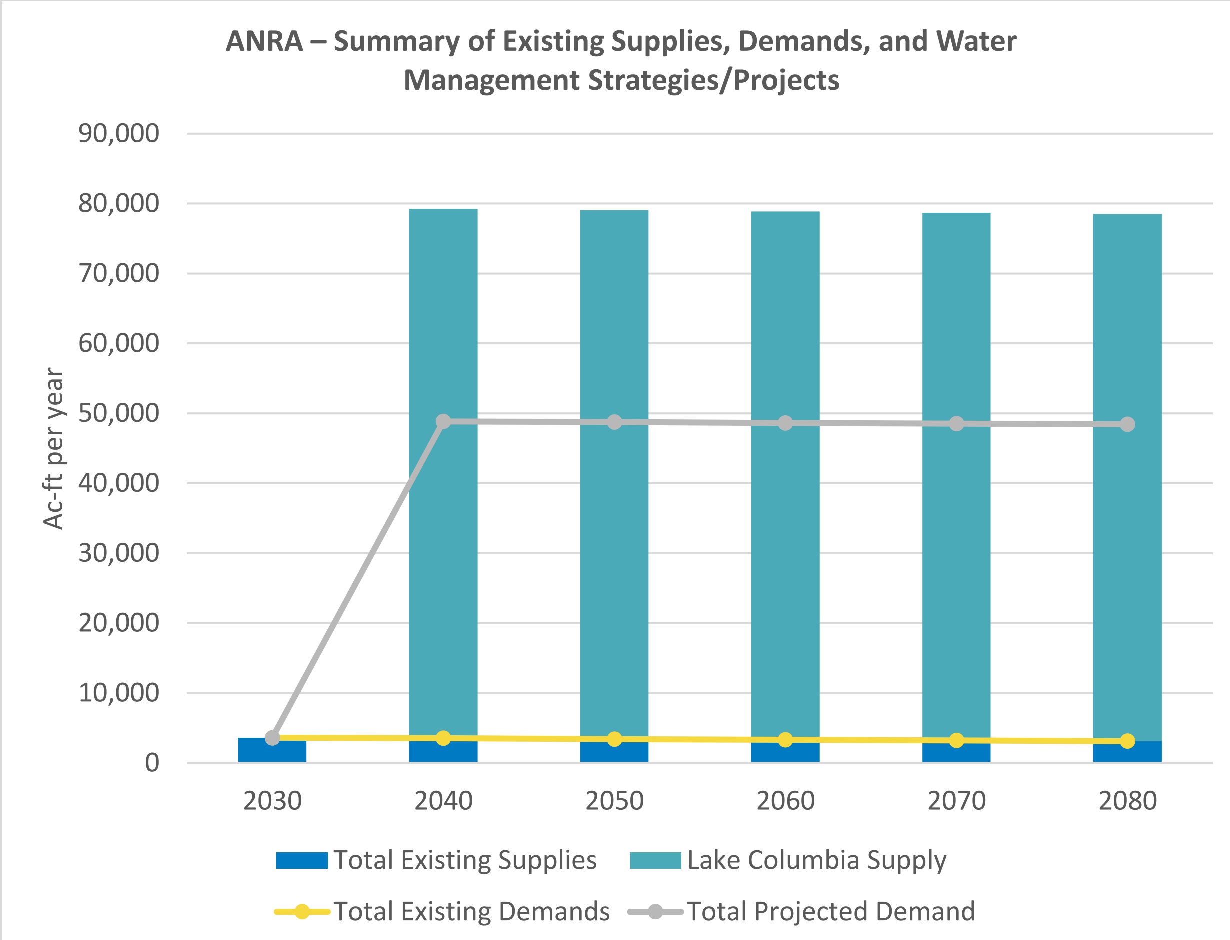


Figure 5B.22 ANRA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.80 ANRA – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Lake Columbia	75,400	$486,368,000	$28,382,000	$375	$1.15
ANRA Treatment and Distribution System	22,232	$455,353,000	$84,250,000	$3,790	$11.63

5B.3.2 Angelina Nacogdoches WCID #1

Angelina Nacogdoches WCID#1 (AN WCID #1) is a major water provider to Steam Electric Power demands for Luminant and Nacogdoches Power in Cherokee and Nacogdoches counties, respectively. In addition to these customers, Angelina Nacogdoches WCID#1 has a contract with Henderson in Rusk County for future use. The demand for wholesale customers is supplied from Lake Striker. Angelina Nacogdoches WCID#1 owns a water right for 20,600 ac-ft/yr from Lake Striker. The entity’s supplies are sufficient to meet the contracted demands. Table 5B.81 includes a summary of demands and supplies for Angelina

Nacogdoches WCID#1, which is also shown in Figure 5B.23. The following recommended strategies were proposed by Angelina Nacogdoches WCID#1 for inclusion in the 2026 Plan.

5B.3.2.1 Hydraulic Dredging Operation (Recommended)

Angelina Nacogdoches WCID#1 believes that the volumetric survey will result in an additional yield that will enhance its water supply reliability. The strategy is to conduct hydraulic dredging of Lake Striker to address the Lake sedimentation issues and increase Lake yield. The timing for the dredging operation is projected to be in 2040. Angelina Nacogdoches WCID#1 provided an estimate of the total cost for this strategy. Angelina Nacogdoches WCID#1 also plans to work with TWDB on the adjustment of the normal pool elevation of Lake Striker. The additional yield associated with the normal pool elevation adjustment is not clear at this point; however, it is assumed to yield an approximate amount of 3,500 ac-ft/yr.

Internal studies conducted by Angelina Nacogdoches WCID#1 resulted in higher yield estimates for Lake Striker than those obtained from the Water Availability Model. Angelina Nacogdoches WCID#1 believes that the additional yield in Lake Striker is sufficient to meet the shortages manifested for this entity in this planning cycle. To address this inconsistency, Angelina Nacogdoches WCID #1 is considering conducting volumetric survey of Lake Striker to determine the capacity of the lake and the resulting yield. Angelina Nacogdoches WCID#1 will coordinate with TWDB to schedule the volumetric survey. TWDB will charge a fee for conducting volumetric surveys. A cost estimate is not included for this strategy since this cost will be determined by Angelina Nacogdoches WCID#1 during their negotiations with TWDB.

A summary of the cost estimates for the recommended strategy is provided in Table 5B.82.

Table 5B.81 AN WCID #1– Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Lake Striker	10,500	9,990	9,480	8,970	8,460	7,950
Total Existing Supplies	**10,500**	**9,990**	**9,480**	**8,970**	**8,460**	**7,950**
Demands (ac-ft per year)						
Total Existing Demands	2,078	2,285	2,513	2,765	3,041	3,345
Surplus or (Shortage) with Existing Supplies	**8,422**	**7,705**	**6,967**	**6,205**	**5,419**	**4,605**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Hydraulic Dredging (Includes Volumetric Survey and Normal Pool Elevation Adjustment)	0	5,600	5,600	5,600	5,600	5,600
Total Increase in Supplies from Recommended WMSs/WMSPs	**0**	**5,600**	**5,600**	**5,600**	**5,600**	**5,600**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**8,422**	**13,305**	**12,567**	**11,805**	**11,019**	**10,205**

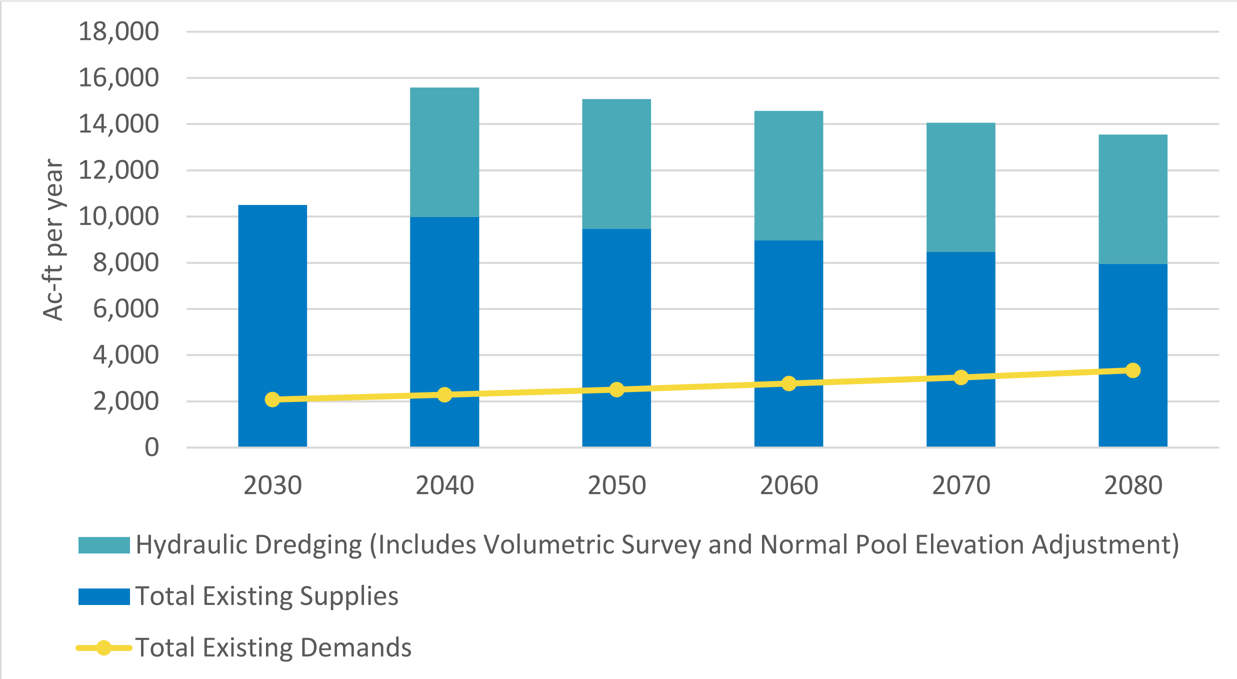


Figure 5B.23 AN WCID#1 – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.82 A AN WCID#1 – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Hydraulic Dredging (Includes Volumetric Survey and Normal Pool Elevation Adjustment)	5,600	$27,980,652	$1,399,033	$4,997	$15.33

5B.3.3 Athens Municipal Water Authority

Athens MWA (AMWA) is a wholesale provider that provides treated water to the City of Athens (Region C and ETRWPA). The City of Athens demands are projected to grow from 2,633 ac-ft per in 2030 to 6,649 ac-ft per year by 2080. The City provides a small volume of supply to local manufacturing demands (estimated 20 ac-ft per year). In addition, AMWA provides raw water lakeside for lawn irrigation around Lake Athens (projected demand estimated of around 85 to 110 ac-ft per year) and the Texas Freshwater Fisheries Center (TFFC), which is captured under the livestock WUG in Henderson County. The TFFC, located at the lake, has a contract with AMWA to divert 3,023 ac-ft per year from Lake Athens for their fish hatchery.

AMWA owns and operates Lake Athens and has a water right to divert 8,500 ac-ft per year from Lake Athens. In the 2026 ETRWP, the firm yield of Lake Athens is estimated to be approximately 4,500 ac-ft per year in 2030 and reduces to approximately 4,200 ac-ft per year in 2080 due to sedimentation. AMWA also owns two groundwater wells. One groundwater well is next to the property of their existing water treatment plant (WTP). Groundwater supply from this well is blended with Lake Athens surface water at the WTP and distributed to City of Athens. The second well, known as the Powder River Well, was constructed in 2023. The City of Athens operates and maintains the WTP and groundwater wells owned by AMWA. In addition, the City of Athens owns three groundwater wells within their City limits.

AMWA's existing WTP has a capacity of 8.0 MGD; however, the existing AMWA high service pump station (HSPS) that is used to deliver treated water supply to the City of Athens has a firm capacity of 4.9 MGD. Based on the projected treated demands for the City of Athens, this pump station will need to be upgraded in the future.

A summary of supplies and demands for AMWA included in Table 5B.83.The total projected water supply needs associated with AMWA and their customers is projected to be approximately 890 ac-ft per year by 2050 and 4,145 ac-ft per year by 2080. Based on the water supply needs identified, the following WMSs and WMSPs related to AMWA are recommended.

5B.3.3.1 City of Athens Municipal Conservation (Recommended)

Municipal conservation is a recommended WMS and WMSP for the City of Athens. Municipal conservation efforts from the City will reduce the future supply needed from AMWA. The projected savings from municipal conservation for the City (across both Region C and the ETRWPA) are 122 ac-ft per year in 2030 and 1,226 ac-ft per year by 2080. The City is located predominantly in Region C, so the recommended municipal WMS and WMSP described was developed by the Region C Water Planning Group consultant. A more detailed discussion of this WMS and WMSP is included in the 2026 Region C regional water plan. The ETRWPG supports and approves the WMS and WMSP developed to reduce the water supply need in both regions.

5B.3.3.2 Reuse of Fish Hatchery Return Flows (Recommended)

A recommended WMS for Athens MWA is the indirect reuse of flows returned from the TFFC fish hatchery to Lake Athens**.** Currently, approximately 95 to 100 percent of the water diverted for the fish hatchery is returned to Lake Athens; however, the fish hatchery is under no contractual obligation to continue this practice. To assure adequate supplies for the fish hatchery and other uses, Athens MWA should work with the fish hatchery to assure that the hatchery continues to return diverted water to Lake Athens for subsequent reuse. For purposes of this plan, it is assumed that 95 percent of the contracted water will be returned. This equates to 2,872 ac-ft/year of additional supply.

5B.3.3.3 WTP Pump Station Expansion (Recommended).

A recommended WMS/WMSP is included for AMWA to expand their existing high service pump station (HSPS) to be able to deliver sufficient supply from their water sources to meet the projected demands of their treated water customer: the City of Athens. The firm capacity of AMWA's existing WTP high service pump station, which is operated by the City of Athens, is 4.9 MGD. Based on the projected treated demands for the City of Athens, this pump station will need to be upgraded in the future. Based on the projected peak treated water demands of the City (assuming a peaking factor of 2.1 based on historical use), this pump station will need to be upgraded to a firm capacity of approximately 5.6 MGD by 2050 (0.70 MGD increase compared to existing) and 9.0 MGD (4.1 MGD increase compared to existing) by 2070. This infrastructure expansion will ensure that AMWA is able to distribute treated water supply from their existing treated sources (Lake Athens, AMWA WTP groundwater well) and potential future sources (indirect reuse of fish hatchery flows from Lake Athens) to meet projected demands from the City of Athens.

5B.3.3.4 New Well(s) in Carrizo-Wilcox Aquifer (Alternative)

Since 2015, AMWA has constructed two new groundwater wells to provide additional supply to their customers. Additional development of groundwater supplies could be a viable option for AMWA as their customers' demands continue to grow. However, the Carrizo-Wilcox Aquifer Modeled Available Groundwater (MAG) in Henderson County (both in Region C and I) has very limited availability beyond what is currently being used. Due to these MAG limitations, this WMS and WMSP is included as an alternative for AMWA. In the future, this could be changed to a recommended WMS and WMSP if the MAG volumes increase. Even with the MAG limitations for this strategy, there are no unmet needs throughout the planning horizon for Athens MWA considering their other recommended options.

This alternative strategy assumes the development of approximately 720 acre-feet per year from the Carrizo-Wilcox Aquifer in Henderson County by 2070. The conceptual design for this strategy involves three public supply wells (capacities of 250 gpm each) located within the Carrizo-Wilcox Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system.

5B.3.3.5 Other Considered Strategies and Projects

Another alternative water management strategy considered for Athens MWA was the reuse of City of Athens wastewater discharges. Recognizing the limitation of its existing supplies, Athens MWA received a reuse permit for 2,677 ac-ft per year that allows the City of Athens to discharge its wastewater effluent to Lake Athens and divert it from the lake for use. However, a study by Region C for the 2011 Regional Plan showed that this strategy was less economically feasible than other alternatives. At this time, Athens MWA and the City of Athens are not pursuing reuse of Athens wastewater discharges.

5B.3.3.6 Athens MWA Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for Athens MWA is presented in Table 5B.83, Table 5B.84, and Figure 5B.24.

Table 5B.83 Athens MWA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Lake Athens (Firm Yield)	4,540	4,480	4,420	4,360	4,300	4,240
Lake Athens Supply Constrained by AMWA WTP HSPS Capacity [a]	4,540	4,480	4,420	4,191	3,851	3,679
Groundwater Wells (AMWA)	1,487	1,487	1,487	1,487	1,487	1,487
Groundwater Wells (City of Athens)	491	491	491	491	491	491
Total Existing Supplies	**6,518**	**6,458**	**6,398**	**6,169**	**5,829**	**5,657**
Demands (ac-ft per year)						
Total Demands	**5,761**	**6,294**	**7,288**	**8,141**	**9,171**	**9,802**
Surplus or (Shortage) with Existing Supplies	**757**	**164**	**(890)**	**(1,972)**	**(3,342)**	**(4,145)**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Municipal Conservation [b]	122	325	687	904	1,112	1,226
Reuse of Fish Hatchery Return Flows	2,872	2,872	2,872	2,872	2,872	2,872
Booster PS Improvements at WTP [c]	0	0	4,592	4,592	4,592	4,592
Additional Treated Water Supply Accessible with Booster PS Improvements at WTP	0	0	0	169	449	561
New Well(s) in Carrizo-Wilcox Aquifer [d]	*0*	*0*	*0*	*0*	*30*	*720*
Total Increase in Supplies from Recommended WMSs/WMSPs	**2,994**	**3,197**	**3,559**	**3,945**	**4,433**	**4,659**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**3,751**	**3,361**	**2,669**	**1,973**	**1,091**	**514**

Notes:

[a] This volume reflects the treated water supply that can be delivered from Lake Athens considering AMWA's existing WTP HSPS capacity. This volume assumes that supply from Lake Athens is distributed proportionally based on AMWA's customer demands in each decade (2030-2080) and supply from AMWA's groundwater well that is blended and treated with Lake Athens supply at the WTP is not constrained.

[b] Includes the municipal conservation savings across both Region C and the ETRWPA.

[c] Gray indicates a WMS/WMSP that involves expansion of infrastructure to access existing and/or future supplies. These should not be included in the total to avoid double counting.

[d] *Italics indicate an alternative WMS/WMSP.*

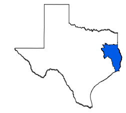


Table 5B.84 Athens MWA – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
City of Athens Municipal Conservation (Region C/I)	122 - 1,226	$157,000	$101,500	$800	$2.46
Reuse of Fish Hatchery Return Flows	2,872	$0	$0	$0	$0.00
WTP Pump Station Expansion [a]	4,596	$3,116,000	$308,000	$67	$0.21
New Well(s) in Carrizo-Wilcox Aquifer [b]	*720*	*$10,270,000*	*$1,286,000*	*$1,786*	*$5.48*

Notes:

[a] Gray indicates a WMS/WMSP that involves expansion of infrastructure to access existing and/or future supplies. These should not be included in the total to avoid double counting.

[b] *Italics indicate an alternative WMS/WMSP.*

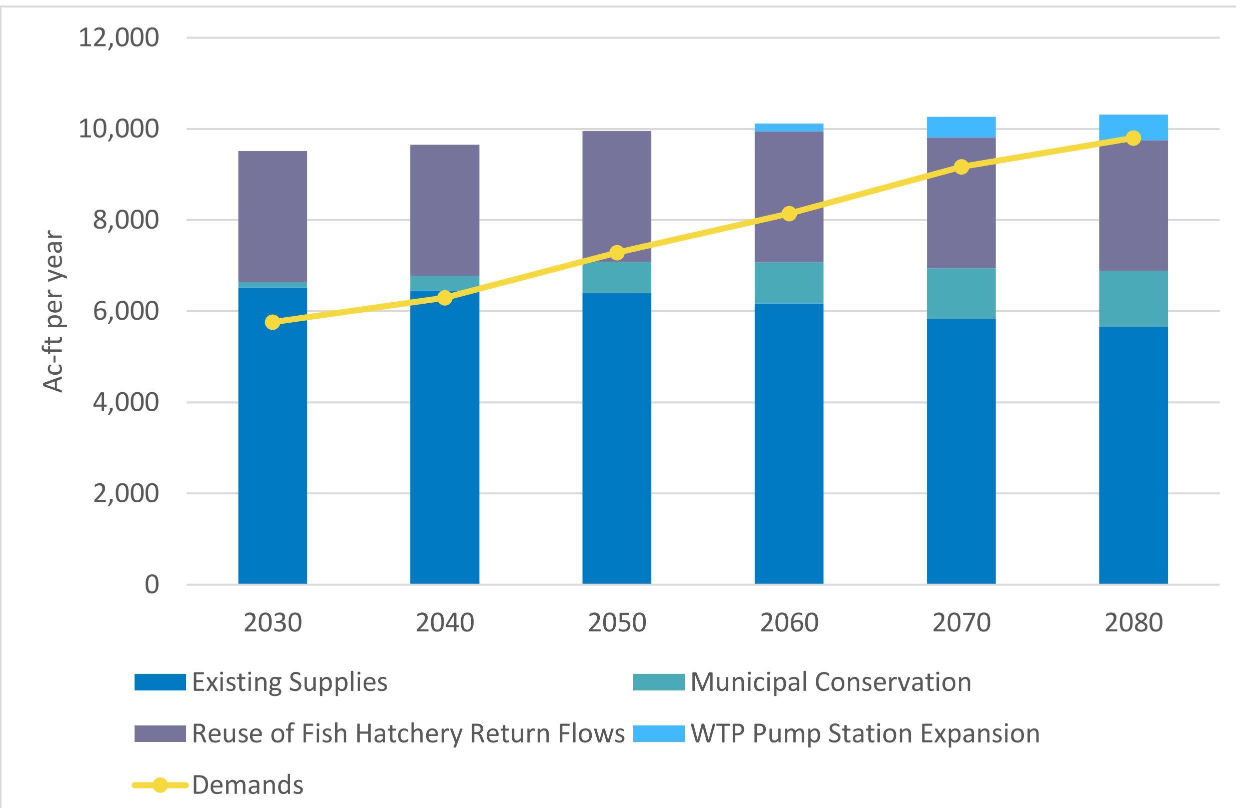


Figure 5B.24 Athens MWA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.3.4 City of Beaumont

The City of Beaumont is a wholesale water provider in Jefferson County. In addition to demands in the City's water service area, Beaumont supplies water to meet the demands of several municipal entities in Jefferson County-Other, the Beaumont Federal Correction Complex, Meeker MUD, and several manufacturing facilities in Jefferson County. Over the planning period (2030-2080), Beaumont and their customers' demands are projected to increase from approximately 33,256 ac-ft per year in 2030 to 35,904 ac-ft per year in 2080.

Current water supply sources for the City of Beaumont include self-supplied surface water from the Neches River, self-supplied groundwater from the Gulf Coast Aquifer, and purchased surface water from the Sam Rayburn/BA Steinhagen system (LNVA). Beaumont's supply is constrained by several infrastructure limitations, including their canal conveyance capacity, surface water treatment plant capacity, and groundwater well field capacity. The City's existing Pine Street surface water treatment plant (WTP) has a capacity of 45 MGD; however, one of the conveyance canals that delivers water from their surface intake to the WTP is estimated to only be able deliver around 37 MGD due to damage from recent storm events. Additionally, the City has three groundwater wells at its Loeb Groundwater Facility in south Hardin County that are each permitted to produce at a maximum rate of 3,500 gallons per minute (approximately 5 MGD each). One of these wells is currently out of service due to its condition. Furthermore, there are other substantial improvements necessary to upgrade and restore the Loeb Groundwater Facility to be able to produce at its full capacity.

As a result of their various infrastructure constraints, Beaumont has an identified need across the planning horizon (2030-2080) of approximately 9,500 ac-ft per year by 2030, which grows to nearly 11,400 ac-ft per year by 2070. To meet this need, several WMSs were recommended for Beaumont, including water conservation, improvements to their well field, and amending their contract with LNVA for additional surface water supply. To access the additional supply from LNVA, recommended WMSPs for Beaumont include rehabilitation of one of their surface water conveyance canals and a new water treatment plant on the west side of their system. The information below summarizes the existing supplies, demands, and recommended WMSs/WSMPs for Beaumont in the 2026 ETRWP.

5B.3.4.1 Municipal Conservation (Recommended)

The City of Beaumont is projected to have a water supply need beginning in 2030. Municipal conservation by the City and their customers could reduce the additional supply they would need from either their self-supplied sources and/or water purchased from LNVA. Conservation strategies were recommended for all municipal WUGs in the ETRWPA. The municipal water conservation strategy includes estimates of potential water savings and cost estimates related to enhanced education and public awareness, water conservation pricing implementation, and a system water audit and water loss control program. Further discussion of these conservation strategies is provided in Chapter 5C.

5B.3.4.2 Well Field Infrastructure Improvements (Recommended)

A recommended WMS/WMSP for the City of Beaumont is to upgrade facilities at their Loeb Groundwater Facility to allow the City to fully utilize their permitted groundwater supply at a sustainable level. The estimated annual supply from this strategy is assumed to be equal to half of the permitted volume of one of the wells at the City's Loeb Groundwater Facility (2.5 MGD or 2,803 ac-ft per year). This WMS/WMSP includes construction of a new well, well collection piping, transmission pipelines, pumping facilities, storage tanks, chemical treatment systems, and other supporting infrastructure.

5B.3.4.3 Amend Supplemental Contract with LNVA (Recommended)

The City of Beaumont has an existing contractual agreement to purchase supply from LNVA for up to 6,000 ac-ft per year. A recommended strategy is included for Beaumont to amend their existing supplement contract with LNVA for additional water supply to meet their projected needs. Based on their existing supplies and potential supplies from their well field infrastructure improvement strategy, the City of Beaumont will need approximately 6,700 ac-ft per year of additional supply from LNVA in 2030. The City's need for additional water supply from LNVA increases across the planning horizon, with a maximum need of approximately 8,600 ac-ft per year in 2070. The City of Beaumont has existing infrastructure and transmission lines to access supply from the LNVA; however, there are some infrastructure constraints that may limit their ability to access the full supply from this strategy. Other recommended projects are included for the City to upgrade the capacity of their infrastructure to fully access this supply, including rehabilitating (dredging) one of their canals and a new surface water treatment plant. These projects are discussed in subsequent sections.

5B.3.4.4 Bunn's Canal Rehabilitation (Recommended)

A recommended project for the City of Beaumont is to rehabilitate one of their conveyance canals (Bunn's Canal) to its pre-storm condition so that it can convey water supply diverted from the Neches River at its full capacity. The City of Beaumont estimates that the canal is only able to convey 38 MGD, which is less than the capacity of Beaumont's Pine Street surface WTP (45 MGD). The purpose of this project is to improve canal access, stabilize the bank canal through levee restoration, and remove sediment to increase the canal's carrying capacity.

5B.3.4.5 New Westside Surface Water Treatment Plant (Recommended)

A recommended project for the City of Beaumont is to construct a new 11 MGD surface water treatment facility. Based on Beaumont's projected water demands coupled with impacts coupled with impacts on the City's potable water system during storm events, the City's existing system may not be sufficient long-term. The new surface WTP will be able to treat 11 MGD of surface water and would be located on the west side of the City, thereby providing flexibility to the City to meet the needs of its customers in conjunction with the City's existing surface WTP. The new SWTP could treat surface water diverted using Beaumont's existing run-of-river rights and/or backup water supplied through the City's contractual agreement with LNVA.

5B.3.4.6 Beaumont Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for Beaumont is presented in Table 5B.85, Table 5B.86, and Figure 5B.25.

Table 5B.85 Beaumont – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Municipal Run-of-River	11,266	11,555	11,809	11,481	11,327	11,310
Industrial Run-of-River	836	1,005	1,168	1,314	1,477	1,659
Gulf Coast Aquifer	5,646	5,646	5,646	5,646	5,646	5,646
Sam Rayburn (LNVA) - Current Base Contract	6,000	6,000	6,000	6,000	6,000	6,000
Total Existing Supplies	**23,748**	**24,206**	**24,623**	**24,441**	**24,450**	**24,615**
Demands (ac-ft per year)						
Total Demands	33,256	34,427	35,719	35,777	35,838	35,904
Surplus or (Shortage) with Existing Supplies	**(9,508)**	**(10,221)**	**(11,096)**	**(11,336)**	**(11,388)**	**(11,289)**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Municipal Conservation	2,094	5,506	7,320	7,327	7,332	7,336
Well Field Infrastructure Improvements	2,872	2,872	2,872	2,872	2,872	2,872
Amend Supplemental Contract with LNVA	6,636	7,349	8,224	8,464	8,516	8,417
Bunn's Canal Rehabilitation [a]	8,968	8,968	8,968	8,968	8,968	8,968
New Westside Surface Water Treatment Plant [a]	0	12,331	12,331	12,331	12,331	12,331
Total Increase in Supplies from Recommended WMSs/WMSPs	**11,602**	**15,727**	**18,416**	**18,663**	**18,720**	**18,625**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**2,094**	**5,506**	**7,320**	**7,327**	**7,332**	**7,336**

Notes:

[a] Gray indicates a strategy that involves expansion of infrastructure to access existing and/or future supplies. These should not be included in the total to avoid double counting.

Table 5B.86 Beaumont – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	2,094 - 7,336	$1,679,000	$858,400	$410	$1.26
Well Field Infrastructure Improvements	2,872	$97,980,000	$8,074,000	$2,860	$8.78
Amend Supplemental Contract with LNVA	6,636 - 8,516	$0	$2,803,000	$326	$1.00
Bunn's Canal Rehabilitation [b]	8,968	$1,139,000	$91,000	$10	$0.03
New Westside Surface Water Treatment Plant [b]	12,331	$202,160,000	$16,324,000	$1,316	$4.04

Notes:

[a] The annual and unit cost use an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water. Ultimately, this cost will need to be negotiated between Beaumont and LNVA and will reflect their wholesale water rates at that time.

[b] Gray indicates a strategy that involves expansion of infrastructure to access existing and/or future supplies. These should not be included in the total to avoid double counting.

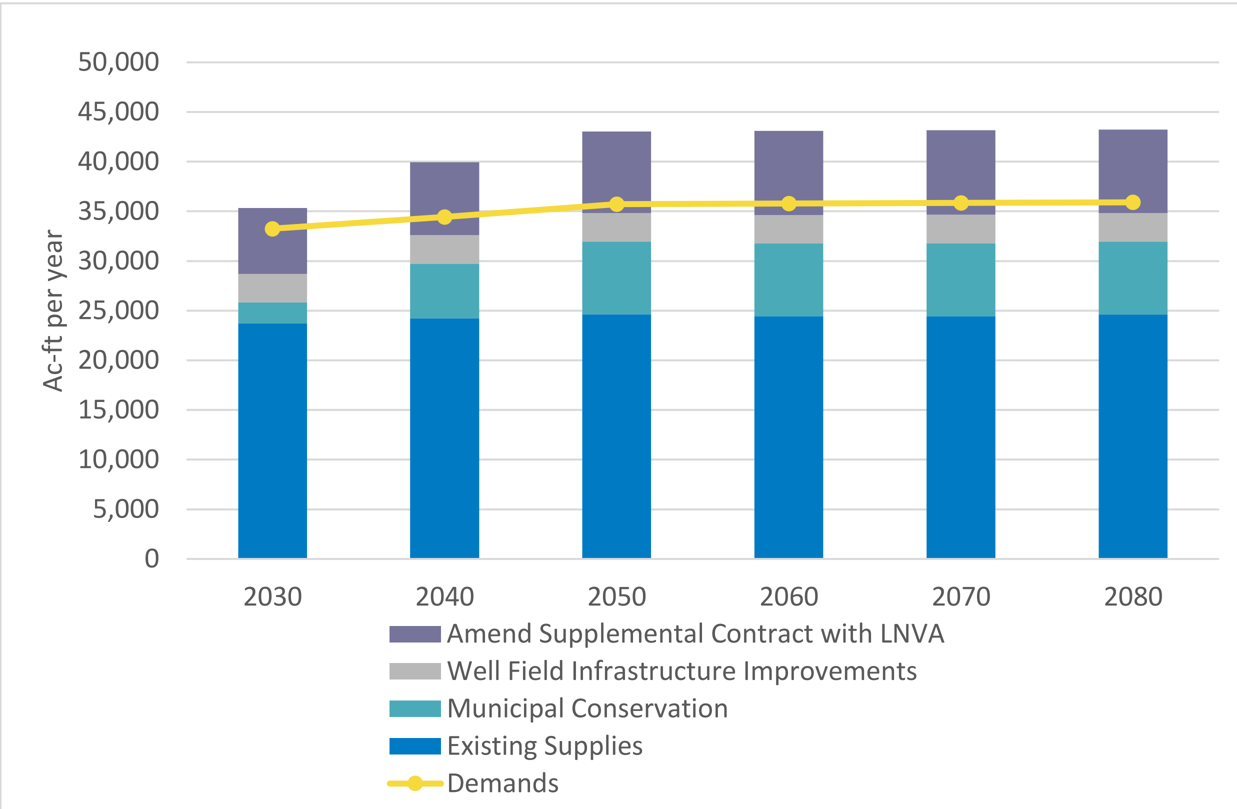


Figure 5B.25 Beaumont – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.3.5 City of Carthage

The City of Carthage is a wholesale water provider in Panola County. In addition to the City's demands, Carthage provides wholesale water supply to other municipal and manufacturing users in Panola County. The City owns two groundwater wells that have a combined rated capacity of 410 gallons per minute (gpm). It is estimated that these wells could produce, on average, 411 ac-ft per year. The City also has a contract with Panola County Fresh Water Supply District (FWSD) for 12 MGD (13,452 ac-ft per year) of water from Lake Murvaul. The City's supplies are limited by their water treatment plant, which has a capacity of 8 MGD. In this round of planning, the City of Carthage has enough supplies to meet the demands of the City and its customers. Currently, the only WMS/WMSP identified for the City is municipal conservation. The information below summarizes the existing supplies, demands, and recommended WMSs and WMSPs for Carthage in the 2026 ETRWP.

5B.3.5.1 Municipal Conservation (Recommended)

Carthage is not projected to have a water supply need within the planning period. However, conservation strategies were recommended for all municipal WUGs in the ETRWPA. The municipal water conservation strategy includes estimates of potential water savings and cost estimates related to enhanced education and public awareness, water conservation pricing implementation, and a system water audit and water loss control program. Further discussion of these conservation strategies is provided in Chapter 5C.

5B.3.5.2 Carthage Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for Carthage is presented in Table 5B.87, Table 5B.88, and Figure 5B.26.

Table 5B.87 Carthage – Summary of Existing Supplies, Demand, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Groundwater Wells (Carrizo-Wilcox Aquifer)	411	411	411	411	411	411
Lake Murvaul (PC FWSD)	13,452	13,452	13,452	13,452	13,452	13,452
Total Existing Supplies	**13,863**	**13,863**	**13,863**	**13,863**	**13,863**	**13,863**
Total Existing Supplies Limited by Treatment Capacity	**4,891**	**4,891**	**4,891**	**4,891**	**4,891**	**4,891**
Demands (ac-ft per year)						
Total Demands	**3,037**	**3,051**	**3,059**	**3,065**	**3,074**	**3,085**
Surplus or (Shortage) with Existing Supplies	**1,854**	**1,840**	**1,832**	**1,826**	**1,817**	**1,806**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Municipal Conservation	31	46	48	50	52	54
Total Increase in Supplies from Recommended WMSs/WMSPs	**31**	**46**	**48**	**50**	**52**	**54**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**1,885**	**1,886**	**1,880**	**1,876**	**1,869**	**1,860**

Table 5B.88 Carthage – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	31 - 54	$173,000	$23,600	$755	$2.32

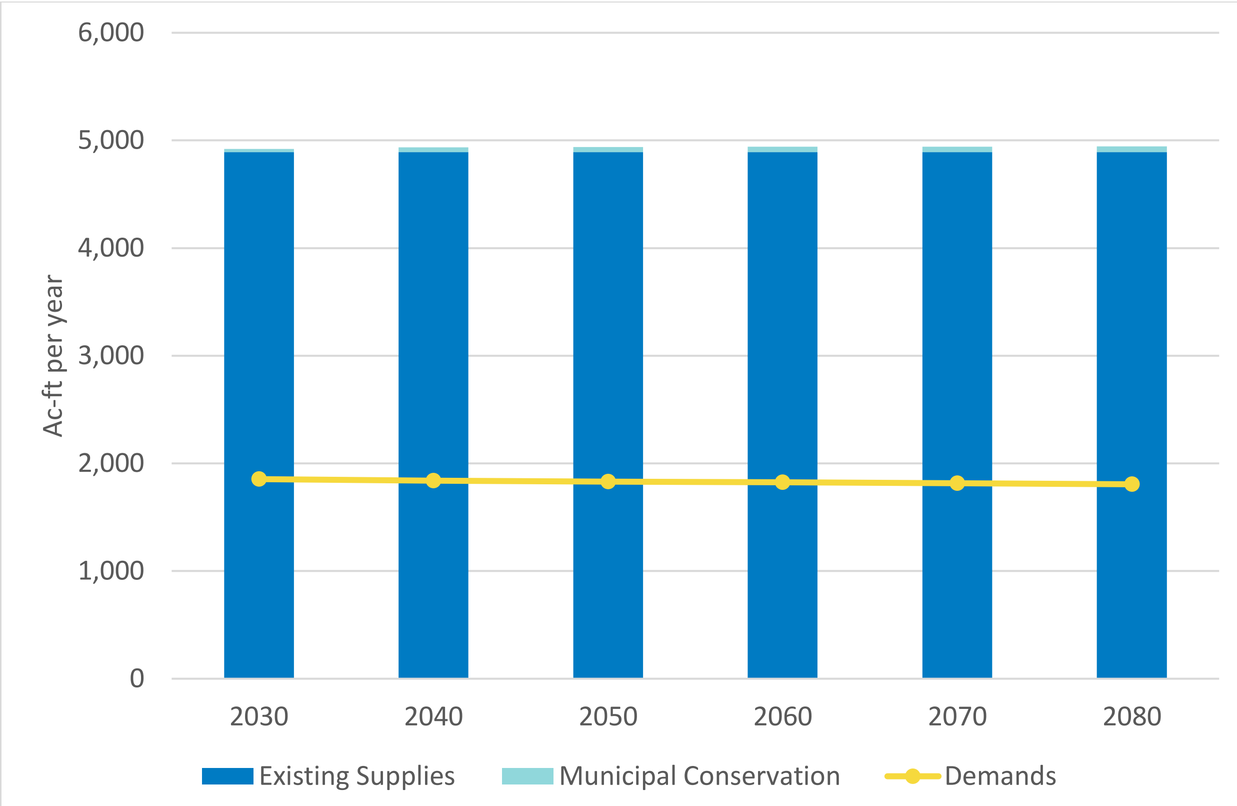


Figure 5B.26 Carthage – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.3.6 City of Center

The City of Center provides water to meet a portion of the demand from Sand Hills WSC in Shelby County. The City also provides water to retail customers in the City of Center and most of the manufacturing demand in Shelby County. City of Center serves as an emergency interconnect to Shelbyville WSC, Flat Fork WSC, and East Lamar WSC.

The City of Center owns water rights for supplies in Lake Center and Lake Pinkston. Currently, the City has sufficient supplies to meet the demand from 2030 to 2080, as it appears that the City's current manufacturing demand is double-counted in both the City's demand and the manufacturing demand in Shelby County. Adjusting for this double-counting issue, the City has ample supply to meet its projected demand. The City is planning WMSs and WMSPs to proactively prepare for satisfying the additional demand in the decades. Tyson is one of the major manufacturing demand users in Shelby County.

To meet the current demands and higher projected future demands, the City has proposed four WMSs for the planning period, and they are discussed below.

5B.3.6.1 Direct Non-Potable Reuse (Recommended)

The City is permitted to use the return flows from the East Bank WWTP. The City is planning a direct reuse project by means of a reuse pipeline from East Bank WWTP to serve the City's industrial customers. The total capacity for the direct non-potable reuse project will be approximately 1 MGD (1,121 ac-ft/yr) and the project will be online in 2030. The project is currently in TCEQ study phase, and the City anticipates the plant will be in operation in the next 2 to 5 years.

5B.3.6.2 Municipal Conservation (Recommended)

The City of Center has a baseline per capita demand of 405 GPCD, which is likely reflective of the demand from municipal customers and manufacturing customers. Conservation strategies were recommended for all municipal WUGs in the ETRWPA, including the City of Center. The municipal water conservation strategy includes estimates of potential water savings and cost estimates related to enhanced education and public awareness, water conservation pricing implementation, and a system water audit and water loss control program. Further discussion of these conservation strategies is provided in Chapter 5C.

5B.3.6.3 Toledo Bend to Lake Center (Alternative)

The City is also planning to purchase water from Sabine River Authority and to transfer water from Toledo Bend Reservoir to Lake Center. The City will construct the raw water transmission pipeline from Toledo Bend Reservoir to Lake Center. The City anticipates the yield from this supply will be 1 to 2 MGD by 2060. For the planning purposes, 2 MGD is assumed.

5B.3.6.4 City of Center Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for Center is presented in Table 5B.89, Table 5B.90, and Figure 5B.27.

Table 5B.89 City of Center – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Lake Center	500	500	500	500	500	500
Lake Pinkston	3,612	3,600	3,587	3,575	3,562	3,550
Total Existing Supplies	**4,112**	**4,100**	**4,087**	**4,075**	**4,062**	**4,050**
Demands (ac-ft per year)						
Existing Demands per TWDB Projection	5,251	5,361	5,467	5,550	5,628	5,702
Reduction of Demand to Correct for Double Counting [a]	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000
Total Existing Demands [a]	4,251	4,361	4,467	4,550	4,628	4,702
Surplus or (Shortage) with Existing Supplies	**(139)**	**(261)**	**(380)**	**(475)**	**(566)**	**(652)**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Municipal Conservation	80	194	241	238	236	232
Reuse Pipeline to Industrial Customer	1,121	1,121	1,121	1,121	1,121	1,121
Pipeline from Toledo Bend [b]	*0*	*0*	*2,242*	*2,242*	*2,242*	*2,242*
Total Increase in Supplies from Recommended WMSs/WMSPs	**1,201**	**1,315**	**1,362**	**1,359**	**1,357**	**1,353**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**1,062**	**1,054**	**982**	**884**	**791**	**701**

Notes:

[a] *The City of Center noted that their demand projection is likely overestimated and they have sufficient supply to meet the anticipated demand. It is noted that the current manufacturing demand served by the City of Center is approximately 1,000 ac-ft.*

[b] *Italics indicate an alternative WMS/WMSP.*

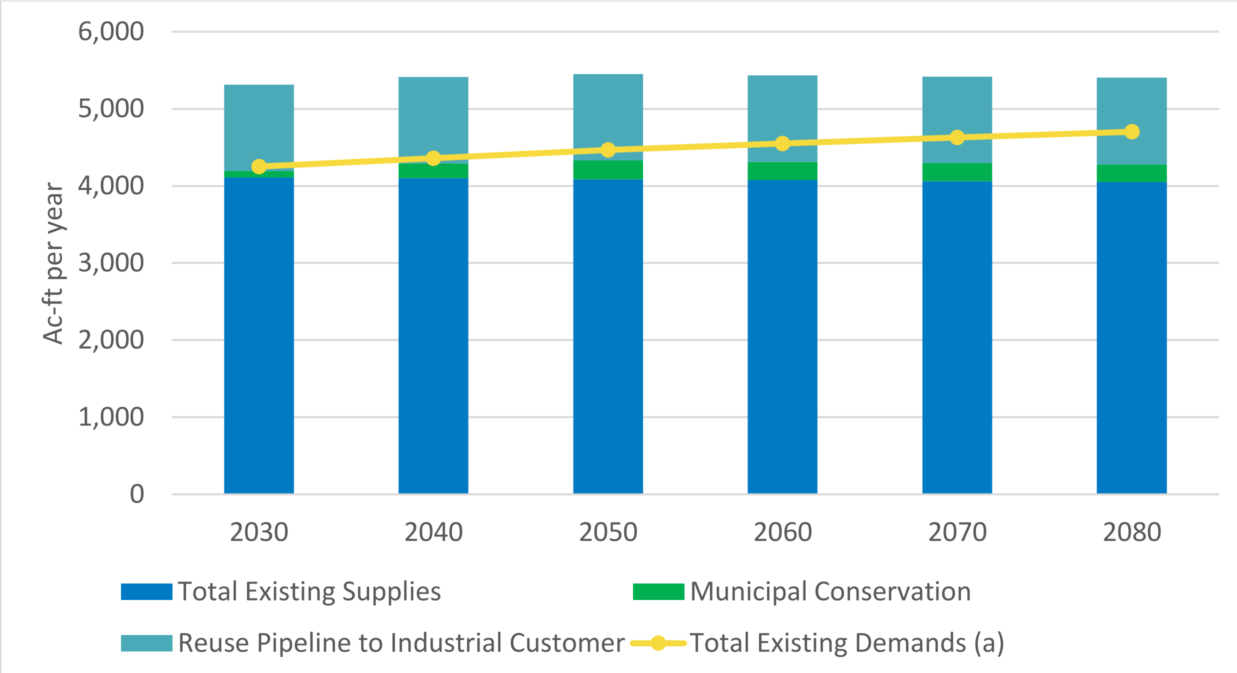


Figure 5B.27 City of Center – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.90 City of Center – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	236	$125,000	$39,300	$200	$0.61
Reuse Pipeline to Industrial Customer	1,121	$25,824,000	$2,608,000	$2,326	$7.14
Pipeline from Toledo Bend (b)	2,242	$70,786,000	$6,486,000	$2,893	$8.88

5B.3.7 Houston County WCID #1

Houston County WCID #1 owns and operates Houston County Lake in the Trinity River Basin in Houston County. This reservoir was originally permitted for 7,000 ac-ft/yr; however, the TCEQ reduced the permitted diversion to 3,500 ac-ft/yr in 1987. In 2009, Houston County WCID #1 applied to the TCEQ for a permit amendment to increase their permitted diversion to the firm yield of the lake and to add industrial use to the permit. However, the TCEQ denied the application. Despite this setback, Houston County WCID #1 upgraded their water treatment plant capacity from 3.1 MGD to 6.2 MGD in 2010.

5B.3.7.1 Groundwater Supplies (Recommended)

Houston County WCID #1 plans to develop new wells in the Carrizo-Wilcox aquifer when a demand shortage is anticipated. However, as the entity currently project a demand surplus, the entity does not have information regarding the number of wells or their associated capacities. A summary of existing supplies, projected demands, and WMSs/WMSPs for Houston County WCID #1 is presented in Table 5B.91, Table 5B.92, and Figure 5B.28.

Table 5B.91 Houston County WCID #1 – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Houston County Lake	3,500	3,500	3,500	3,500	3,500	3,500
Total Existing Supplies	**3,500**	**3,500**	**3,500**	**3,500**	**3,500**	**3,500**
Demands (ac-ft per year)						
Total Existing Demands	3,178	3,167	3,134	3,151	3,154	3,150
Surplus or (Shortage) with Existing Supplies	**322**	**333**	**366**	**349**	**346**	**350**
Recommended Water Management Strategies/Projects (ac-ft per year)						
New Wells (Carrizo-Wilcox)	1,000	1,000	1,000	1,000	1,000	1,000
Total Increase in Supplies from Recommended WMSs/WMSPs	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**1,322**	**1,333**	**1,366**	**1,349**	**1,346**	**1,350**

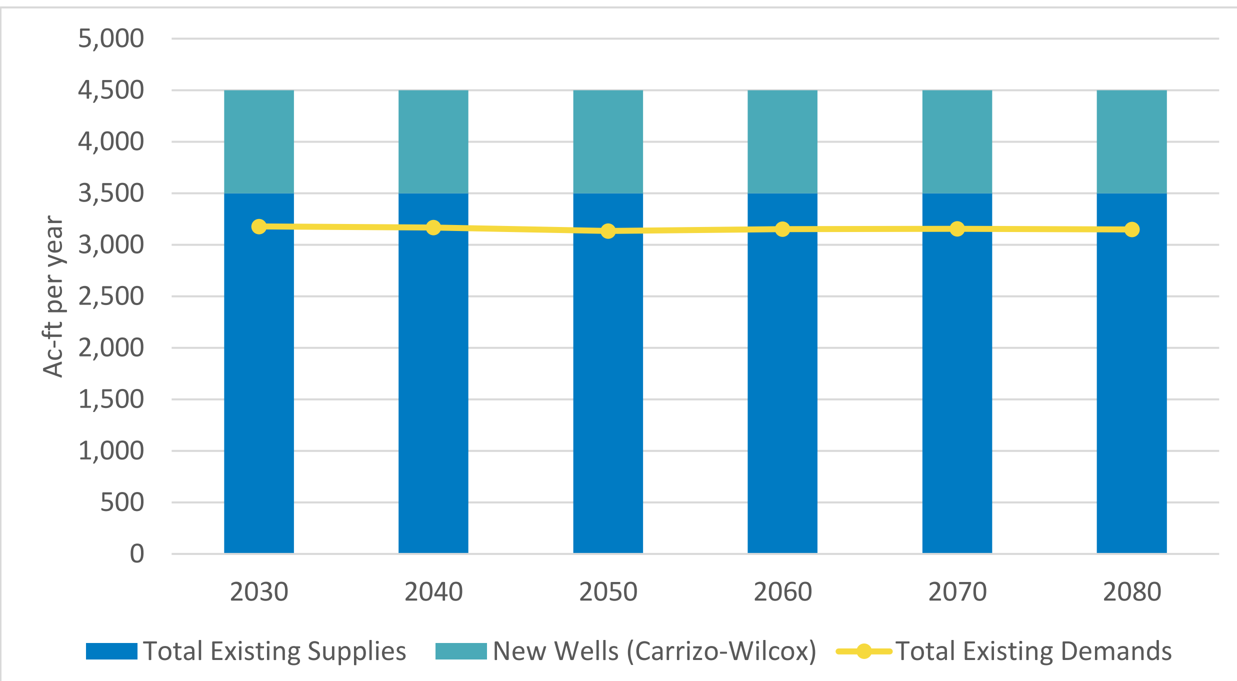


Figure 5B.28 Houston County WCID #1 – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.92 Houston County WCID #1 – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Carrizo-Wilcox)	3,500	$40,283,000	$3,697,000	$1,056	$3.24

5B.3.8 City of Jacksonville

The City of Jacksonville has sufficient raw water and treatment capacity to meet its projected customer demands for the planning period. Jacksonville has a water right to use 6,200 ac-ft/year from Lake Jacksonville, but available supply is limited by their existing water treatment plant capacity (5,173 ac-ft/yr). The City has several constraints to providing treated surface water to all its customers. The City's existing surface water treatment plant is currently underutilized and could provide more surface water with the necessary infrastructure improvements. Currently, the City operates the treatment plant for only part of the day. The City may be able to treat more raw water either by implementing infrastructure improvements to the treatment system or by operating the plant for longer time each day. It is recommended that the City of Jacksonville implement infrastructure improvements to fully utilize its existing water sources. City of Jacksonville has chosen to not implement this strategy at this time.

5B.3.8.1 Raw Water Transmission System from Lake Columbia (Recommended)

The recommended strategy for City of Jacksonville is a transmission and treatment system to access the City's contracted supplies from Lake Columbia. The City of Jacksonville is a participant in the Lake Columbia project. Jacksonville has a contract with Angelina & Neches River Authority for 4,275 ac-ft/year from Lake Columbia. Lake Columbia will provide a source of additional raw water for Jacksonville beyond this planning period or sooner if the City grows faster than projected. This strategy assumes that water would be diverted at Lake Columbia and transported to Jacksonville for treatment and distribution. It is assumed that the first phase of this project would develop 1,700 ac-ft/year (1.6 MGD). Subsequent phases would fully develop the City's contracted amount. The online decade of this WMS is expected to be 2050.

5B.3.8.2 Municipal Conservation (Recommended)

The City of Jacksonville has a baseline per capita demand of 177 GPCD. Conservation strategies were recommended for all municipal WUGs in the ETRWPA, including the City of Jacksonville. The municipal water conservation strategy includes estimates of potential water savings and cost estimates related to enhanced education and public awareness, water conservation pricing implementation, and a system water audit and water loss control program. Further discussion of these conservation strategies is provided in Chapter 5C.

5B.3.8.3 City of Jacksonville Summary

A summary of current contracted customer demands, existing supplies, and additional supplies from future WMS is summarized in Table 5B.93 and Figure 5B.29. A summary of cost estimates for the recommended WMS is listed in Table 5B.94. A detailed project summary is included in each WMS technical memorandum in Appendix 5B-A.

Table 5B.93 City of Jacksonville – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Lake Jacksonville	5,173	5,173	5,173	5,173	5,173	5,173
Lake Acker	0	0	0	0	0	0
Carrizo Wilcox Aquifer	2,218	2,218	2,218	2,218	2,218	2,218
Total Existing Supplies	**7,391**	**7,391**	**7,391**	**7,391**	**7,391**	**7,391**
Demands (ac-ft per year)						
Total Existing Demands	5,170	5,279	5,324	5,356	5,386	5,411
Surplus or (Shortage) with Existing Supplies	**2,221**	**2,112**	**2,067**	**2,035**	**2,005**	**1,980**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Supply from Lake Columbia	0	0	1,700	1,700	1,700	1,700
Municipal Conservation	114	279	349	348	345	343
Total Increase in Supplies from Recommended WMSs/WMSPs	**114**	**279**	**2,049**	**2,048**	**2,045**	**2,043**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**2,335**	**2,391**	**4,116**	**4,083**	**4,050**	**4,023**

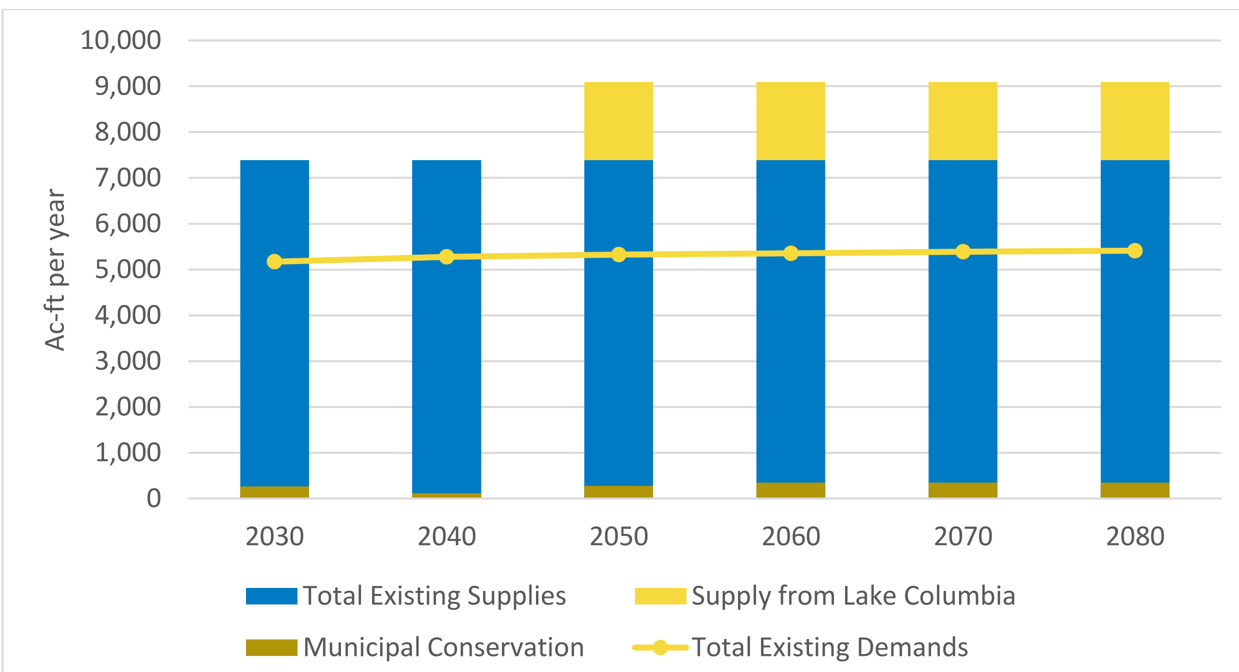


Figure 5B.29 City of Jacksonville – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.94 City of Jacksonville – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Supply from Lake Columbia	1,700	$67,185,000	$6,428,000	$3,781	$11.60
Municipal Conservation	345	$257,000	$68,700	$300	$0.92

5B.3.9 Lower Neches Valley Authority

Current supplies for the Lower Neches Valley Authority (LNVA) include the B.A. Steinhagen Lake/Sam Rayburn Reservoir system (Sam Rayburn Reservoir), Neches run-of-river, and a run-of-the-river diversion from the Trinity River in Region H. LNVA provides water to several water user groups (WUGs) in the ETRWPA and Region H, including municipal, industrial (manufacturing), irrigation, and livestock demands. The projected water demands from existing customers supplied by LNVA total over 440,000 ac-ft per year from 2030 to 2080. In addition to these demands, there are nearly 200,000 ac-ft per year in potential future demands from existing and future customers projected by 2080, largely from manufacturing water users.

LNVA is pursuing several water management strategies and projects to increase its reliable water supplies and to increase its infrastructure to provide conveyance to future customers. These WMSs and WMSPs include:

- Devers Pump Station Relocation (Region H)
- Neches Pump Station Upgrade and Fuel Diversification
- West Beaumont Reservoir
- Neches-Trinity Interconnect (Region H)
- Purchase from SRA (Toledo Bend Reservoir)

In addition to these strategies, the construction of Rockland Reservoir is an alternative water management strategy considered. A brief discussion of each WMS and WMSP for LNVA in the 2026 ETRWP is presented below.

5B.3.9.1 Devers Pump Station Relocation (Recommended).

LNVA provides a substantial portion of supply to irrigators in the eastern portion of Region H (Chambers and Liberty counties) through its Devers Canal System, which diverts water from the Trinity River at Devers 1st Pump Station. In order to meet the needs of current and future customers and increase deliverable supply, LNVA has identified the need to develop a new Devers 1st Pump Station. Major infrastructure components associated with this strategy include a new intake structure, high-capacity pump station, and discharge structures to connect the pump station to the Devers Canal System. The new facility has a planned capacity of 200,000 gpm, resulting in an additional 55,000 gpm (88,704 ac-ft/yr) of reliable pumping capacity. The new pump station will be located adjacent to the current pump station, limiting the required permitting and the need for development of additional conveyance to connect to existing canal infrastructure. This project will not require a new water right appropriation because it is associated with infrastructure capacity related to the use of existing rights.

5B.3.9.2 Neches Pump Station Upgrades and Fuel Diversification (Recommended)

This recommended WMS/WMSP includes improvements to LNVA pump stations on the Neches River canal system in Jefferson County. LNVA serves municipal, agricultural, and industrial customers in Jefferson County through their canal systems. These canal systems are fed by intake pump stations. This project includes constructing a new 200,000 gpm pump station at the Neches First Lift Pump Station with new pumps driven by electric motors with back-up diesel generators at a location that is less susceptible to flooding events. LNVA's existing 1930's pump station at Neches First Lift is driven only by natural gas engines and is within a building that is not able to be flood-proofed against the flood of record. In addition, this project involves a new 100,000 gpm pump and electric motor installed at the Neches Second Lift Pump Station, as well as a diesel generator for backup power. In addition to floodproofing their 1930's pump station, this project will diversify LNVA's fuel needs and provide back-up pumping capacity in case there is loss of natural gas to the facility. These upgrades will add a total capacity of 300,000 gpm at LNVA's Neches First and Second Lift Pump Stations, resulting in an additional 100,000 gpm (approximately 161,500 ac ft/yr) of firm pumping capacity.

5B.3.9.3 Beaumont West Regional Reservoir (Recommended)

This recommended WMS/WMSP involves the construction of an approximate 1,100-acre reservoir on the northwest end of Beaumont. The reservoir is anticipated to have an approximate capacity of 7,700 acre-feet, which is equivalent to approximately three (3) weeks of water supply to meet municipal and industrial demands downstream. This reservoir is located so that stored water can be sent to all industrial and municipal customers on the LNVA system. In addition, the location of the reservoir provides a significant advantage to provide water in case of an emergency fire water demand, source pollution in the Neches River or Pine Island Bayou, or losses of either of the LNVA pumping stations in severe events, such as what occurred during Hurricane Harvey.

5B.3.9.4 Neches-Trinity Basin Interconnect (Recommended)

LNVA is planning to construct an approximate 13-mile, single 84-inch pipeline that runs in an east-west direction, as well as a 62,000 gpm pump station. The proposed pipeline enables the movement of Neches River water westward toward the upper reaches of the Devers Canal system and potentially back into the Trinity River. The water from this strategy will enable LNVA to provide water for irrigation customers in Region H, as well as to serve new industries as they emerge along the IH-10 corridor.

5B.3.9.5 Purchase from Sabine River Authority (Toledo Bend Reservoir) (Recommended)

The proximity of the Sabine River Basin to the Neches River Basin could make the transfer of water from the Sabine River a feasible strategy for LNVA. A WMS/WMSP is recommended for LNVA to purchase water supply from SRA and transfer it to the Neches River Basin. The strategy would require a contract with SRA, approximately 20 miles of open channel canal conveyance, and an intake pump station.

5B.3.9.6 Rockland Reservoir (Alternative)

Rockland Reservoir was authorized for construction, as a federal facility, in 1945 along with Sam Rayburn Reservoir, Lake B. A. Steinhagen and Dam A Lake. A 1947 report recommended construction of Sam Rayburn Reservoir and Lake B.A. Steinhagen with deferral of Rockland Reservoir and Dam A until such time the need develops. The Rockland Reservoir site is located on the Neches River at River Mile 160.4. The top of the flood pool would be at elevation 174 ft. msl with the conservation pool at 165 ft. msl. The

Reservoir Site Protection Study updated the yield and costs for the Rockland Reservoir using ENR indexing (TWDB, 2007). No recent detailed yield analysis or cost data has been developed for Rockland Reservoir. Based on the TWDB study, the estimated yield of Rockland is 614,400 ac-ft per year and the unit cost of water is $198 per acre-feet (scaled to September 2023 dollars). More detailed studies are needed to confirm the yield and costs for this project.

5B.3.9.7 LNVA Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for LNVA is presented in Table 5B.95 and Figure 5B.30. A summary of cost estimates for the recommended WMS is listed in Table 5B.96.

Table 5B.95 LNVA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Sam Rayburn / B.A. Steinhagen System	792,000	792,000	792,000	792,000	792,000	792,000
Neches Run-of-River	381,876	381,876	381,876	381,876	381,876	381,876
Trinity Run-of-River (Region H)	2,173	2,173	2,173	2,173	2,173	2,173
Lufkin (Sam Rayburn)	28,000	0	0	0	0	0
Total Existing Supplies	**1,204,049**	**1,173,876**	**1,173,876**	**1,173,876**	**1,173,876**	**1,173,876**
Demands (ac-ft per year)						
Demand from Existing Customers	441,125	445,170	445,165	445,120	445,075	445,032
Demand from Potential Future Customers [a]	13,245	46,888	84,783	121,813	158,745	195,616
Total Demand from Existing and Potential Future Customers	**454,370**	**492,058**	**529,948**	**566,933**	**603,820**	**640,648**
Surplus or (Shortage) with Existing Supplies	**749,679**	**683,991**	**646,101**	**609,116**	**572,229**	**535,401**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Devers Pump Station Relocation (Region H) [b]	88,704	88,704	88,704	88,704	88,704	88,704
Neches Pump Station Upgrades and Fuel Diversification [b]	161,420	161,420	161,420	161,420	161,420	161,420
West Beaumont Reservoir	7,700	7,700	7,700	7,700	7,700	7,700
Neches-Trinity Basin Interconnect (Region H) [b]	0	67,000	67,000	67,000	67,000	67,000
Purchase from SRA (Toledo Bend)	0	0	200,000	200,000	200,000	200,000
Total Increase in Supplies from Recommended WMSs/WMSPs	**7,700**	**7,700**	**207,700**	**207,700**	**207,700**	**207,700**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**757,379**	**691,691**	**853,801**	**816,816**	**779,929**	**743,101**

Notes:

[a] Includes projected demands from the City of Beaumont (beyond their existing contract with LNVA) and projected needs for manufacturing water users in Jasper and Jefferson counties.

[b] Gray indicates a strategy that involves development or expansion of infrastructure to access existing and/or future supplies. These should not be included in the total to avoid double counting.

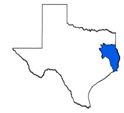


Table 5B.96 LNVA – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Devers Pump Station Relocation (Region H) [a]	88,704	$21,338,000	$1,883,000	$21	$0.07
Neches Pump Station Upgrades and Fuel Diversification [a]	161,420	$66,948,000	$5,681,000	$35	$0.11
West Beaumont Reservoir	7,700	$110,438,000	$6,084,000	$790	$2.42
Neches-Trinity Basin Interconnect (Region H) [a]	67,000	$127,826,000	$11,065,000	$165	$0.51
Purchase from SRA (Toledo Bend)	200,000	$451,797,000	$102,526,000	$513	$1.57

Notes:

[a] Gray indicates a strategy that involves development or expansion of infrastructure to access existing and/or future supplies. These should not be included in the total to avoid double counting.

Figure 5B.30 LNVA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.3.10 City of Lufkin

The City of Lufkin currently relies on groundwater from the Carrizo-Wilcox aquifer and surface water from Lake Kurth and Sam Rayburn Reservoir. The City's groundwater infrastructure includes 15 active wells, including several wells acquired from the Abitibi Bowater Corporation. The City provides water to Diboll, Huntington, Redland WSC, Angelina County-Other (Burke, Angelina Freshwater Supply, and Woodlawn WSC) and manufacturing, steam electric power, and irrigation demands in Angelina County. Lufkin has a recommended WMS to expand their developed supplies and provide conveyance from Sam Rayburn Reservoir to Lake Kurth. With additional groundwater and surface water supplies, the City expects to provide up to an additional 16 MGD of water to meet industrial demands in Angelina County. In addition, municipal conservation is considered as a recommended WMS for the City to reduce municipal demands.

5B.3.10.1 Develop Sam Rayburn Reservoir Water Rights (Recommended)

To meet the City of Lufkin's long-term water needs, Lufkin is continuing to plan and develop a water management strategy to utilize its surface water rights in Sam Rayburn Reservoir. In the late 1960's, the City of Lufkin purchased storage and water production rights for surface water from Sam Rayburn Reservoir through contracts with the LNVA and the U.S. Army Corp of Engineers. The City has a water right to divert up to 28,000 ac-ft annually of surface water from the reservoir. This equates to an average withdrawal rate of 25 MGD.

With the acquisition of Lake Kurth, the long-range plan is to expand the surface water treatment plant near Lake Kurth and treat raw water from Sam Rayburn Reservoir at the expanded facility. For planning purposes, it is assumed that water from Sam Rayburn Reservoir will be diverted from the northern end of the Lake and transported through a 36-inch pipeline. The treatment plant proposed at Lake Kurth will be initially expanded from 16 MGD to 25 MGD with the potential for further expansions beyond this planning period. This strategy is projected to be developed in three phases, with the first phase to develop access to 10 MGD of Sam Rayburn supplies by 2040, second phase with an additional 10 MGD capacity expansion by 2050, and the final phase of 5 MGD capacity expansion by 2060. The initial size of the treatment facility will depend on the projected needs at the time.

5B.3.10.2 Municipal Conservation (Recommended)

The City of Lufkin has a baseline demand of 149 GPCD. After performing a conservation cost analysis, the ETRWPG believes that a water conservation strategy for the City is economically achievable. This recommended strategy includes cost estimates related to enhanced public and school education, water conservation pricing implementation, and a water loss mitigation strategy. The proposed municipal conservation strategy would reduce the City's demand, increasing the surplus supply available for the City.

5B.3.10.3 City of Lufkin Summary

The supplies and demands associated with the City of Lufkin are shown in Table 5B.97 and Figure 5B.31. A summary of cost estimates for the recommended WMS is listed in Table 5B.98.

Table 5B.97 City of Lufkin – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Carrizo-Wilcox	17,888	17,888	17,888	17,888	17,888	17,888
Lake Kurth	17,425	17,448	17,471	17,494	17,517	17,540
Sam Rayburn Reservoir (to LNVA)	0	0	0	0	0	0
Total Existing Supplies	**35,313**	**35,336**	**35,359**	**35,382**	**35,405**	**35,428**
Demands (ac-ft per year)						
Total Existing Demands	28,285	28,408	28,503	28,614	28,725	28,838
Surplus or (Shortage) with Existing Supplies	**7,028**	**6,928**	**6,856**	**6,768**	**6,680**	**6,590**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Municipal Conservation	208	427	526	553	582	610
Transfer from Rayburn to Lake Kurth – Phase I (2040)	0	11,210	11,210	11,210	11,210	11,210
Transfer from Rayburn to Lake Kurth – Phase II (2050)	0	0	11,210	11,210	11,210	11,210
Transfer from Rayburn to Lake Kurth – Phase III (2060)	0	0	0	5,580	5,580	5,580
Total Increase in Supplies from Recommended WMSs/WMSPs	**208**	**11,637**	**22,946**	**28,553**	**28,582**	**28,610**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**7,236**	**18,565**	**29,802**	**35,321**	**35,262**	**35,200**

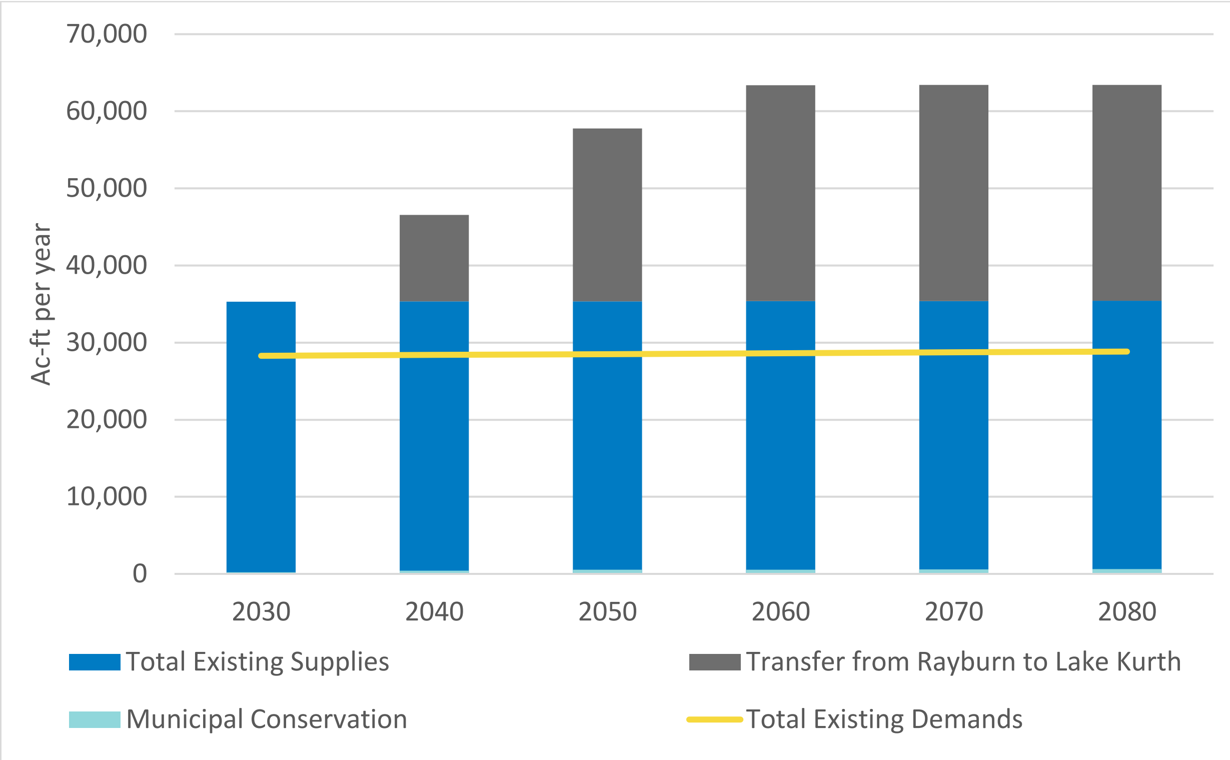


Figure 5B.31 City of Lufkin – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.98 City of Lufkin – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	582	$740,000	$133,400	$447	$1.37
Transfer from Rayburn to Lake Kurth – Phase I (2040)	11,210	$136,547,000	$15,519,000	$1,384	$4.25
Transfer from Rayburn to Lake Kurth – Phase II (2050)	11,210	$125,310,000	$28,432,000	$1,278	$3.92
Transfer from Rayburn to Lake Kurth – Phase III (2060)	5,580	$24,037,000	$20,419,000	$729	$2.24

5B.3.11 City of Nacogdoches

The City of Nacogdoches utilizes groundwater from the Carrizo-Wilcox aquifer and surface water from Lake Nacogdoches. In addition to the City of Nacogdoches retail customers, the City is a major water provider to Appleby WSC, D & M WSC, Nacogdoches MUD#1, Lily Grove SUD, and Melrose WSC. Most, if not all, of the manufacturing demands in the Nacogdoches county are also supplied by the City. The Neches WAM shows the firm yield of Lake Nacogdoches to be approximately 14,335 ac-ft/year by 2020, reducing to 12,525 ac-ft/year by 2070. Groundwater from the Carrizo-Wilcox aquifer is used to supply much of the southern part of the city, and the City of Nacogdoches has been increasing its groundwater supplies to better serve this section of the city. The City has also developed two new wells, rehabilitated two existing wells, and is in the process of developing another new well. With the City's existing groundwater supplies, Nacogdoches has a reliable supply of approximately 21,000 ac-ft/year. This supply is sufficient to meet the projected demands in this plan, but the City's current water planning efforts indicate greater population growth and higher demands by the commercial and manufacturing sectors than projected by the TWDB. Therefore, the City has two recommended strategies in the 2026 Regional Water Plan.

5B.3.11.1 Raw Water Transmission System to Lake Columbia (Recommended)

The City of Nacogdoches is pursuing one recommended WMS to increase the reliability of its supplies and provide for projected growth using surface water from Lake Columbia. The City of Nacogdoches is also among those contracted for participation in the Lake Columbia project. The City proposes to obtain raw water from Lake Columbia to transmit to Lake Nacogdoches. The City's existing treatment plant would be expanded to treat the additional water. Currently, there are no alternative strategies proposed for City of Nacogdoches. Cost estimates were developed for the raw water transmission system from Lake Columbia to City of Nacogdoches.

5B.3.11.2 Municipal Conservation (Recommended)

The City of Nacogdoches has a baseline per capita demand of 187 GPCD. Conservation strategies were recommended for all municipal WUGs in the ETRWPA, including the City of Nacogdoches. The municipal water conservation strategy includes estimates of potential water savings and cost estimates related to enhanced education and public awareness, water conservation pricing implementation, and a system water audit and water loss control program. Further discussion of these conservation strategies is provided in Chapter 5C.

5B.3.11.3 City of Nacogdoches Summary

The supplies and demands associated with the City of Nacogdoches are shown in Table 5B.99 and Figure 5B.32. A summary of cost estimates for the recommended WMSs is listed in Table 5B.100.

Table 5B.99 City of Nacogdoches – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Carrizo-Wilcox	6,492	6,492	6,492	6,492	6,492	6,492
Lake Nacogdoches	14,335	13,973	13,611	13,249	12,887	12,525
Total Existing Supplies	**20,827**	**20,465**	**20,103**	**19,741**	**19,379**	**19,017**
Demands (ac-ft per year)						
Total Existing Demands	11,030	11,337	11,650	12,073	12,498	12,928
Surplus or (Shortage) with Existing Supplies	**9,797**	**9,128**	**8,453**	**7,668**	**6,881**	**6,089**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Supply from Lake Columbia	0	8,551	8,551	8,551	8,551	8,551
Municipal Conservation	364	884	1,152	1,223	1,295	1,369
Total Increase in Supplies from Recommended WMSs/WMSPs	**364**	**9,435**	**9,703**	**9,774**	**9,846**	**9,920**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**10,161**	**18,563**	**18,156**	**17,442**	**16,727**	**16,009**

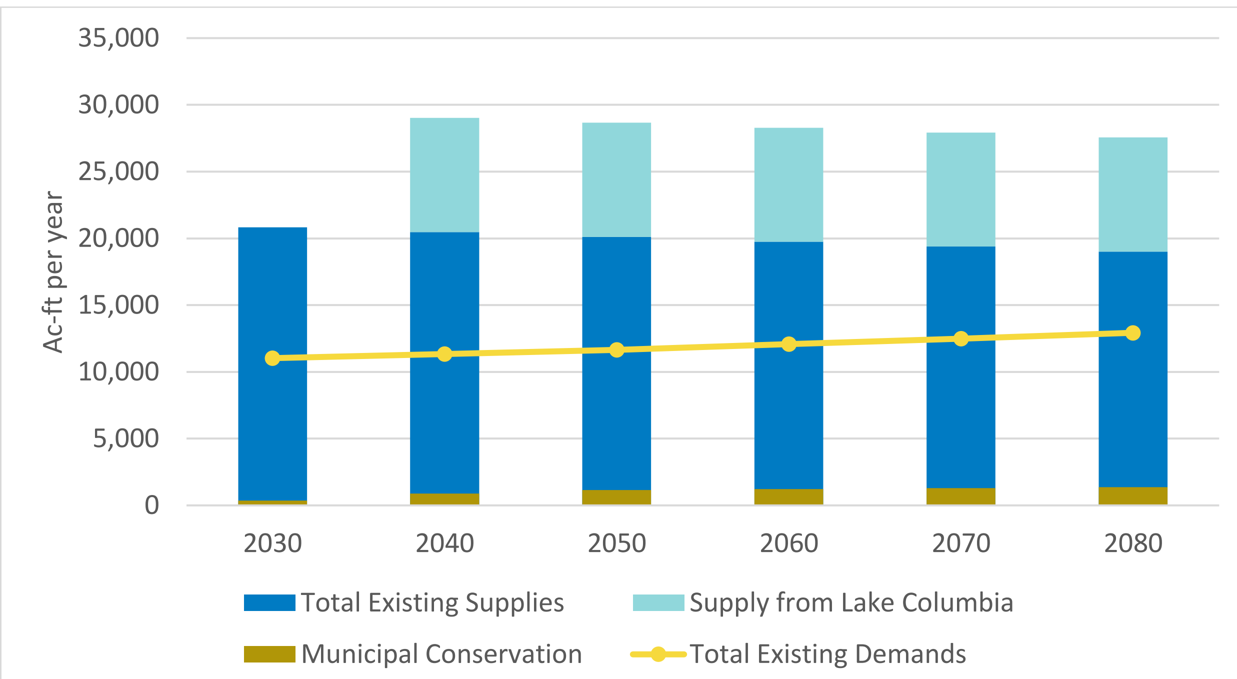


Figure 5B.32 City of Nacogdoches – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.100 City of Nacogdoches – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Supply from Lake Columbia	8,551	$82,440,000	$9,278,000	$1,085	$3.33
Municipal Conservation	1,369	$652,000	$188,100	$517	$1.59

5B.3.12 Panola County Fresh Water Supply District

Panola County Fresh Water Supply District (PC FWSD) is a wholesale water provider in Panola County. PC FWSD is the wholesale provider to City of Carthage and Mining demands in Panola County. PC FWSD owns and operates Lake Murvaul and has a water right for 22,400 ac-ft per year. In this round of planning, PC FWSD has enough supplies to meet the projected customer demand for the planning period 2030-2080. Currently, no WMSs or WMSPs were identified for this entity. Conservation was recommended for all municipal WUGs in the ETRWPA, including some of PC FWSD's customers. Potential future reductions in water demands due to conservation would reduce demands on PC FWSD's supplies.

5B.3.12.1 Panola County FWSD Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for PC FWSD (if any) is presented in Table 5B.101 and Figure 5B.33.

Table 5B.101 PC FWSD – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Lake Murvaul (Firm Yield)	20,800	20,016	19,482	18,448	17,664	16,880
Total Existing Supplies	**20,800**	**20,016**	**19,482**	**18,448**	**17,664**	**16,880**
Demands (ac-ft per year)						
Total Demands	**14,820**	**14,820**	**14,820**	**14,820**	**14,820**	**14,820**
Surplus or (Shortage) with Existing Supplies	**5,980**	**5,196**	**4,662**	**3,628**	**2,844**	**2,060**

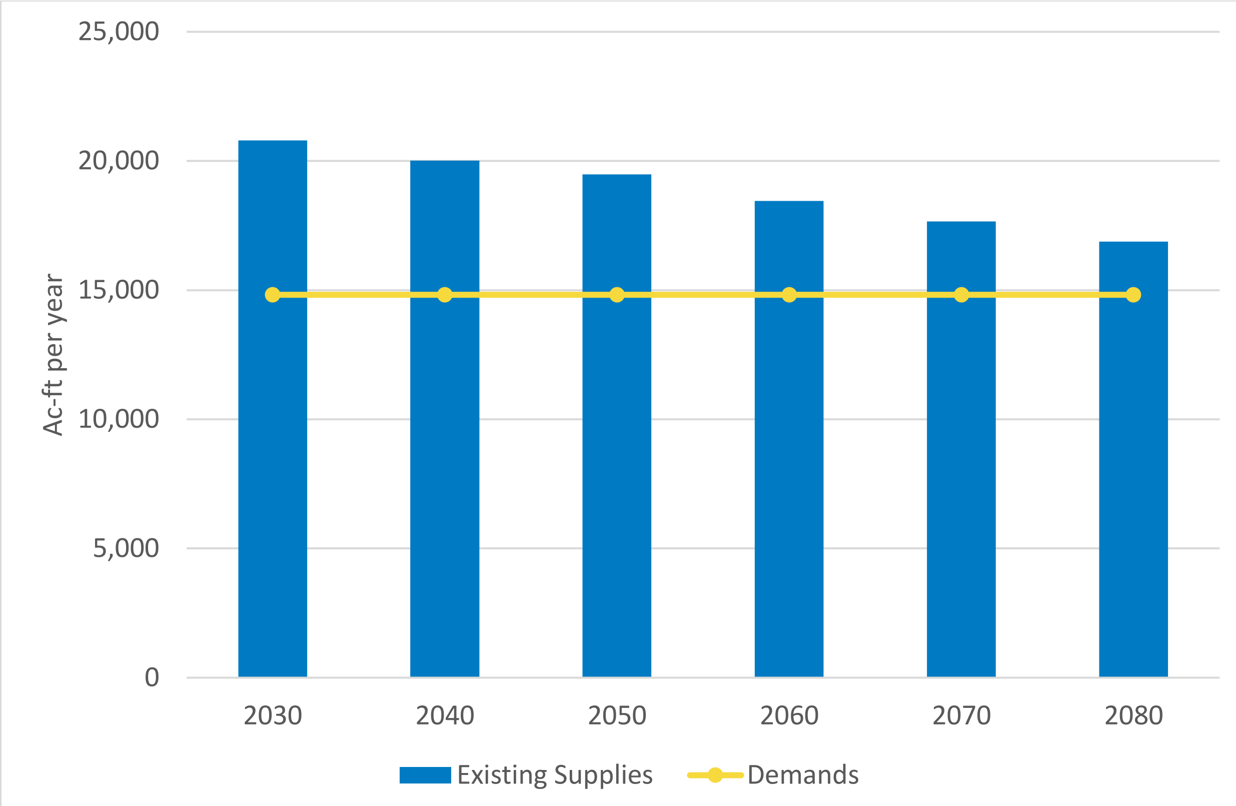


Figure 5B.33 PC FWSD – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.3.13 City of Port Arthur

The City of Port Arthur provides treated water to municipal users both inside and outside the city limits and to several industrial facilities in Jefferson County. Current water supplies for the City of Port Arthur include raw surface water from the Sam Rayburn/B.A. Steinhagen Reservoir System (LNVA). LNVA provides 100 percent of the City's supply to meet their demands. This supply is limited by Port Arthur's water treatment plant capacity of 40 MGD. Currently, the only WMS/WMSP identified for the City is municipal conservation. The information below summarizes the existing supplies, demands, and recommended WMSs and WMSPs for Port Arthur in the 2026 ETRWP.

5B.3.13.1 Municipal Conservation (Recommended)

Port Arthur is not projected to have a water supply need within the planning period. However, conservation strategies were recommended for all municipal WUGs in the ETRWPA. The municipal water conservation strategy includes estimates of potential water savings and cost estimates related to enhanced education and public awareness, water conservation pricing implementation, and a system water audit and water loss control program. Further discussion of these conservation strategies is provided in Chapter 5C.

5B.3.13.2 Port Arthur Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for Port Arthur is presented in Table 5B.102 and Figure 5B.34. A summary of cost estimates for the recommended WMS is listed in

Table **5B.103**.

Table 5B.102 Port Arthur – Summary of Existing Supplies, Demand, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Sam Rayburn/B.A. Steinhagen Reservoir System (LNVA)	33,955	37,990	37,990	37,990	37,990	37,990
Total Existing Supplies	**33,955**	**37,990**	**37,990**	**37,990**	**37,990**	**37,990**
Demands (ac-ft per year)						
Total Demands	33,955	37,990	37,990	37,990	37,990	37,990
Surplus or (Shortage) with Existing Supplies	**0**	**0**	**0**	**0**	**0**	**0**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Municipal Conservation	473	677	736	788	838	887
Total Increase in Supplies from Recommended WMSs/WMSPs	**473**	**677**	**736**	**788**	**838**	**887**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**473**	**677**	**736**	**788**	**838**	**887**

Table 5B.103 Port Arthur – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	473 - 887	$1,518,000	$194,300	$411	$1.26

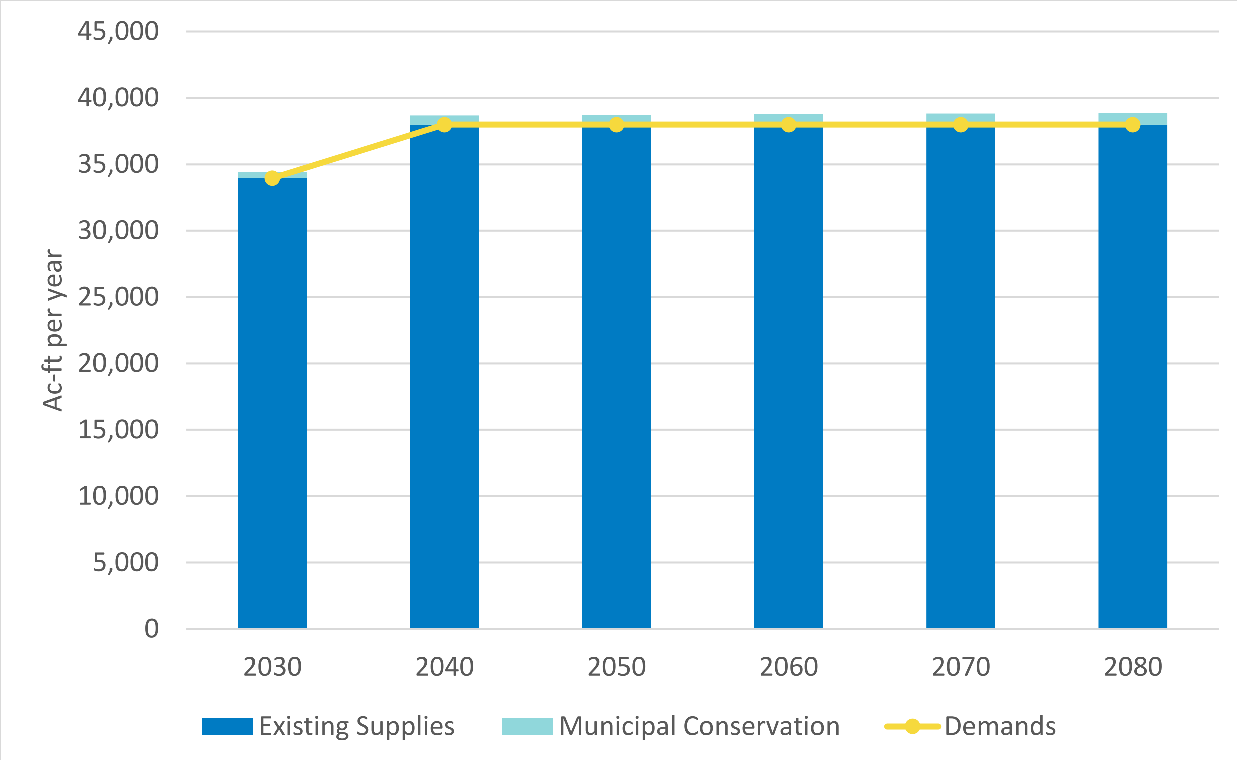


Figure 5B.34 Port Arthur – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.3.14 Sabine River Authority

The Sabine River Authority of Texas (SRA) is based in the ETRWPA (Region I) and the North East Texas Regional Water Planning Area (Region D). SRA currently provides water supply from its Lower Basin system (Toledo Bend Reservoir and the canal system) to water users in the ETRWPA. SRA provides water supply from its Upper Basin system (Lake Tawakoni and Lake Fork) to water users in Regions C and D. SRA's Upper Basin system water supply sources are nearly fully contracted, and SRA is currently exploring opportunities for additional water supply in their Upper Basin. This section describes the supply and demand evaluation for SRA's Lower Basin located in the ETRWPA. The supply, demand, and strategy evaluation for SRA's Upper Basin is not included in this plan. Instead, discussion regarding SRA's Upper Basin and any potential strategies pursued by SRA outside of the ETRWPA is included in the Region C and Region D regional water plans.

SRA supplies wholesale water to several customers in the ETRPWA from its Lower Basin supplies: the Toledo Bend Reservoir and the canal system. Municipal customers in SRA's Lower Basin currently include the cities of Hemphill, Huxley, and Rose City, and El Camino WSC and G-M WSC. In addition to municipal customers, SRA also currently supplies steam electric power users in Orange, Newton, and Rusk Counties, manufacturing users in Orange and Jefferson Counties, and irrigation users in Orange County. There are additional demands projected for manufacturing users in Orange and Newton Counties that are assumed to be supplied by SRA from their Lower Basin sources.

SRA has sufficient supplies in its Lower Basin to meet current contracted customer demands and has substantial surplus supplies for potential future buyers. In addition to the current customers, some ETRWPA water suppliers have water management strategies (WMSs) and/or projects (WMSPs) that use SRA's Toledo Bend Reservoir supplies. The ETRWPA WMSs and WMSPs that use supplies from Toledo Bend Reservoir include: 1) Pipeline from Toledo Bend to City of Center; and 2) Transfer from Toledo Bend to LNVA. It should be noted that the strategies listed were identified as recommended WMSs and WMSPs for these entities by the ETRWPG. None of these entities have yet contracted with SRA regarding these potential WMSs. For the successful implementation of these strategies, these users will have to contract with SRA for supplies. Additional discussion of these WMSs and WMSPs, including cost estimates are included in the write-up for the specific entities and are not included here as they are not sponsored by SRA. It should be noted that the cost estimates for these strategies include a placeholder cost for purchasing water, which is applied consistently across all strategies in the 2026 ETRWP. Purchase water costs will ultimately be subject to negotiation between the seller (SRA) and future buyers.

In addition to the recommended WMSs and WMSs for ETRPWA water suppliers, there may potentially be future WMSs and WMSPs to use and transfer SRA's Toledo Bend Reservoir supplies outside of the ETRWPA. These are not discussed in the ETRWP and are instead discussed in the respective regional water plans where those WMSs/WMSPs would be developed. Development of these WMSs/WMSPs would be subject to negotiation between the sponsors and SRA.

5B.3.14.1 SRA Summary

A summary of the total demands, existing supplies, and surpluses for the SRA Lower Basin within the ETRWPA is included in Table 5B.104 and Figure 5B.35. No WMSs or WMSPs sponsored by SRA in the ETRWPA were identified in this cycle of regional water planning.

Table 5B.104 SRA (Lower Basin) – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Toledo Bend Reservoir	941,900	941,583	941,230	940,949	940,632	940,315
Canal System	129,961	129,961	129,961	129,961	129,961	129,961
Total Existing Supplies	**1,071,861**	**1,071,544**	**1,071,191**	**1,070,910**	**1,070,593**	**1,070,276**
Demands (ac-ft per year)						
Toledo Bend Reservoir Current Customer Contracts	26,806	26,806	26,806	26,806	26,806	26,806
Canal System Current Customer Contracts	106,635	106,635	106,635	106,635	106,635	106,635
Potential Future Lower Basin Customer Demands	34,728	34,955	35,191	37,847	42,384	47,090
Total Demands (Current Contracts and Potential Future Customers)	**168,169**	**168,396**	**168,632**	**171,288**	**175,825**	**180,531**
Surplus or (Shortage) with Existing Supplies	**903,692**	**903,148**	**902,559**	**899,622**	**894,768**	**889,745**

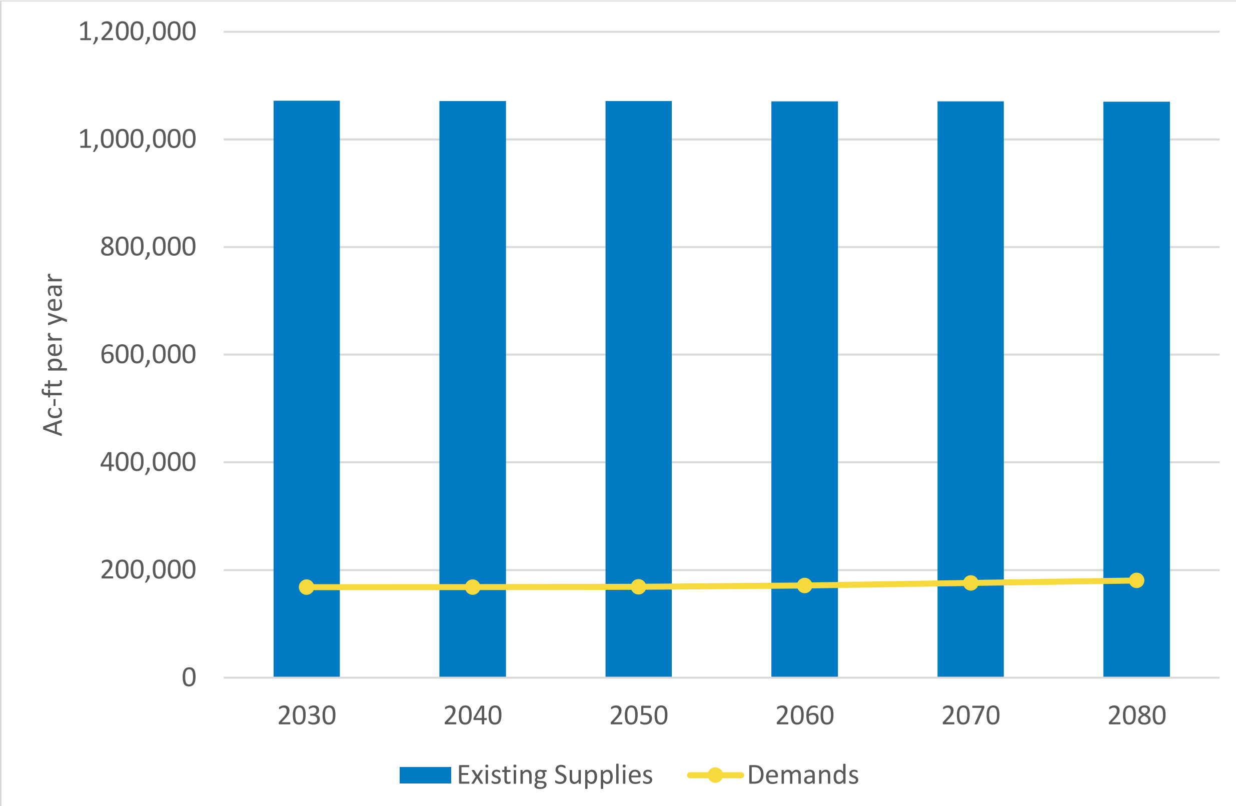


Figure 5B.35 SRA (Lower Basin) – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.3.15 City of Tyler

The City of Tyler currently provides wholesale supplies to retail customers, irrigation, and manufacturing demands within the City limits. The City is the wholesale provider for Whitehouse, Southern Utilities, Walnut Grove WSC, and Community Water Company. The City of Tyler's current water supplies include a firm yield of approximately 32,000 acre-feet per year from Lake Tyler, 33,630 ac-ft/yr (i.e., 30 MGD) from Lake Palestine, and 400 acre-feet per year from Bellwood Lake. The City is planning to cap the wells and plug those that are in a deteriorated state. They are not planning to maintain or rehabilitate any of the wells. The City of Tyler is shown to have sufficient supplies through the planning period using the TWDB approved demand projections.

Additionally, there is significant interest from other water users in Smith County seeking to contract with the City for water supplies. Recommended strategies include providing additional water to Chandler, as well as mining and manufacturing users in Smith County. The City has sufficient supplies to meet these potential future demands.

The City of Tyler has recommended strategies to develop infrastructure to develop the rest of Lake Palestine and for municipal conservation. The City's supplies, customer demands, and WMSs are summarized in the Table 5B.105. Summary of the cost estimates for the recommended strategies are included in Table 5B.106.

5B.3.15.1 Lake Palestine Infrastructure (Recommended)

The City of Tyler proposed the following recommended strategy for the 2021 and 2026 Plan. This strategy involves the City developing an additional 30 MGD of Lake Palestine water. The City has developed about half of its contracted supply in Lake Palestine and plans to develop the remaining supply (i.e., 30 MGD) by 2060 as part of its long-term water supply plan. This development will be executed in two stages, with the initial phase bringing 15 MGD into operation by 2040, and the subsequent phase will introduce the remaining 15 MGD by 2060.

5B.3.15.2 Municipal Conservation (Recommended)

City of Tyler has a per capita demand of 255 GPCD. Conservation strategies were recommended for all municipal WUGs in the ETRWPA, including the City of Tyler. The municipal water conservation strategy includes estimates of potential water savings and cost estimates related to enhanced education and public awareness, water conservation pricing implementation, and a system water audit and water loss control program. Further discussion of these conservation strategies is provided in Chapter 5C.

5B.3.15.3 City of Tyler Summary

The supplies and demands associated with the City of Tyler are shown in Table 5B.105 and Figure 5B.36.

Table 5B.105 City of Tyler – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Lake Tyler [a]	32,900	32,665	32,430	32,203	31,977	31,750
Bellwood Lake [b]	400	400	400	400	400	400
Lake Palestine [c]	33,630	33,630	33,630	33,630	33,630	33,630
Total Existing Supplies	**66,930**	**66,695**	**66,460**	**66,233**	**66,007**	**65,780**
Demands (ac-ft per year)						
Total Existing Demands	39,975	44,121	48,862	51,474	54,240	57,165
Surplus or (Shortage) with Existing Supplies	**26,955**	**22,574**	**17,598**	**14,759**	**11,767**	**8,615**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Municipal Conservation	991	2,115	2,842	3,161	3,507	3,883
Lake Palestine Infrastructure Expansion	0	16,815	16,815	33,630	33,630	33,630
Total Increase in Supplies from Recommended WMSs/WMSPs	**991**	**18,930**	**19,657**	**36,791**	**37,137**	**37,513**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**27,946**	**41,505**	**37,255**	**51,550**	**48,904**	**46,128**

Notes:

[a] The capacity of the City's WTP is 34 MGD (or 38,114 ac-ft/yr), but the supply is limited by the firm yield from 2026 RWP WAM model.
[b] Assume 400 ac-ft/yr of raw water is used for irrigation in Smith County, but it is not used for municipal purposes.
[c] Limited to infrastructure constraint (30 mgd).

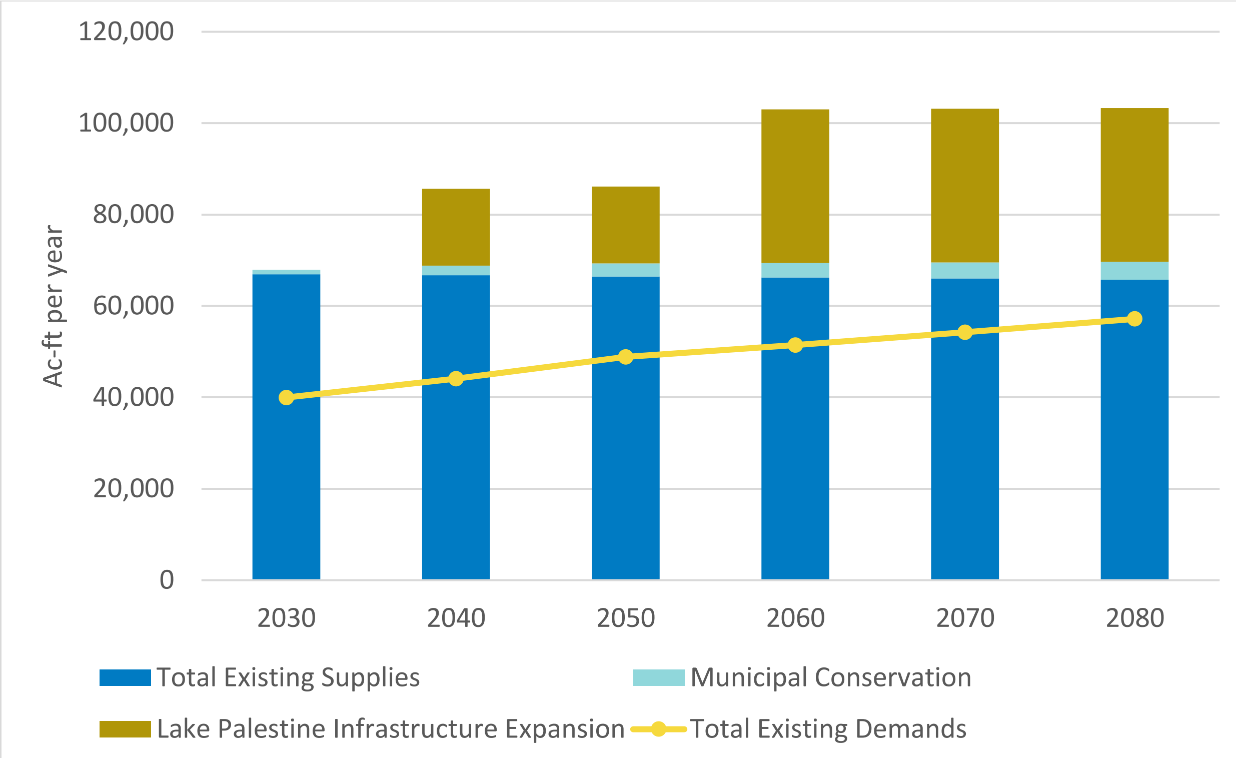


Figure 5B.36 City of Tyler – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.106 City of Tyler – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	3,507	$6,731,000	$613,000	$400	$1.23
Lake Palestine Infrastructure Expansion	33,630	$289,320,000	$37,268,000	$1,108	$3.40

5B.3.16 Upper Neches River Municipal Authority

The Upper Neches River Municipal Water Authority (UNRMWA) owns and operates Lake Palestine in the Neches River Basin. UNRMWA has a water right for 238,110 ac-ft per year from Lake Palestine and a downstream run-of-river diversion. The City of Palestine, City of Tyler, and City of Dallas have contracts for supplies from Lake Palestine for amounts of 28,000 ac-ft per year, 67,200 ac-ft per year, and 114,337 ac-ft per year, respectively. In addition to these three cities, UNRMWA is projected to have small needs from local irrigation and manufacturing users taking supplies from around the lake.

The yield for Lake Palestine was estimated using the Neches River Basin Water Availability Model (Neches WAM) adapted for the 2026 ETRWP. Based on the yield analysis from the ETRWP, the Lake Palestine system is projected to have a yield of 177,110 ac-ft per year in 2030, reducing to 166,910 ac-ft per year by 2080 due to sedimentation. When comparing current contracts for Lake Palestine supply and the projected yield of the Lake Palestine system, the UNRMWA shows a water supply need during the planning period for Lake Palestine supplies. However, when comparing the projected demands for UNRMWA's contracted customers to the yield, there is no shortage for Lake Palestine supplies.

UNRMWA does not think the contractual shortages to be real as the shortage is primarily associated with the reduced firm yield of Lake Palestine due to projected sediment accumulation in the lake. UNRMWA believes that the storage-area-elevation curves used in the Water Availability Models are severely under-predicting the storage volumes available in various parts of the lake. Therefore, UNRMWA believes that the lake yield is larger than what is projected by the Water Availability Models. UNRMWA is currently working with the TWDB to develop revised and refined volumetric information for Lake Palestine, but this information is not available for the 2026 regional planning cycle. The lake yield may be recomputed in the next planning cycle.

To address potential contractual shortages identified over the planning period, UNRMWA has evaluated multiple potentially feasible water management strategies. UNRMWA was the sponsor of the proposed Lake Fastrill project. With the uncertainties surrounding this project, the UNRMWA in conjunction with the City of Dallas has identified the need for a Lake Fastrill replacement project.

In 2013, UNRMWA and Dallas initiated the Upper Neches River Water Supply Project Feasibility Study (HDR, 2014) to evaluate potential water supply strategies to replace the Lake Fastrill project. These strategies included Neches run-of-river diversions of unappropriated water from the Upper Neches River operated in system with Lake Palestine, tributary storage, and/or operated conjunctively with groundwater. The additional water supply provided by these strategies could be used to supplement existing water supplies available to Dallas and potentially other UNRMWA customers. Compared to the Lake Fastrill project, all run-of-river diversion strategies provide lesser firm yield but avoid environmental impacts and some of the permitting challenges associated with a large, main-stem reservoir on the Neches River.

Based on this study, the preferred (recommended) strategy was the Neches run-of-river diversion operated as a system with Palestine. This was included as a recommended WMS/WMSP for UNRMWA and Dallas in the 2021 regional water plans. The Draft 2024 Dallas Long Range Water Supply Plan (LRWSP; Dallas Water Utilities, 2024) re-evaluated this strategy and again designated the Neches run-of-river diversion operated as a system with Lake Palestine as a recommended strategy. The re-evaluated configuration of this strategy from the Draft 2024 Dallas LRWSP is included as a recommended WMS/WMSP for UNRMWA and Dallas in the 2026 regional water plans.

5B.3.16.1 Neches Run-of-River with Lake Palestine (Recommended)

The Draft 2024 Dallas LRWSP outlines the infrastructure associated with this WMS/WMSP. UNRMWA is considered as the project sponsor for this WMS/WMSP in the regional water plans. This recommended project includes a new river intake and pump station for run-of-river diversions from the Neches River. The run-of-river diversions will be taken from the river segment between the existing Rocky Point diversion and the Weches Dam site below the SH 21 crossing, between the Neches River National Wildlife Refuge, and upstream of the Weches Dam site. Diversions would be conveyed through a 42-mile pipeline (23 miles of 72-inch diameter pipeline and 19 miles of 66-inch pipeline) to Dallas' pump station located at Lake Palestine. This water supply would then be delivered to Dallas through their integrated pipeline project (IPL). New facilities required for this project include a small diversion dam on the Neches River, a river intake and pump station, and a transmission pipeline and booster pump station supporting transmission to Lake Palestine.

Run-of-the-river diversions will be authorized under a new appropriation of surface water, subject to senior water rights, drought conditions, and TCEQ environmental flows restrictions, and drought conditions. Water availability at the designated diversion point was calculated based on a maximum diversion rate of 141 cfs (91 MGD). The estimated firm yield from this strategy is approximately 82,900 ac-ft per year (74 MGD). The run-of-river diversions are an interruptible supply, and the firm yield associated with the WMS is the incremental increase in the firm yield of Lake Palestine resulting from the system operation of the new diversions and the transmission facilities with Lake Palestine. This firm yield was computed using a 2021 version of TCEQ's Neches River WAM, which includes hydrology from 1940 to 2018.

Although the additional system firm yield from this WMS/WMSP is approximately 82,900 ac-ft per year, the water available from this strategy is limited to the available capacity in Dallas' IPL, which is approximately 53,800 ac-ft per year (48 MGD).

For regional planning purposes, the WMS/WMSP is expected to be online in 2070 when the City of Dallas is expected to use its share of supplies from this WMS/WMSP. The timing can be changed to an earlier or later date if the timing of needs for this WMS/WMSP changes.

The supply generated from the recommended Neches run-of-river strategy is potentially susceptible to risks associated with a drought worse than the historical record, which could reduce water availability. Alternative variations of this project could help address the potential risks. In addition to the run-of-the-river strategy described above, other strategies were mentioned (but not evaluated) in the Draft 2024 Dallas LRWSP. One approach considered an off-channel reservoir (OCR) to provide storage for the run-of-river water, while another explored using local groundwater conjunctively to firm up the run-of-river flow. These two alternative strategies were evaluated in the Upper Neches River Water Supply Project Feasibility Study (HDR, 2014).

5B.3.16.2 UNRMWA Summary

A summary of existing water supplies, demands, surplus/shortages, and recommended WMSs/WMSPs for UNRMWA in the 2026 ETRWP are described in Table 5B.107 and Figure 5B.37. Planning-level opinion of probable construction costs were obtained from the Draft 2024 Dallas LRWSP for inclusion in Table 5B.108.

Table 5B.107 UNRMWA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Lake Palestine System (Firm Yield)	177,110	175,040	172,970	170,950	168,930	166,910
Total Existing Supplies	**177,110**	**175,040**	**172,970**	**170,950**	**168,930**	**166,910**
Demands (ac-ft per year)						
Lake Palestine Contracted Customer Demands [a]	154,565	154,542	154,520	154,502	154,487	154,487
Surplus or (Shortage) Compared to Contracted Customer Demands	**22,545**	**20,498**	**18,450**	**16,448**	**14,443**	**12,423**
Lake Palestine Contracts	210,247	210,224	210,202	210,184	210,169	210,169
Surplus or (Shortage) Compared to Contracts	**(33,137)**	**(35,184)**	**(37,232)**	**(39,234)**	**(41,239)**	**(43,259)**
Water Management Strategies/Projects (ac-ft per year)						
Neches Run-of-River with Lake Palestine [c]	0	0	0	0	82,900	82,900
Surplus or (Shortage) with WMSs/WMSPs Compared to Contracted Customer Demands	**22,545**	**20,498**	**18,450**	**16,448**	**97,343**	**95,323**
Surplus or (Shortage) with WMSs/WMSPs Compared to Contracts	**(33,137)**	**(35,184)**	**(37,232)**	**(39,234)**	**41,661**	**39,641**

Notes:

[a] Total assumes the full contracted volume to City of Dallas (114,338 ac-ft/year) and other lakeside customers, and projected demands on Lake Palestine for the City of Tyler and City of Palestine.

[b] The yield shown is based on information from the Draft 2024 Dallas LRWSP (DWU, 2024). According to the Draft LRWSP, the total available yield from this strategy is 82,900 ac-ft/year, while only 53,800 ac-ft/year is accessible through Dallas' integrated pipeline project (IPL).

Table 5B.108 UNRMWA – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Neches Run-of-River with Lake Palestine (Recommended)[a]	53,800	$719,027,000	$69,397,000	$1,290	$3.96

Notes:

[a] The supply quantity shown is based on information from the Draft 2024 Dallas LRWSP (DWU, 2024). According to the Draft LRWSP, the total available yield from this strategy is 82,900 ac-ft/year, while only 53,800 ac-ft/year is accessible through Dallas' integrated pipeline project (IPL). Costs shown are representative of the supply accessible through the Dallas IPL.

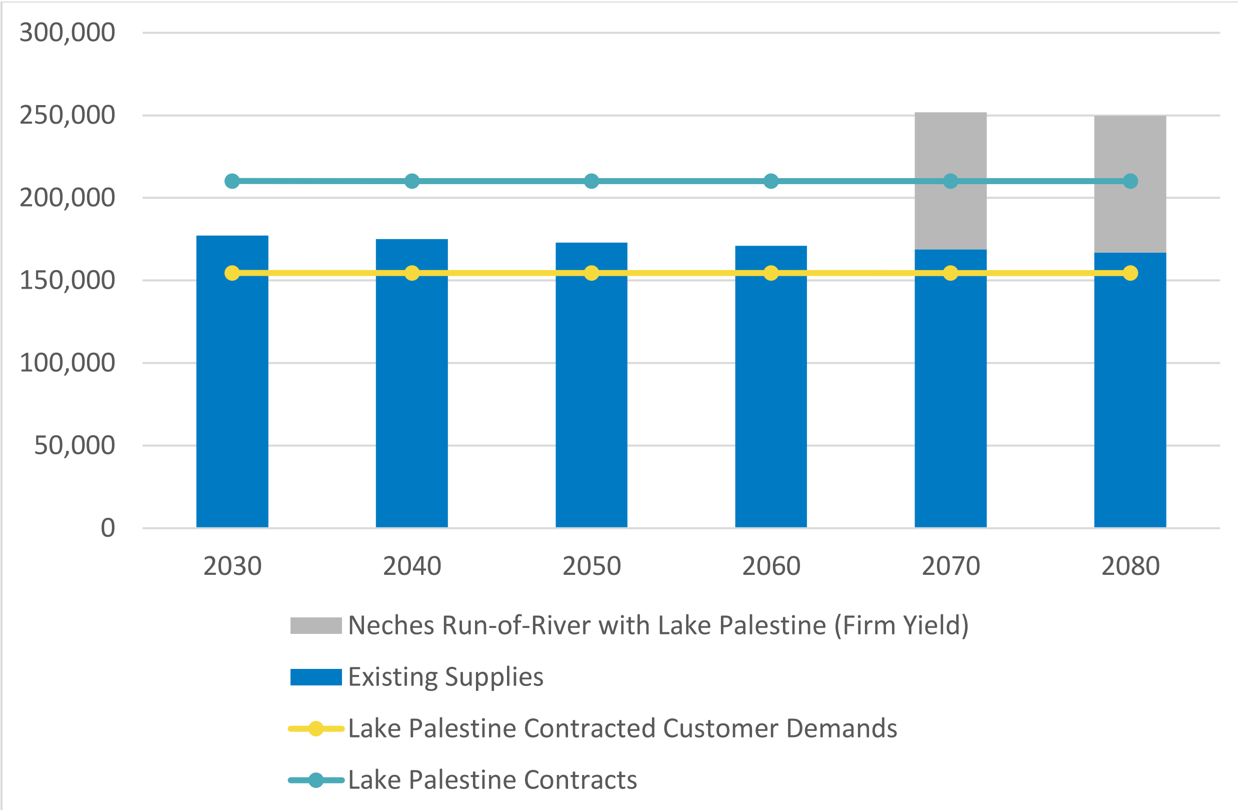


Figure 5B.37 UNRMWA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.4 TEXAS WATER DEVELOPMENT BOARD DATABASE

The 2027 Texas Water Development Board Database (DB27) is an electronic database provided by the Texas Water Development Board which collects, maintains, and analyzes water planning data. The Regional Water Planning Groups and their contracted consultants may enter data for their respective regions in order to facilitate development of useful and relevant regional and state water plans. The DB27 Reports required by the TWDB are included as an Appendix ES-A, Report 13.

In the ETRWPA, there are some strategies which are recommended but fully allocated in DB27 to 'Unassigned Volumes'. This occurs when a wholesale water provider or water user group (WUG) plans to develop supplies beyond the exact projected needs of their customers (a management supply factor of greater than 1). This is prudent planning given uncertainty in growth of existing and potential future customers and the potential for a drought worse than the drought of record. In these cases, the strategy is still recommended. However, it is not allocated out to customers as surpluses because this water is not owned by the WUG. This is a surplus that the wholesale provider keeps as a margin of safety against a worse potential drought, unanticipated growth, or new customers. Since it is unknown which of these factors it will be used for, it is left on the wholesale water provider. In the database it is allocated to 'unassigned volumes.'

5B.5 DOCUMENTATION OF IMPLEMENTATION STATUS AND ANTICIPATED TIMELINE FOR CERTAIN TYPES OF RECOMMENDED WMSS

The 2026 regional water plans must include a new sub-section documenting the implementation status of certain water management strategies that are recommended in the plan. The implementation status must be provided for the following types of recommended WMSs with any online decade:

- All reservoir strategies (including major and minor reservoirs)
- All seawater desalination strategies
- Direct potable reuse strategies that provide greater than 5,000 acre-feet per year (AFY) of supply in any planning decade
- Brackish groundwater strategies that provide greater than 10,000 AFY of supply in any planning decade
- Aquifer storage and recovery strategies that provide greater than 10,000 AFY in any decade
- All water transfers from out of state
- Any other innovative technology projects the RWPG considers appropriate

Two WMSs from the 2026 ETRWP meet the criteria above: Lake Columbia Reservoir and the West Beaumont Reservoir.

Appendix 5B-D includes a summary of key milestones associated with these two WMSs, including when the sponsor took an affirmative vote or other action to make expenditures to construct or file applications for permits, the status of permits (e.g., state water right, diversion, discharge, federal 404), planning, design and construction status, and expenditures to date.

Figure 5B.38 and Figure 5B.39 illustrate the estimated project timeline and estimated schedule of key milestones (e.g., feasibility, design, permitting, acquisition, construction) for these two reservoir WMSs, respectively.

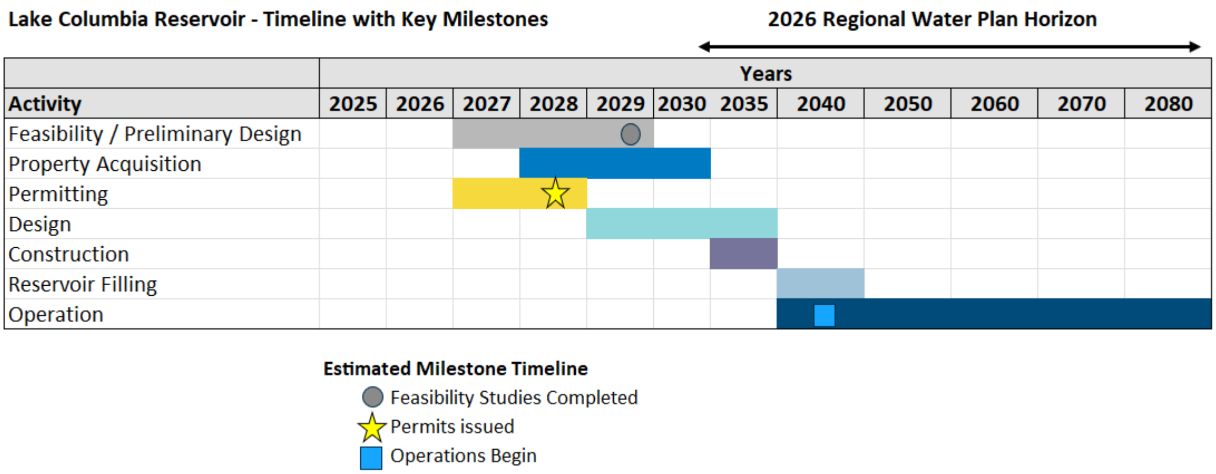


Figure 5B.38 Timeline and Milestone for Lake Columbia Reservoir

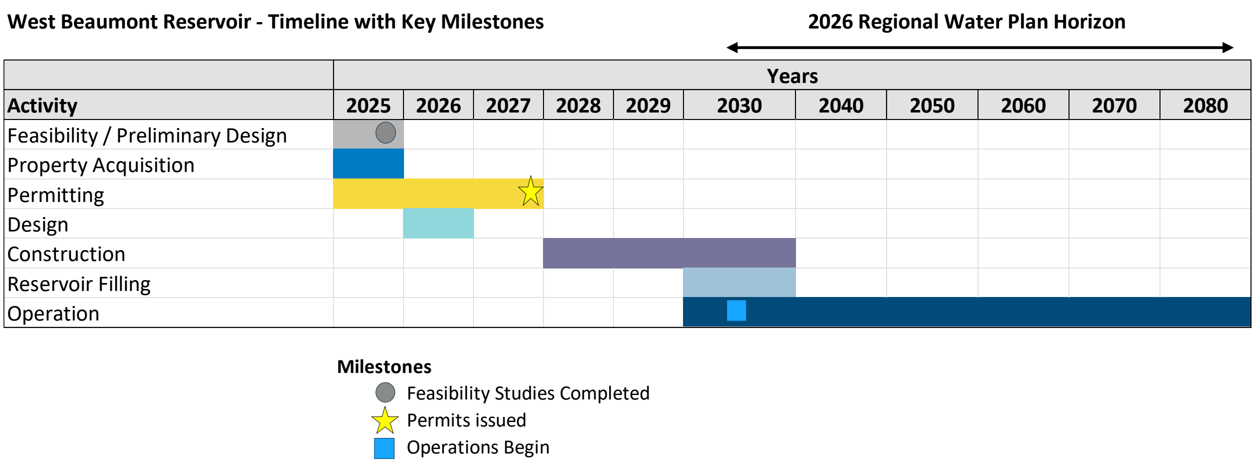


Figure 5B.39 Timeline and Milestone for West Beaumont Reservoir

5B.6 SUMMARY OF RECOMMENDED AND ALTERNATIVE WATER MANAGEMENT STRATEGIES AND PROJECTS

The tables below (Table 5B.1 and Table 5B.2) include a summary of all recommended and alternative water management strategies (WMSs) and water management strategy projects (WMSPs) considered for the WUGs and MWPs in the ETRWPA for the 2026 Plan. As indicated in the summary tables, the ETRWPG has not recommended any aquifer storage and recovery, seawater desalination, or brackish groundwater desalination strategies in the ETRWPA. This is due to the absence of project sponsors and the availability of more cost-effective water management strategies for increasing water supplies. All recommended WMSs and WMSPs in the ETRWPA have been designed to meet the criteria set forth by the State Water Planning Database. These strategies and projects aim to reduce water consumption, minimize water loss or waste, enhance water use efficiency, and develop, deliver, or treat additional water supply volumes. By implementing these measures, the ETRWPA ensures that additional water is available to WUGs and

WWPs during Drought of Record conditions, thereby securing a reliable water supply for at least one planning decade.

The water supply from the water management strategies has not been included to account for water loss. The demands developed in Chapter 2 of this plan already incorporate appropriate levels of water loss based on current system performance. Therefore, the identified supplies and projects are designed to meet these demands without additional consideration for water loss. The ETRWPG expects that future projects will be developed and maintained responsibly, leading to a reduction in water losses below current levels. This reduction is specifically addressed within the water loss reduction component of the municipal conservation strategy.

Table 5B.109 Summary 2026 Needs and Water Management Strategies for Water User Groups by County (ac-ft per year)

NEEDS RECOMMENDED STRATEGY *ALTERNATIVE STRATEGY*

County	WUG	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
ANDERSON	**B C Y WSC**	Unmet Need	0	0	0	0	0	0	--			
		Municipal Conservation	5	7	8	8	8	9	$310,000	$24,200	$4,500	$13.81
		New Wells (Carrizo-Wilcox)	0	170	170	170	170	170	$4,254,000	$525,000	$3,088	$9.48
	STEAM ELECTRIC POWER	Unmet Need	-2,296	-2,296	-2,296	-2,296	-2,296	-2,296	--			
		New Wells (Carrizo-Wilcox)	2,300	2,300	2,300	2,300	2,300	2,300	$21,908,000	$1,834,000	$797	$2.45
ANGELINA	**LUFKIN**	Unmet Need	0	0	0	0	0	0	--			
		Develop Sam Rayburn Water Rights	Lufkin strategies discussed in Table 5B.2						Lufkin strategies discussed in Table 5B.110			
		Municipal Conservation	208	427	526	553	582	610				
	MANUFACTURING	Unmet Need	-2,145	-2,314	-2,488	-2,671	-2,859	-3,055	--			
		Purchase from Lufkin (Sam Rayburn)	2,150	2,320	2,490	2,680	2,860	3,060	$90,393,000	$8,493,000	$1,379	$4.23
	MINING	Unmet Need	-373	-412	-448	-480	-508	-533	--			
		Purchase from Lufkin	380	420	450	480	510	540	$13,921,000	$1,702,000	$3,152	$9.67
CHEROKEE	**ALTO RURAL WSC**	Unmet Need	-124	-209	-306	-414	-533	-665	--			
		New Wells (Carrizo-Wilcox)	670	670	670	670	670	670	$7,612,000	$970,000	$1,448	$4.44
		Municipal Conservation	18	29	34	38	45	51	$97,000	$14,300	$800	$2.46
	JACKSONVILLE	Unmet Need	0	0	0	0	0	0	--			
		Raw Water Transmission System from Lake Columbia	Jacksonville strategies discussed in Table 5B.2						Jacksonville strategies discussed in Table 5B.110			
		Municipal Conservation	114	279	349	348	345	343				
HARDIN	*NO WUGS WITH UNMET NEEDS, NO STRATEGIES EVALUATED*											
HENDERSON	**ATHENS** [2]	Unmet Need	0	0	-364	-1,053	-2,076	-2,701	--			
		Municipal Conservation (Region C)	122	325	687	904	1,112	1,226	$157,000	$101,500	$800	$2.46
		Athens MWA Strategies	0	0	364	1,222	2,055	1,989	Athens MWA strategies discussed in Table 5B.110			
	EDOM WSC [2]	Unmet Need	-67	-75	-79	-83	-86	-87	--			
		New Wells (Carrizo-Wilcox)	87	87	87	87	87	87	$2,325,000	$255,000	$2,931	$8.99
	CHANDLER	Unmet Need	0	0	-43	-281	-573	-934	--			
		Purchase from Tyler (Lake Palestine)	0	0	50	290	580	940	$15,028,000	$2,774,000	$3,000	$9.06
		New Wells (Carrizo-Wilcox)	*0*	*0*	*940*	*940*	*940*	*940*	$10,727,000	$1,387,000	$1,476	$4.53
		Municipal Conservation	13	23	30	40	52	77	$38,000	$9,700	$700	$2.15
	LIVESTOCK [2]	Unmet Need	0	0	0	0	-321	-490	--			
		Athens MWA Indirect Reuse	0	0	507	884	1,216	1,385	$0	$0	$0	$0.00
	MINING [2]	Unmet Need	-15	-16	-17	-19	-47	-143	--			
		New Wells (Queen City)	150	150	150	150	150	150	$471,000	$40,000	$267	$0.82
		Unmet Need	-2,061	-2,061	-2,061	-2,061	-2,061	-2,061	--			

NEEDS **RECOMMENDED STRATEGY** *ALTERNATIVE STRATEGY*

County	WUG	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
	STEAM ELECTRIC POWER [2]	*This demand no longer exists, so no WMS was evaluated*							-	-	-	-
HOUSTON	**TDCJ EASTHAM UNIT**	Unmet Need	-113	-111	-111	-111	-111	-111	--			
		New Wells (Carrizo-Wilcox)	120	120	120	120	120	120	$5,018,000	$583,000	$4,858	$14.91
		Municipal Conservation	20	30	32	34	36	37	$134,000	$15,100	$700	$2.15
	LIVESTOCK	Unmet Need	0	0	0	-59	-285	-285	--			
		New Wells (Carrizo-Wilcox)	0	0	0	290	290	290	$969,000	$87,000	$300	$0.92
JASPER	**SOUTH JASPER COUNTY WSC**	Unmet Need	0	0	0	0	0	0	--			
		New Wells (Gulf Coast)	0	330	330	330	330	330	$6,553,000	$812,000	$2,461	$7.55
		Municipal Conservation	1	1	1	1	1	1	$14,000	$1,300	$1,200	$3.68
	MANUFACTURING	Unmet Need	-455	-2,589	-4,802	-7,097	-9,476	-11,943	--			
		Purchase from LNVA (Sam Rayburn)	460	2,590	4,810	7,100	9,480	11,950	$159,597,000	$17,386,000	$1,074	$3.30
JEFFERSON	**BEAUMONT**	Unmet Need	-8,613	-9,118	-9,768	-9,793	-9,648	-9,374	--			
		Municipal Conservation	2,094	5,506	7,320	7,327	7,332	7,336	Beaumont strategies discussed in Table 5B.110			
		Well Field Infrastructure Improvements	2,823	2,823	2,823	2,823	2,823	2,823				
		Amendment to Supplemental Contract with LNVA	6,685	7,398	8,273	8,513	8,565	8,466				
		Bunn's Canal Rehabilitation	8,968	8,968	8,968	8,968	8,968	8,968				
		New Westside Surface Water Treatment Plant	0	12,331	12,331	12,331	12,331	12,331				
	CHINA	Unmet Need	0	0	0	0	0	0	--			
		New Wells (Gulf Coast)	0	250	250	250	250	250	$6,182,000.00	$525,000	$2,967	$9.09
		Municipal Conservation	3	5	6	6	6	7	$13,000	$2,200	$800	$2.46
	PORT ARTHUR	Unmet Need	0	0	0	0	0	0	--			
		Municipal Conservation	473	677	736	788	838	887	Port Arthur strategies discussed in Table 5B.110			
	TRINITY BAY CONSERVATION DISTRICT [2]	Unmet Need	0	0	0	0	-71	-207	--			
		Municipal Conservation	100	228	322	436	623	797	$18,639,709	$147,000	$1,470	$4.51
	MANUFACTURING	Unmet Need	-6,037	-36,896	-71,613	-106,146	-140,665	-175,165	--			
		Purchase from LNVA (Sam Rayburn)	6,100	36,900	71,700	106,200	140,700	175,200	$698,989,000	$117,584,000	$558	$1.71
NACOGDOCHES	**D & M WSC**	Unmet Need	0	-30	-62	-115	-167	-218	--			
		New Wells (Carrizo-Wilcox)	0	220	220	220	220	220	$5,542,000	$652,000	$2,964	$9.09
		Municipal Conservation	20	30	34	38	40	44	$131,000	$21,800	$1,100	$3.38
	NACOGDOCHES	Unmet Need	0	0	0	0	0	0	--			
		Lake Columbia Raw Water Transmission System	Nacogdoches strategies discussed in Table 5B.2						Nacogdoches strategies discussed in Table 5B.110			
		Municipal Conservation	364	884	1,152	1,223	1,295	1,369				

NEEDS RECOMMENDED STRATEGY *ALTERNATIVE STRATEGY*

County	WUG	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
	COUNTY-OTHER	Unmet Need	0	0	0	0	0	0	--			
		Lake Naconiche Regional Water Supply System	0	1,700	1,700	1,700	1,700	1,700	$105,317,000	$8,346,000	$4,909	$15.07
NEWTON	*NO WUGS WITH UNMET NEEDS, NO STRATEGIES EVALUATED*											
ORANGE	**ORANGE COUNTY WCID 1**	Unmet Need	0	0	0	0	0	0	--			
		New Wells (Gulf Coast)	1,610	1,610	1,610	1,610	1,610	1,610	$9,364,000	$1,512,000	$939	$2.88
		Municipal Conservation	53	118	148	141	134	122	$212,000	$41,500	$800	$2.46
PANOLA	*NO WUGS WITH UNMET NEEDS, NO STRATEGIES EVALUATED*											
POLK	*NO WUGS WITH UNMET NEEDS, NO STRATEGIES EVALUATED*											
RUSK	**GASTON WSC**	Unmet Need	0	0	0	0	0	0	--			
		New Wells (Carrizo-Wilcox)	0	130	130	130	130	130	$3,700,000	$525,000	$3,492	$10.72
		Municipal Conservation	1	1	1	1	1	1	$10,000	$900	$1,200	$3.68
	JACOBS WSC	Unmet Need	0	0	0	0	-26	-58	--			
		New Wells (Carrizo-Wilcox)	0	0	0	0	60	60	$5,975,000.00	$738,000	$12,300	$37.74
		Municipal Conservation	2	2	2	2	2	2	$24,000	$2,200	$1,400	$4.30
SABINE	**LIVESTOCK**	Unmet Need	0	0	0	-97	-96	-96	--			
		New Wells (Yegua Jackson)	0	0	0	100	100	100	$601,000	$47,000	$470	$1.44
SAN AUGUSTINE	*NO WUGS WITH UNMET NEEDS, NO STRATEGIES EVALUATED*											
SHELBY	**CENTER**	Unmet Need	0	0	0	0	0	0	--			
		Municipal Conservation	80	194	241	238	236	232	Center strategies discussed in Table 5B.110			
	MANUFACTURING	Unmet Need	-841	-934	-1,053	-1,148	-1,239	-1,325	--			
		Purchase from Center	850	940	1,060	1,150	1,240	1,330	$79,104,000	$6,938,000	$2,440	$7.49
SMITH	**LIBERTY UTILITIES SILVERLEAF WATER** [2]	Unmet Need	-331	-360	-397	-439	-481	-524	--			
		New Wells (Queen City)	Refer to the Region D 2026 IPP for details.									
		Municipal Conservation	85	182	288	403	429	447	$0	$58,000	$684	$2.10
	SOUTHERN UTILITIES [1,2]	Unmet Need	0	0	0	0	-68	-401	--			
		Amendment to Supplemental Contract with City of Tyler	0	0	0	0	70	410	$0	$670,000	$1,634	$5.02
		Municipal Conservation	680	1,815	2,438	2,552	2,668	2,786	$931,000	$313,100	$500	$1.53
	TYLER	Unmet Need	0	0	0	0	0	0	--			
		Lake Palestine Expansion	Tyler strategies discussed in Table 5B.2						Tyler strategies discussed in Table 5B.110			
		Municipal Conservation	991	2,115	2,842	3,161	3,507	3,883				
	COUNTY-OTHER	Unmet Need	-273	-143	-33	0	0	0	--			
		Purchase from Tyler	280	150	40	0	0	0	$16,362,000	$1,797,000	$6,418	$19.70

NEEDS	RECOMMENDED STRATEGY	*ALTERNATIVE STRATEGY*										
County	**WUG**	**2026 Needs and Strategies**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**	**Capital Costs ($)**	**Annual Costs ($)**	**Unit Costs During Amortization ($ per acre-feet)**	**Unit Costs During Amortization ($ per 1000 gal)**
		Municipal Conservation	7	6	6	5	5	4	$216,000	$17,400	$2,400	$7.37
	MANUFACTURING	Unmet Need	0	0	-43	-413	-497	-567	--			
		Purchase from Tyler	0	0	50	420	500	570	$50,202,000	$4,295,000	$5,461	$16.76
	MINING	Unmet Need	-314	-333	-353	-374	-397	-421	--			
		Purchase from Tyler	320	340	360	380	400	430	$17,996,000	$1,890,000	$4,395	$13.49
TRINITY	**IRRIGATION**	Unmet Need	-215	-215	-215	-215	-215	-215	--			
		New Wells (Yegua Jackson)	220	220	220	220	220	220	$646,000	$52,000	$236	$0.73
TYLER	**MANUFACTURING**	Unmet Need	-78	-82	-87	-92	-97	-102	--			
		New Wells (Gulf Coast)	110	110	110	110	110	110	$607,000	$49,000	$445	$1.37

(1) Entities split into more than one county within the East Texas Regional Water Planning Area reflect the cumulative need in the region.
(2) Unmet needs shown reflect the total unmet needs for a Water User Group (WUG), including unmet needs identified in other regions (C, D, H).
(3) Conservation strategy volumes reflect the total for each WUG, including totals from other regions (C, D, H).
(4) The annual and unit costs shown are for the decade with the highest annual and unit cost.
(5) CT denotes Consultant Team
(6) For WUGs that are also Major Water Providers (MWPs), see Table 5B.2 for a full list of strategy details.
(7) *Italics indicate an alternative strategy.*
(8) Gray indicates a strategy that involves expansion of infrastructure to access existing or future supplies. These should not be included in the total to avoid double counting.

Table 5B.110 2026 Needs and Water Management Strategies for Major Water Providers (ac-ft per year)

NEEDS RECOMMENDED STRATEGY *ALTERNATIVE STRATEGY* BALANCE (Does not include Alternative totals)

Major Water Provider	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
ANRA	Unmet Needs (Contractual)	0	0	0	0	0	0	----			
	Lake Columbia	0	75,720	75,640	75,560	75,480	75,400	$486,368,000	$28,382,000	$375	$1.15
	ANRA Treatment and Distribution System	0	22,232	22,232	22,232	22,232	22,232	$455,353,000	$84,250,000	$3,790	$11.63
	RECOMMENDED WMS TOTAL	**0**	**75,720**	**75,640**	**75,560**	**75,480**	**75,400**	**$941,721,000**	**$112,632,000**	-	-
AN WCID #1	Unmet Needs	0	0	0	0	0	0	----			
	Hydraulic Dredging (Includes Volumetric Survey and Normal Pool Elevation Adjustment)	0	5,600	5,600	5,600	5,600	5,600	$27,981,000	$13,990,000	$4,997	$15.33
	RECOMMENDED WMS TOTAL	**0**	**5,600**	**5,600**	**5,600**	**5,600**	**5,600**	**$27,981,000**	**$13,990,000**	-	-
ATHENS MWA	Unmet Needs	0	0	-890	-1,972	-3,342	-4,145	----			
	Athens Municipal Conservation (Region C)	122	325	687	904	1,112	1,226	$157,000	$101,500	$800	$2.46
	Reuse of Fish Hatchery Return Flows	2,872	2,872	2,872	2,872	2,872	2,872	$0	$0	$0	$0.00
	WTP Booster Pump Station Expansion	0	0	4,592	4,592	4,592	4,592	$3,116,000	$308,000	$67	$0.21
	Additional Lake Athens Supply Used with WTP Infrastructure Upgrades	0	0	0	169	449	561				
	New Wells (Carrizo-Wilcox)	*0*	*0*	*0*	*0*	*720*	*720*	*$10,270,000*	*$1,286,000*	*$1,786*	*$5.48*
	RECOMMENDED WMS TOTAL	**2,994**	**3,197**	**3,559**	**3,945**	**4,433**	**4,659**	**$3,273,000**	**$409,500**	-	-
BEAUMONT	Unmet Needs	-9,508	-10,221	-11,096	-11,336	-11,388	-11,289	----			
	Municipal Conservation	2,094	5,506	7,320	7,327	7,332	7,336	$1,679,000	$858,400	$400	$1.23
	Well Field Infrastructure Improvements	2,823	2,823	2,823	2,823	2,823	2,823	$97,980,000	$8,074,000	$2,860	$8.78
	Amend Supplemental Contract with LNVA	6,685	7,398	8,273	8,513	8,565	8,466	$0	$2,803,000	$326	$1.00
	Bunn's Canal Rehabilitation	8,968	8,968	8,968	8,968	8,968	8,968	$1,139,000	$91,000	$10	$0.03
	New Westside Surface Water Treatment Plant	0	12,331	12,331	12,331	12,331	12,331	$202,160,000	$16,324,000	$1,316	$4.04
	RECOMMENDED WMS TOTAL	**11,602**	**15,727**	**18,416**	**18,663**	**18,720**	**18,625**	**$302,958,000**	**$28,150,400**	-	-
CARTHAGE	Unmet Needs	0	0	0	0	0	0	----			
	Municipal Conservation	31	46	48	50	52	54	$173,000	$23,600	$800	$2.46
	RECOMMENDED WMS TOTAL	**31**	**46**	**48**	**50**	**52**	**54**	**$173,000**	**$23,600**	-	-

NEEDS RECOMMENDED STRATEGY *ALTERNATIVE STRATEGY* BALANCE (Does not include Alternative totals)

Major Water Provider	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
CENTER	Unmet Needs	-1,139	-1,261	-1,380	-1,475	-1,566	-1,652	----			
	Municipal Conservation	80	194	241	238	236	232	$125,000	$39,300	$500	$1.53
	Reuse Pipeline to Industrial Customer	1,121	1,121	1,121	1,121	1,121	1,121	$25,824,000	$2,608,000	$2,326	$7.14
	Pipeline from Toledo Bend	*0*	*0*	*2,242*	*2,242*	*2,242*	*2,242*	*$70,786,000*	*$6,486,000*	*$2,893*	*$8.88*
	RECOMMENDED WMS TOTAL	**1,201**	**1,315**	**1,362**	**1,359**	**1,357**	**1,353**	**$25,949,000**	**$2,647,300**	-	-
HOUSTON CO WCID 1	Unmet Needs	0	0	0	0	0	0	----			
	New Wells (Carrizo-Wilcox)	1,000	1,000	1,000	1,000	1,000	1,000	$16,528,000	$1,447,000	$1,447	$4.44
	RECOMMENDED WMS TOTAL	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**$16,528,000**	**$1,447,000**	**-**	**-**
JACKSONVILLE	Unmet Needs	0	0	0	0	0	0	----			
	Supply from Lake Columbia	0	0	1,700	1,700	1,700	1,700	$67,185,000	$6,428,000	$3,781	$11.60
	Municipal Conservation	114	279	349	348	345	343	$257,000	$68,700	$600	$1.84
	RECOMMENDED WMS TOTAL	**114**	**279**	**2,049**	**2,048**	**2,045**	**2,043**	**$67,442,000**	**$6,496,700**	**-**	**-**
LNVA	Unmet Needs	0	0	0	0	0	0	----			
	Devers Pump Station Relocation (Region H)	88,704	88,704	88,704	88,704	88,704	88,704	$21,338,000	$1,883,000	$21	$0.07
	Neches Pump Station Upgrades and Fuel Diversification	161,420	161,420	161,420	161,420	161,420	161,420	$66,948,000	$5,681,000	$35	$0.11
	West Beaumont Reservoir	7,700	7,700	7,700	7,700	7,700	7,700	$110,438,000	$6,084,000	$790	$2.42
	Neches-Trinity Basin Interconnect (Region H)	0	67,000	67,000	67,000	67,000	67,000	$127,826,000	$11,065,000	$165	$0.51
	Purchase from SRA (Toledo Bend)	0	0	200,000	200,000	200,000	200,000	$451,797,000	$102,526,000	$513	$1.57
	RECOMMENDED WMS TOTAL	**7,700**	**7,700**	**207,700**	**207,700**	**207,700**	**207,700**	**$778,347,000**	**$127,239,000**	**-**	**-**
LUFKIN	Unmet Needs	0	0	0	0	0	0	----			
	Municipal Conservation	208	427	526	553	582	610	$740,000	$133,400	$600	$1.84
	Transfer from Rayburn to Lake Kurth – Phase I (2040)	0	11,210	11,210	11,210	11,210	11,210	$136,547,000	$15,519,000	$1,384	$4.25
	Transfer from Rayburn to Lake Kurth – Phase II (2050)	0	0	11,210	11,210	11,210	11,210	$125,310,000	$28,432,000	$1,278	$3.92
	Transfer from Rayburn to Lake Kurth – Phase III (2060)	0	0	0	5,580	5,580	5,580	$24,037,000	$20,419,000	$729	$2.24
	RECOMMENDED WMS TOTAL	**208**	**11,637**	**22,946**	**28,553**	**28,582**	**28,610**	**$286,634,000**	**Note (9)**	-	-
NACOGDOCHES	Unmet Needs	0	0	0	0	0	0	----			

NEEDS | RECOMMENDED STRATEGY | *ALTERNATIVE STRATEGY* | BALANCE (Does not include Alternative totals)

Major Water Provider	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
	Supply from Lake Columbia	0	8,551	8,551	8,551	8,551	8,551	$82,440,000	$9,278,000	$1,085	$3.33
	Municipal Conservation	364	884	1152	1223	1295	1369	$652,000	$188,100	$500	$1.53
	RECOMMENDED WMS TOTAL	**364**	**9,435**	**9,703**	**9,774**	**9,846**	**9,920**	**$83,092,000**	**$9,466,100**	-	-
PANOLA COUNTY FWSD	No unmet needs, no strategies were identified							----			
PORT ARTHUR	Unmet Needs	0	0	0	0	0	0	----			
	Municipal Conservation	473	677	736	788	838	887	$1,518,000	$194,300	$400	$1.23
	RECOMMENDED WMS TOTAL	**473**	**677**	**736**	**788**	**838**	**887**	**$1,518,000**	**$194,300**	-	-
SRA	No unmet needs in Region I, no strategies were identified in Region I							----			
TYLER	Unmet Needs	0	0	0	0	0	0	----			
	Municipal Conservation	991	2,115	2,842	3,161	3,507	3,883	$6,731,000	$613,000	$600	$1.84
	Lake Palestine Infrastructure Expansion	0	16,815	16,815	16,815	16,815	16,815	$252,305,000	$27,852,000	$1,656	$5.08
	RECOMMENDED WMS TOTAL	**991**	**18,930**	**19,657**	**19,976**	**20,322**	**20,698**	**$259,036,000**	**$28,465,000**	-	-
UNRMWA	Unmet Needs (Contractual)	-33,137	-35,184	-37,232	-39,234	-41,239	-43,259	----			
	Run of River, Neches with Lake Palestine	0	0	0	0	82,900	82,900	$719,027,000	$69,558,000	$1,293	$3.97
	RECOMMENDED WMS TOTAL	**0**	**0**	**0**	**0**	**82,900**	**82,900**	**$719,027,000**	**$69,558,000**	-	-

(1) Entities split into more than one county within the East Texas Regional Water Planning Area reflect the cumulative need in the region.

(2) Unmet needs shown reflect the total unmet needs for a Major Water Provider (MWP), including unmet needs identified in other regions (C, D, H).

(3) Conservation strategy volumes reflect the total for each MWP, including totals from other regions (C, D, H).

(4) The annual and unit costs shown are for the decade with the highest annual and unit cost.

(5) CT denotes Consultant Team

(6) *Italics indicate an alternative strategy.*

(7) Gray indicates a strategy that involves expansion of infrastructure to access existing or future supplies. These should not be included in the total to avoid double counting.

(8) Annual costs from Phase 2 and 3 include the debt services from the previous phase, thus the annual costs of the three phrases cannot be added.

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Chapter 5C: Water Conservation Recommendations

2026 Initially Prepared Plan

Prepared for:

East Texas Regional Water Planning Group

February 2025

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Appendix 5C-A: Estimated Plumbing Code Efficiency Savings by County

Appendix 5C-B: GPCD Goals of Region I WUGs

LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ASTM	American Society for Testing and Materials
BMP	Best Management Practice
CII	Commercial, Industrial, and Institutional
ETRWPA	East Texas Regional Water Planning Area
ETRWPG	East Texas Regional Water Planning Group
ft/yr	Feet per Year
FWSD	Fresh Water Supply District
GPCD	Gallons Per Capita Per Day
gcd	Gallons per connection per day
LNVA	Lower Neches Valley Authority
MUD	Municipal Utility District
MWA	Municipal Water Authority
MWD	Municipal Water District
PVC	Polyvinyl Chloride
PWS	Public Water System
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SUD	Special Utility District
SWIFT	State Water Implementation Fund for Texas
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TWDB	Texas Water Development Board
UCM	Utility Conservation Measures
UPC	Uniform Plumbing Code
WCAC	Water Conservation Advisory Council
WCID	Water Control and Improvement District
WCITF	Water Conservation Implementation Task Force
WCP	Water Conservation Plan
WMSs	Water Management Strategies
WSC	Water Supply Corporation
WUG	Water User Group
WWP	Wholesale Water Provider

5C WATER CONSERVATION RECOMMENDATIONS

Water conservation is defined by Texas Water Code §11.002(8) as "the development of water resources; and those practices, techniques and technologies that will reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses." Water conservation measures are long-term, permanent strategies to reduce water use.

Title 31 Texas Administrative Code (31 TAC) §357.34(h) requires the 2026 Regional Water Plan to consolidate and present recommendations that may include Best Management Practices (BMPs) appropriate for the region. Further, for water user groups (WUGs) with identified water needs, conservation water management strategies (WMSs) must be included as part of the WUG list of strategies to meet shortages or a summary of reasons must be provided in the plan for not including conservation WMSs.

Following Section 5C.1 is a discussion of water conservation practices and trends in the East Texas Regional Water Planning Area (ETRWPA). This will be followed by a summary and discussion in Section 5C.2 of water conservation plans in use by WUGs in the region and BMPs in use currently or which could be implemented by WUGs over the planning period or in the future.

Conservation WMSs are recommended for all Region I WUGs, regardless of their needs, as water conservation is considered a best management practice in the ETRWPA.

5C.1 WATER CONSERVATION PRACTICES AND TRENDS IN THE EAST TEXAS REGIONAL WATER PLANNING AREA

The ETRWPA water demand projections incorporate an expected level of conservation to be implemented over the planning period. For municipal use, the assumed reductions in per capita water use are the result of the implementation of the following regulatory initiatives:

- The Water Saving Performance Standards Act, implemented by Texas in 1992. This act prohibits the sale, distribution, or importation of plumbing fixtures that do not meet certain low flow performance standards. House Bill 2667, implemented September 1, 2009, updated the water savings performance standards. For new fixtures, the average toilet flush volume is limited to 1.28 gallons, and the maximum showerhead flow is limited to 2.5 gallons per minute.
- A federal requirement that residential clothes washers manufactured on or after January 1, 2007, must achieve a water factor[1] of 9.5 gallons per cubic foot of capacity. For front-loading machines, the maximum integrated water factor[2] decreases to 4.5 gallons per cubic foot on March 7, 2015. For top-loading machines, the maximum integrated water factor decreases to 8.4 gallons per cubic foot on March 7, 2015, and 6.5 gallons per cubic foot on January 1, 2018.
- A federal requirement that residential dishwashers manufactured on or after May 30, 2013, must achieve water consumption of 5.0 gallons per cycle or less.
- As of June 2021, the 2018 edition of the Uniform Plumbing Code (UPC) and the 2018 edition of the International Code Council's International Plumbing Code have been adopted by the State

[1] Total weighted per-cycle water consumption for the cold wash/cold rinse cycle divided by the clothes container capacity.

[2] Total weighted per-cycle water consumption for all wash cycles divided by the clothes container capacity.

Board's Rule 367.2 in Title 22 of the Texas Administrative Code. These codes maintain or increase the efficiency of shower heads and faucet aerators, as shown in Table 5C.1 below. The 2024 UPC was released in January 2024, and the standards for plumbing fixtures in the 2024 UPC align with those shown in the table below.

Table 5C.1: Standards for Plumbing Fixtures

Fixture	Standard
Toilets	1.28 gallons per flush
Shower Heads	2.5 gallons per minute at 80 psi
Urinals	0.5 gallon per flush
Faucet Aerators	1.5 gallons per minute at 60 psi
Drinking Water Fountains	Shall be self-closing

The "low flow plumbing fixture rules" measure assumes all new construction will be built with water saving plumbing fixtures and existing plumbing fixtures will be replaced over time with low flow fixtures. The "efficient new residential clothes washer standards" and "efficient new residential dishwasher standards" measures assume all new construction will be built with efficient clothes washers and dishwashers and existing clothes washers and dishwashers will be replaced over time with efficient appliances. On a regional basis, these regulatory initiatives are projected to reduce municipal water use by 2.9 percent (over 6,800 acre-feet (ac-ft) per year) by 2080. See Appendix 5C-A for Table 5C-A-1: Estimated Plumbing Code Efficiency Savings by County.

The ETRWPA is a water-rich region, and water conservation in the region is generally driven by economics rather than by lack of water supply. The East Texas Regional Water Planning Group (ETRWPG) believes water users in the ETRWPA will implement advanced water conservation measures (i.e., savings associated with active conservation measures) as economic conditions dictate to each individual user. Given the general abundance of accessible water supply to the water users in the ETRWPA, the ETRWPG believes the water conservation strategies included in this planning period represent an economically achievable level, or "highest practicable level," of conservation.

5C.1.1 Water Use in the East Texas Regional Water Planning Area

The State of Texas Water Conservation Implementation Task Force (WCITF) set a statewide goal of an average per capita consumption of 140 gallons per capita per day (GPCD) in 2001. The WCITF also set a recommended goal for municipal water suppliers to have a minimum annual reduction of one percent in total GPCD until the entity achieves a total GPCD of 140 or less. In 2007, the 80th Texas Legislature, via the passage of Senate Bill 3 and House Bill 4, directed the TWDB to appoint the members of the newly-created Water Conservation Advisory Council (WCAC), which was established to continue the work initiated by the WCITF. The WCAC has submitted a Report and Recommendations to the 88th Texas Legislature, with the following updates:[1]

- Recent trends indicate regional water planning groups should eliminate the 140 GPCD target.
- A recommended methodology is to reduce the planning year GPCD by one percent each year. However, the Council acknowledges the cumulative reduction might not be feasible beyond 2040.

It must be recognized that long-term changes to water supplies can be brought on by impacts on water quality or quantity, or by changing economic conditions. Such changes could require additional emphasis on water conservation in the future. The need for additional water conservation will continue to be evaluated in future plans.

The base per-capita values used to calculate demand projections in Chapter 2 are presented in Table 5C.1 for every WUG in the ETRWPA. In the 2021 RWP, the base GPCD for each WUG was calculated by the Texas Water Development Board (TWDB) using 2011 water-use surveys, setting a minimum GPCD value of 60 GPCD. Those baselines were carried forward to the 2026 RWP, with adjustment for plumbing code savings. However, about 143 out of the 243 municipal WUGs requested a new dry year baseline GPCD which is reflective of their recent water use pattern.

House Bill 807 was passed by the Texas State Legislature on June 10th, 2019. This bill requires planning groups to set specific GPCD goals in each decade of the planning period for municipal water user groups in Region I. These goals and the baseline usages are provided in Table 5C-B-1: GPCD Goals of Region I WUGs in Appendix 5C-B.

5C.1.2 Water Loss in the East Texas Regional Water Planning Area

Since 2003, retail public water utilities have been required to complete and submit a water loss audit form to the TWDB once every five years. Since 2013, retail public utilities that supply potable water to more than 3,300 connections or receive financial assistance from the TWDB must file an annual water audit with the TWDB. The most recent available data were reported in 2024 for water loss during calendar year 2022. The TWDB compiled the data from these reports. The water audit reporting requirements follow the International Water Association and American Water Works Association Water Loss Control Committee methodology.

The primary purposes of a water loss audit are to account for all of the water being used and to identify potential areas where water can be saved. Water audits track multiple sources of water loss that are commonly described as apparent loss and real loss. Apparent loss is water used but for which the utility did not receive compensation. Apparent losses are associated with customer meters under-registering, billing adjustment and waivers, and unauthorized consumption. Real loss is water physically lost from the system before it could be used, including main breaks and leaks, customer service line breaks and leaks, and storage overflows. The sum of the apparent loss and the real loss make up the total water loss for a utility.

In the ETRWPA, 55 public water suppliers submitted a water loss audit to TWDB for calendar year 2022. These water suppliers represent a retail service population of approximately 452,000 people, or about 42 percent of the regional population. Table 5C.2 shows a summary of reported 2022 water loss accounting for the ETRWPA.

Table 5C.2: Reported 2022 Water Loss Accounting in the East Texas Regional Water Planning Area

Corrected input volume 100.0% 22,611,100,740 gallons	Authorized consumption 80.7% 18,236,202,037	Billed authorized consumption 78.3% 17,711,457,658	Billed metered consumption 78.2% 17,678,493,611	Revenue water 78.3% 17,711,457,658
			Billed unmetered consumption 0.1% 32,964,047	
		Unbilled authorized consumption 2.3% 524,744,379	Unbilled metered consumption 1.6% 350,620,193	Non-revenue water 21.7% 4,899,643,082
			Unbilled unmetered consumption 0.8% 174,124,186	
	Water losses 19.3% 4,374,898,703	Apparent losses 3.3% 736,660,517 $4,953,295	Unauthorized consumption 0.2% 45,319,717	
			Customer meter under-registering 2.9% 646,155,199	
			Data handling discrepancies 0.2% 45,185,601	
		Real losses 16.1% 3,638,238,186 $9,980,001	Reported breaks and leaks 5.4% 1,214,838,320	
			Unreported loss 10.7% 2,423,399,866	

On a regional basis, the reported percentage of total water loss for the ETRWPA was 19.3 percent. Based on this table, it appears enhanced water loss control programs may be a potentially feasible water conservation strategy for some WUGs in the East Texas Region.

5C.2 WATER CONSERVATION PLANS

The Texas Commission on Environmental Quality (TCEQ) requires water conservation plans for all municipal, industrial, and other non-irrigation water users with surface water rights of 1,000 ac-ft per year or more, all irrigation water users with surface water rights of 10,000 ac-ft per year or more, and all retail public water suppliers providing water service to 3,300 connections or more. Water conservation plans are also required for all water users applying for a new or amended State water right and for entities seeking more than $500,000 in State funding for water supply projects.

All conservation plans must specify quantifiable 5-year and 10-year conservation goals and targets. While these goals are not enforceable, they must be identified. Updated water conservation plans for WUGs in the region were to be submitted to the TCEQ and to the ETRWPG by May 1, 2024. Failure to submit a water conservation plan is a violation of the Texas Water Code, Section 11.1272 and the Texas Administrative Code, Section 288.30, and is subject to enforcement by the TCEQ.

A list of the 59 users in the ETRWPG required to submit water conservation plans is shown in Table 5C.3.

Other entities have contracts with regional and wholesale water providers (WWPs) for greater than 1,000 ac-ft per year. Presently, these water users are not required to develop water conservation plans unless the user is seeking State funding; however, a WWP may request that its customers prepare a conservation plan to assist in meeting the goals and targets of the WWP's plan.

To assist entities in the ETRWPA with developing water conservation plans, model Water Conservation Plans for municipal water users (major or retail public water suppliers), industrial users, mining, and irrigation districts are available on the TCEQ's website (https://www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/conserve.html). Each of these model plans addresses the latest TCEQ requirements and is intended to be modified by each user to best reflect the activities appropriate to the entity. The ETRWPG does not prepare any Region I-specific model plans because the model plans on the TCEQ website are more up-to-date and comprehensive.

Table 5C.3: Water Users and Types of Use That Are Required to Develop, Implement, and Submit Water Conservation Plans

WUG Name	PWS Name
Alto	City of Alto
Arp	City of Arp
Beaumont	City of Beaumont Water Utility Dept
Bridge City	City of Bridge City
Brookeland FWSD	Brookeland FWSD
Carthage	City of Carthage
Center	City of Center
Chandler	City of Chandler
China	City of China
Corrigan	City of Corrigan
County-Other, Anderson	Dogwood Springs WSC Plant 1
County-Other, Jasper	Holmwood Angelina & Neches River Authority
County-Other, Nacogdoches	Nacogdoches County MUD 1
County-Other, Sabine	Beechwood WSC
Craft Turney WSC	Craft Turney WSC Main
Crockett	City of Crockett
Cushing	City of Cushing
D & M WSC	D & M WSC
Diboll	City of Diboll
G M WSC	G-M WSC
Groves	City of Groves
Henderson	City of Henderson
Hudson WSC	Hudson WSC

Table 5C.3: Water Users and Types of Use That Are Required to Develop, Implement, and Submit Water Conservation Plans (Cont.)

WUG Name	PWS Name
Huntington	City of Huntington
Jacksonville	City of Jacksonville
Jasper	City of Jasper
Jasper County WCID 1	Jasper County WCID 1
Jefferson County WCID 10	Jefferson County WCID 10
Kirbyville	City of Kirbyville
Lufkin	City of Lufkin
Lumberton MUD	Lumberton MUD
M & M WSC	M & M WSC
Mauriceville SUD	Mauriceville MUD
Meeker MWD	Meeker MWD
NA - Wholesaler	Athens Municipal Water Authority
NA - Wholesaler	Houston County WCID 1
NA - Wholesaler	Sabine River Authority
NA - Wholesaler	Upper Neches River MWA
Nacogdoches	City of Nacogdoches
Nederland	City of Nederland
Newton	City of Newton
Orange	City of Orange
Orange County WCID 1	Orange County WCID 1
Orange County WCID 2	Orange County WCID 2
Palestine	City of Palestine
Pleasant Springs WSC	Pleasant Springs WSC
Port Arthur	City of Port Arthur
Port Neches	City of Port Neches
Rayburn Country MUD	Rayburn Country MUD
Rusk	City of Rusk
San Augustine	City of San Augustine
Silsbee	City of Silsbee
South Newton WSC	South Newton WSC
Southern Utilities	Southern Utilities
The Consolidated WSC	The Consolidated WSC Rural System
Troup	City of Troup
Tyler	City of Tyler
Tyler County SUD	Tyler County SUD
Upper Jasper County Water Authority	Upper Jasper County Water Authority 1

Implemented water conservation strategies vary by water user and are shown in Table 5C.4. This table lists the number of entities who have implemented the various water conservation strategies among the

43 Region I primary utilities that have submitted the 2016 to 2022 annual water conservation reports to the TWDB. The focus of the conservation activities for municipal water users in the ETRWPA are:

- Metering New Connections & Retrofitting Existing Connections
- Public Information
- Utility Water Audit & Water Loss

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Table 5C.4: Best Management Practices by Region I Entities from the Conservation Annual Reports

BMP	2016	2017	2018	2019	2020	2021	2022	Average
Athletic Fields Conservation	1	N/A	N/A	N/A	N/A	N/A	N/A	1
Conservation Coordinator	3	7	9	8	9	8	10	8
Conservation Ordinance Planning & Development	N/A	N/A	N/A	N/A	N/A	2	1	2
Cost Effective Analysis	N/A	1	N/A	1	1	1	2	1
Customer Characterization	N/A	N/A	N/A	N/A	N/A	1	3	2
Enforcement of Irrigation Standards	N/A	N/A	N/A	N/A	N/A	N/A	1	1
Golf Course Conservation	2	N/A	1	1	1	1	1	1
Landscape Irrigation Conservation & Incentives	2	1	1	2	1	1	1	1
Metering New Connections & Retrofitting Existing Connections	9	15	12	14	17	13	10	13
Other	1	3	3	1	1	1	N/A	2
Outdoor Watering Schedule	N/A	N/A	N/A	N/A	1	2	1	1
Park Conservation	2	1	N/A	N/A	N/A	N/A	N/A	2
Prohibition on Wasting Water	4	3	4	7	8	9	8	6
Public Information	17	20	16	18	18	21	17	18
Public Outreach & Education	1	N/A	N/A	2	4	6	5	4
Rainwater Harvesting & Condensate Reuse	N/A	N/A	1	1	1	1	1	1
Residential Landscape Irrigation Evaluation	N/A	1	N/A	N/A	N/A	N/A	2	2
Residential Toilet Replacement Programs	N/A	1	N/A	N/A	N/A	N/A	1	1
Reuse for Agriculture	1	1	N/A	N/A	N/A	N/A	N/A	1
Reuse for Chlorination/Dechlorination	2	4	3	3	2	2	1	2
Reuse for Industry	N/A	1	N/A	N/A	N/A	N/A	N/A	1
Reuse for On-site Irrigation	N/A	1	1	N/A	N/A	1	N/A	1
Reuse for Plant Washdown	4	8	6	5	5	5	4	5
School Education	6	3	6	5	4	8	4	5
Showerhead, Aerator, & Toilet Flapper Retrofit	1	N/A	1	1	1	1	2	1
Utility Water Audit & Water Loss	8	12	9	10	21	17	18	14
Water Conservation Pricing	3	2	5	6	8	7	6	5
Water Survey for Single Family & Multi-family Customers	2	2	4	2	2	2	3	2
Water Wise Landscape Design & Conversion Programs	1	N/A	1	1	1	1	1	1

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5C.3 RECOMMENDED WATER CONSERVATION STRATEGIES IN ETRWPA

Water conservation actions implemented as strategies would result in savings above that assumed for the TWDB water demand projections. The Texas Water Development Board, in conjunction with the Texas Commission on Environmental Quality and the Water Conservation Advisory Council has developed guidelines for conservation BMPs. These BMP guidelines are available online at https://www.twdb.texas.gov/conservation/BMPs/. Recommended water conservation strategies are presented by WUG type in the following sections.

5C.3.1 Municipal Water Conservation Strategies

In the 2026 Regional Water Planning effort, a new requirement distinguishes water conservation strategies into two separate categories:

- Water Use Reduction Strategy: This category focuses on measures that directly reduce water consumption by end users.
- Water Loss Mitigation Strategy: This category addresses the reduction of water loss within the distribution system.

Water Use Reduction Strategies

Based on the recommendation from the WCAC to eliminate the 140 GPCD planning target, the ETRWPG conducted a comprehensive review of baseline GPCD values for the Region I WUGs, as presented in Figure 5C.1. This analysis revealed GPCD values are influenced by various factors, including the size of the entity, the composition of customer bases (e.g., residential versus commercial, industrial, and institutional), the nature of industrial activities, geographic location, and prevailing economic conditions. These findings underscore that GPCD is not an ideal metric for comparing water conservation efficiency across entities.

In response, the ETRWPG categorized the Region I WUGs by population size and analyzed their GPCD distributions. The analysis revealed that smaller WUGs generally have higher GPCDs, potentially due to their rural locations and larger lot sizes. Mid-sized WUGs tend to exhibit lower GPCDs, while larger WUGs show higher GPCDs again, likely due to increased commercial, industrial, and institutional (CII) activities.

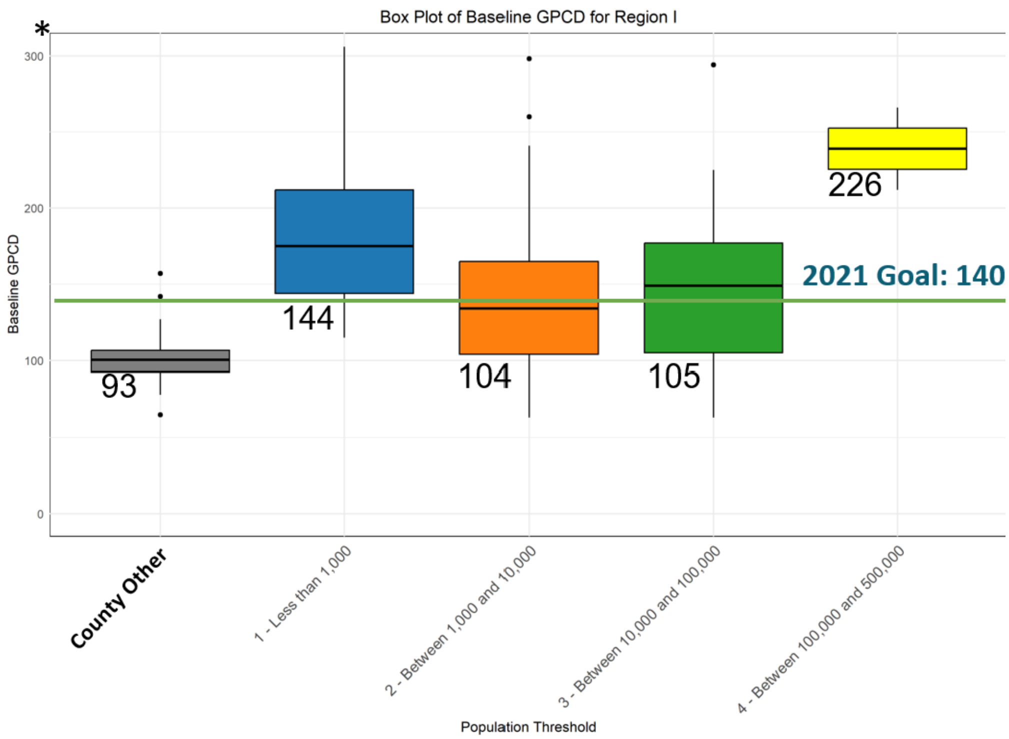

Figure 5C.1: Baseline GPCD Distribution of Region I WUGs

Note**:** y-axis cap at 300 GPCD.

Smaller WUGs with populations under 1,000 and entities too small to be WUGs and fall under the county-other WUG often lack the resources to implement advanced water conservation strategies. As a result, the ETRWPG decided to keep the 140 GPCD trigger from the 2021 RWP for those smaller entities rather than set a trigger lower than what was recommended in the previous plan. The ETRWPG noted that even though Region I is a water-rich region, Region I seeks to promote water conservation as a mindset among its water users and views it as a best management practice. Thus, GPCD thresholds were developed for all WUGs, shown in Table 5C.5. When these thresholds are exceeded, advanced conservation measures for water use reduction are recommended.

Addressing water use reduction, the ETRWPG evaluated various strategies for municipal WUGs projected to exceed their respective GPCD thresholds, regardless of whether a demonstrated need for additional water supplies was present. The evaluated conservation practices include initiatives such as enhanced public and school education programs and the adoption of water conservation pricing structures.

Table 5C.5: GPCD Thresholds by WUG Category

Category	25th Percentile	GPCD Threshold
County-Other	93	140
1 – Population Less than 1,000	144	140
2 - Population Between 1,000 and 10,000	104	104
3 - Population Between 10,000 and 100,000	105	105
4 - Population Between 100,000 and 500,000	226	140

Enhanced Public and School Education. Enhanced public and school education would involve providing formal and indirect means of information on how to conserve water beyond current efforts. Education costs were applied to all the entities meeting the above criteria. Assumptions made in evaluating the efficiency of this measure included restrictions to the annual budget spent on education would be limited to approximately $1.50 per capita. The total budget available will be an indication as to the effectiveness of the program. Table 5C.6 indicated efficiencies assigned to various ranges of available budget.

Table 5C.6: Water Conservation Efficiencies for Enhanced Public and School Education

Budget		Efficiency of Conservation
Low	High	
$1,500 (minimum)	$14,999	1.5%
$15,000	$29,999	2.0%
$30,000	$44,999	2.5%
$45,000	$60,000 (maximum)	3.0%

Note: Sourced from East Texas Regional Water Planning Group

Water Conservation Pricing. Water conservation pricing requires an increasing rate structure with increasing use. The minimum price increase between rate blocks should be 25 percent. For maximum effectiveness, the price increase between rate blocks should be at least 50 percent. The effectiveness of this measure is, in part, determined by whether water conservation pricing is currently implemented. Water conservation pricing is assumed to achieve a 1.5 percent reduction in demand.

Water Loss Mitigation Strategy

The water loss mitigation control program involves committing more resources towards identifying and repairing leaks, replacing inaccurate water meters, minimizing billing errors, and replacing mains with chronic leakage. Utilities would strive to achieve target water loss percentages that depend on water system characteristics. For more rural utilities with fewer than 32 connections per mile of mains, the target water loss is 57 gallons per connection per day (gcd) (

Table 5C.7). For more urban or suburban utilities with 32 or more connections per mile of main, the target water loss is 30 gcd. For WUGs with severe water loss, achieving the water loss target may involve replacing a substantial portion of the potable water transmission and distribution system.

Municipal water entities pursuing infrastructure replacement programs to reduce water loss may qualify for funding from state-supported initiatives, including the State Water Implementation Fund for Texas (SWIFT). According to the TWDB website as of January 2025, SWIFT has been allocated $11.5 billion to make water project financing more affordable and to provide consistent state financial assistance for developing water supply projects identified in the State Water Plan. The ETRWPG encourages all Region I WUGs to consider utilizing the SWIFT program if they are interested in mitigating water loss through water main replacements.

Table 5C.7 Water Loss Mitigation Targets

Service Connections per Mile of Main	Real Water Loss Target (gallons per connection per day)
Less than 32	30
32 or more	57

For a given WUG, the projected water savings from the water loss mitigation strategy is calculated as the difference between the WUG's actual water loss and the TWDB water loss thresholds. The implementation schedule assumes the measure will be 25 percent complete by 2030, 75 percent complete by 2040, and 100 percent complete by 2050. To ensure a conservative estimate, a cap of 30 percent of the demand projection has been applied to the calculated savings.

To maintain the target water loss levels, it is assumed entities will invest appropriate resources in leak detection and management programs during the planning horizon. This ongoing effort is critical to sustaining the projected savings.

Water savings from main replacement were estimated at 0.5 percent of the total water demand for each WUG. It is assumed that main replacements would begin in 2030 with a capital cost and loan service. The length of the main to be replaced is based on the water loss per mile and the total length of the distribution system in miles. The following assumptions are utilized in the water loss mitigation cost estimates.

- Capital Cost:
  - The unit cost of main replacement is derived from the TWDB UCM model for an 8-inch PVC pipe: $198 per linear foot in rural rocky areas and $287 per linear foot in urban rocky areas.
  - An interest rate of 3.5 percent and a 20-year term are assumed.
  - The recommended WMSs are not expected to exceed two standard pipe diameters. For planning purposes, an 8-inch PVC pipe was used as a simplified yet representative cost estimate, given the limited available information on specific utility requirements. If, during implementation, a larger pipe size is required to meet adopted utility standards, the evaluation will document the specific standard and provide:
    - A map of the proposed line replacement
    - Detailed water loss calculations before and after the replacement
    - This assumption ensures a reasonable cost estimate while allowing for future adjustments based on utility-specific design standards.
- Annual O&M Cost: Leak Detection and Management Program
  - To achieve and maintain the projected water loss reduction, entities are expected to spend $300 per acre-foot per year (ac-ft/yr) to achieve a 34.7 percent reduction in water loss from their baseline year and $600/ac-ft/yr to achieve additional savings beyond the 34.7 percent. These cost estimates are based on a 2022 water loss study that analyzed data from over 800 utilities in California, Texas, and Georgia. The study found it is economically efficient for a median utility to reduce water losses by 34.7 percent at a cost of $277/ac-ft/yr.[2] Adjusted for inflation, the rounded cost of $300/ac-ft/yr was adopted. Achieving savings beyond 34.7 percent is expected to be significantly more challenging, warranting a doubled cost factor to reflect the increased difficulty and expense.

Projected Total Conservation Savings and Cost

With the recommended strategies, total conservation savings are projected to range from approximately 7,400 acre-feet in 2030 to 23,900 acre-feet in 2080, as shown in Figure 5C.2. Estimated savings will be from Enhanced Education, Conservation Rate Pricing, and water loss mitigation strategies. Estimated conservation savings for each WUG are listed in Table 5C.8.

The estimated annual cost of each strategy is also shown in Figure 5C.2. Conservation Rate Pricing is excluded since this method does not have costs associated with increasing rates. Water loss mitigation has unit costs ranging from approximately $410 to $890 per acre-ft per year and has a higher capital cost due to the initial replacement of water mains (with a payback period of 20 years) and ongoing leak detection programs. Enhanced Education has unit costs ranging from approximately $180 to $460 per acre-foot per year and has a decreasing cost trend due to the increasing percent implementation of conservation. Estimated annual costs for each WUG are listed in Table 5C.9.

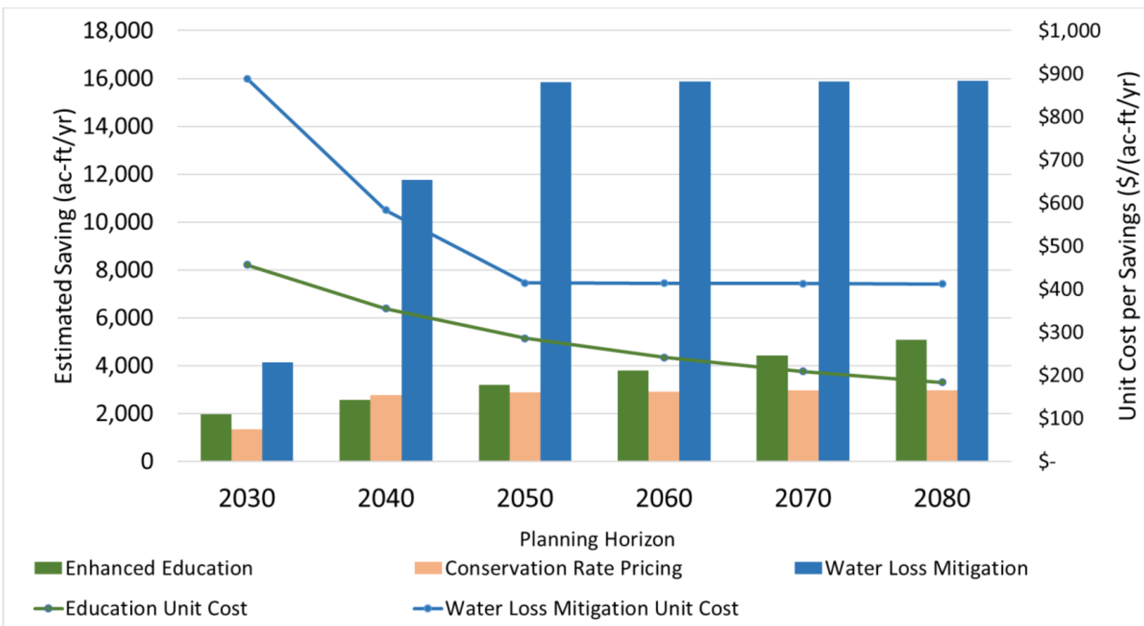

Figure 5C.2: Estimates of Total Conservation Savings and Cost

Table 5C.8: Water Conservation Savings for Water User Groups

Water User Group	Counties	Amount Conserved (ac-ft per year)					
		2030	2040	2050	2060	2070	2080
Afton Grove WSC	Cherokee	4	6	6	7	8	9
Alto	Cherokee	4	6	6	6	7	7
Alto Rural WSC	Cherokee	18	29	34	38	45	51
Anderson County Cedar Creek WSC	Anderson	3	4	4	4	4	5
Angelina WSC	Angelina	2	2	2	2	2	2
Appleby WSC	Nacogdoches	20	30	34	37	40	44
Arp	Smith	13	33	41	37	34	29
B B S WSC	Henderson, Anderson	3	4	4	5	5	5
B C Y WSC	Anderson	5	7	8	8	8	9
Beaumont	Jefferson	2,094	5,506	7,320	7,327	7,332	7,336
Beckville	Panola	0.4	0.4	0.3	0.3	0.3	0.3
Berryville	Anderson, Henderson	0.5	0.5	0.5	1	1	1
Bethel Ash WSC	Henderson, Van Zandt	4	4	4	4	4	4
Bevil Oaks	Jefferson	0.5	1	1	0.5	0.5	0.5
Blackjack WSC	Cherokee	3	4	2	2	2	2
Bon Wier WSC	Newton	2	2	2	2	2	0
Bridge City	Orange	6	7	7	7	7	7
Brookeland FWSD	Jasper, Newton, Sabine	3	5	5	5	5	5
Brownsboro	Henderson	5	7	8	8	9	9
Brushy Creek WSC	Henderson, Anderson	10	17	19	20	21	22
Bullard	Cherokee, Smith	20	35	40	46	52	58
Caro WSC	Nacogdoches	7	11	12	13	14	16
Carthage	Panola	31	46	48	50	52	54
Center	Shelby	80	194	241	238	236	232
Centerville WSC	Trinity	6	15	15	14	12	10
Central WCID of Angelina County	Angelina	3	3	3	3	3	3
Chalk Hill SUD	Gregg, Rusk	1	1	1	1	1	1
Chandler	Henderson	13	23	30	40	52	77
Chester WSC	Polk, Tyler	3	4	4	4	5	5
China	Jefferson	3	5	6	6	6	7
Choice WSC	San Augustine, Shelby	1	1	1	1	1	1
Clayton WSC	Panola	5	7	10	11	12	12
Colmesneil	Tyler	3	4	5	5	5	5
Corrigan	Polk	13	36	48	50	52	54
County-Other, Anderson	Anderson	3	3	3	3	3	2
County-Other, Angelina	Angelina	3	3	3	3	3	3
County-Other, Cherokee	Cherokee	2	2	1	1	1	0.1
County-Other, Hardin	Hardin	5	5	4	4	3	2
County-Other, Houston	Houston	8	10	6	5	2	0
County-Other, Jasper	Jasper	6	5	5	4	4	3

Table 5C.8: Water Conservation Savings for Water User Groups (Cont.)

Water User Group	Counties	Amount Conserved (ac-ft per year)					
		2030	2040	2050	2060	2070	2080
County-Other, Jefferson	Jefferson	10	9	6	5	5	4
County-Other, Nacogdoches	Nacogdoches	3	3	3	3	3	4
County-Other, Newton	Newton	3	3	3	2	2	2
County-Other, Orange	Orange	10	9	8	7	6	5
County-Other, Panola	Panola	5	5	5	5	4	4
County-Other, Rusk	Rusk	5	4	4	3	2	1
County-Other, Sabine	Sabine	1	0.5	0.4	0.4	0.4	0.4
County-Other, San Augustine	San Augustine	1	1	1	0.5	0.4	0.2
County-Other, Shelby	Shelby	5	5	5	5	4	4
County-Other, Smith	Smith	7	6	6	5	5	4
County-Other, Trinity	Trinity	1	1	1	1	1	1
County-Other, Tyler	Tyler	4	3	3	2	2	1
Craft Turney WSC	Cherokee	57	155	199	196	193	190
Crockett	Houston	96	251	298	289	280	267
Cross Roads SUD	Gregg, Rusk	2	2	2	2	2	2
Crystal Farms WSC	Rusk	1	1	1	1	1	1
Cushing	Nacogdoches	3	6	7	9	9	11
Cypress Creek WSC	Tyler	3	4	4	4	4	3
D & M WSC	Nacogdoches	20	30	34	38	40	44
Damascus-Stryker WSC	Polk	3	6	6	7	7	9
Dean WSC	Smith	14	22	24	27	29	33
Deberry WSC	Panola	2	2	2	2	2	2
Denning WSC	San Augustine	11	27	31	29	27	25
Diboll	Angelina	13	19	22	23	25	26
East Lamar WSC	Shelby	1	1	1	1	1	1
Ebenezer WSC	Rusk	3	5	5	5	5	5
Elkhart	Anderson	6	10	8	8	9	9
Emerald Bay MUD	Smith	5	7	8	8	9	9
Etoile WSC	Nacogdoches	7	10	11	12	13	14
Federal Correctional Complex Beaumont	Jefferson	12	17	18	19	20	21
Five Way WSC	Shelby	3	4	5	5	5	5
Flat Fork WSC	Shelby	3	2	2	2	2	2
Four Pines WSC	Anderson	1	1	1	1	1	1
Four Way SUD	Angelina	2	2	2	2	2	2
Frankston	Anderson, Henderson	4	6	6	6	7	7
Frankston Rural WSC	Anderson	5	7	6	7	7	7
G M WSC	Sabine, San Augustine	35	97	118	111	104	97
Garrison	Nacogdoches, Rusk	24	66	89	93	97	102
Gaston WSC	Rusk	1	1	1	1	1	1
Goodsprings WSC	Rusk	1	1	1	1	1	1
Grapeland	Houston	5	6	7	8	8	9
Groves	Jefferson	167	447	582	587	593	598
Gum Creek WSC	Cherokee	1	1	0.5	0.5	0.5	0.5

Table 5C.8: Water Conservation Savings for Water User Groups (Cont.)

Water User Group	Counties	Amount Conserved (ac-ft per year)					
		2030	2040	2050	2060	2070	2080
Hardin County WCID 1	Hardin	1	1	1	1	1	1
Hemphill	Sabine	9	12	12	12	12	12
Henderson	Rusk	65	94	100	107	113	121
Hollands Quarter WSC	Panola	1	1	1	1	1	0.5
Hudson WSC	Angelina	5	5	5	5	5	5
Huntington	Angelina	12	31	40	40	42	42
Huxley	Shelby	5	6	6	6	5	5
Jackson WSC	Smith	2	3	3	3	3	3
Jacksonville	Cherokee	114	279	349	348	345	343
Jacobs WSC	Rusk	2	2	2	2	2	2
Jasper	Jasper	34	47	48	46	47	47
Jasper County WCID 1	Jasper	4	11	15	15	15	16
Jefferson County WCID 10	Jefferson	11	17	18	19	20	21
Joaquin	Shelby	3	2	2	2	2	2
Kelly G Brewer	Orange	6	10	10	11	11	9
Kirbyville	Jasper	8	11	12	13	14	16
Kountze	Hardin	1	1	1	1	1	1
Leagueville WSC	Henderson	1	1	1	1	1	1
Lilly Grove SUD	Nacogdoches	26	69	91	96	103	107
Lovelady	Houston	3	4	4	2	2	2
Lufkin	Angelina	208	427	526	553	582	610
Lumberton MUD	Hardin	1	5	8	8	8	8
M & M WSC	Angelina	1	1	1	1	1	1
Mauriceville SUD	Jasper, Newton, Orange	4	4	4	4	4	4
McClelland WSC	Shelby	15	39	42	36	30	24
Meeker MWD	Jefferson	8	11	12	12	13	14
Melrose WSC	Nacogdoches	15	24	26	30	32	35
Minden Brachfield WSC	Panola, Rusk	1	1	1	1	1	1
Moore Station WSC	Henderson	8	11	12	13	14	16
Moscow WSC	Polk, Tyler	1	1	1	1	1	1
Mt Enterprise WSC	Rusk	4	6	6	6	6	7
Murchison	Henderson	3	4	4	4	5	5
Nacogdoches	Nacogdoches	364	884	1,152	1,223	1,295	1,369
Neches WSC	Anderson	3	4	5	5	5	5
Nederland	Jefferson	154	406	524	523	523	521
New London	Rusk	5	7	8	8	7	7
New Prospect WSC	Rusk	3	1	1	1	1	3
New Summerfield	Cherokee	1	1	1	1	1	1
New WSC	Sabine, San Augustine, Shelby	7	19	24	22	21	20
Newton	Newton	23	57	66	59	52	46
Nome	Jefferson	9	25	32	33	32	32
North Cherokee WSC	Cherokee	9	13	14	14	15	14
North Hardin WSC	Hardin	3	3	3	3	3	3
Norwood WSC	Anderson	1	1	1	1	1	1

Table 5C.8: Water Conservation Savings for Water User Groups (Cont.)

Water User Group	Counties	Amount Conserved (ac-ft per year)					
		2030	2040	2050	2060	2070	2080
Orange	Orange	329	910	1,193	1,190	1,189	1,169
Orange County WCID 1	Orange	53	118	148	141	134	122
Orange County WCID 2	Orange	29	81	105	102	99	97
Orangefield WSC	Orange	18	30	36	48	59	72
Overton	Smith, Rusk	9	13	14	13	13	14
Palestine	Anderson	145	299	358	367	374	382
Panola-Bethany WSC	Harrison, Panola	14	33	37	33	29	26
Pennington WSC	Trinity, Houston	4	6	6	5	5	5
Pinehurst	Orange	7	10	11	11	12	12
Pineland	Sabine	5	11	13	13	13	12
Pleasant Springs WSC	Anderson	3	6	6	6	6	7
Pollok-Redtown WSC	Angelina, Cherokee	1	1	1	1	1	1
Port Arthur	Jefferson	473	677	736	788	838	887
Port Neches	Jefferson	7	21	27	27	27	26
Rayburn Country MUD	Jasper	13	31	37	35	33	31
Redland WSC	Angelina	1	1	1	1	1	1
Rehobeth WSC	Panola	2	2	2	2	2	2
Rural WSC	Jasper	1	1	0.5	0.4	0.4	0.4
Rusk	Cherokee	16	24	26	27	29	30
Rusk Rural WSC	Cherokee	6	17	23	22	22	21
San Augustine	San Augustine	12	17	18	19	20	21
San Augustine Rural WSC	San Augustine	17	51	68	68	66	66
Sand Hills WSC	San Augustine, Shelby	27	85	129	141	153	167
Seneca WSC	Tyler	3	4	4	4	4	2
Silsbee	Hardin	30	72	94	102	109	124
Slocum WSC	Anderson	2	2	2	2	2	2
Sour Lake	Hardin	5	7	8	8	9	9
South Jasper County WSC	Jasper	1	1	1	1	1	1
South Kirbyville Rural WSC	Jasper, Newton	1	1	1	1	1	1
South Newton WSC	Newton, Orange	8	11	12	11	11	12
South Rusk County WSC	Cherokee, Rusk	20	52	63	60	57	54
Southern Utilities	Smith, Cherokee, Rusk	680	1,815	2,438	2,552	2,668	2,786
Swift WSC	Nacogdoches	8	13	13	14	16	19
Tatum	Panola, Rusk	5	7	8	7	7	7
TDCJ Beto Gurney & Powledge Units	Anderson	34	49	52	55	58	61
TDCJ Coffield Michael	Anderson	66	98	104	109	115	121
TDCJ Eastham Unit	Houston	20	30	32	34	36	37
Tenaha	Shelby	23	55	60	50	42	31
The Consolidated WSC	Anderson, Houston	38	57	64	69	75	80
Timpson	Shelby	3	4	4	4	2	2
Troup	Cherokee, Smith	8	11	12	13	14	14
Tucker WSC	Anderson	1	1	1	1	1	1
Tyler	Smith	991	2,115	2,842	3,161	3,507	3,883

Table 5C.8: Water Conservation Savings for Water User Groups (Cont.)

Water User Group	Counties	Amount Conserved (ac-ft per year)					
		2030	2040	2050	2060	2070	2080
Tyler County SUD	Tyler	22	52	63	62	61	60
Upper Jasper County Water Authority	Angelina, Jasper	16	46	57	54	51	47
Virginia Hill WSC	Henderson	8	11	12	13	14	14
Walnut Grove WSC	Cherokee, Smith	26	42	47	52	58	62
Walston Springs WSC	Anderson	8	13	16	19	21	23
Warren WSC	Tyler	5	7	8	8	9	9
Wells	Cherokee	1	1	1	1	1	1
West Hardin WSC	Liberty, Hardin	2	2	2	2	2	2
West Jacksonville WSC	Cherokee	21	56	72	71	70	68
West Jefferson County MWD	Jefferson	5	5	5	5	5	5
Whitehouse	Smith	20	28	30	32	33	35
Wildwood POA	Hardin, Tyler	3	6	6	6	5	5
Woden WSC	Nacogdoches	10	24	31	33	36	38
Woodlawn WSC	Angelina	1	1	1	1	1	1
Woodville	Tyler	17	27	30	32	36	40
Wright City WSC	Cherokee, Rusk, Smith	5	9	12	12	13	13
Zavalla	Angelina	1	1	1	1	1	1
Total		**7,452**	**17,094**	**21,933**	**22,578**	**23,262**	**23,976**

Note**:** Draft values are subject to change and represent WUG total, including splits. All Region I primary WUGs are presented above.

Table 5C.9: Estimated Water Conservation Cost

Water User Group	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Afton Grove WSC	$13,000	$3,200	$3,300	$2,300	$2,300	$2,400	$2,400
Alto	$20,000	$2,700	$2,700	$1,300	$1,300	$1,300	$1,300
Alto Rural WSC	$97,000	$14,300	$15,400	$8,700	$9,800	$11,000	$12,200
Anderson County Cedar Creek WSC	$9,000	$1,800	$1,800	$1,200	$1,200	$1,200	$1,200
Angelina WSC	$23,000	$2,100	$2,100	$500	$500	$600	$600
Appleby WSC	$401,000	$34,800	$35,900	$7,700	$7,700	$7,800	$8,900
Arp	$11,000	$6,900	$15,700	$18,300	$16,700	$15,200	$13,600
B B S WSC	$11,000	$3,000	$3,000	$2,200	$2,200	$2,200	$2,200
B C Y WSC	$310,000	$24,200	$24,200	$2,400	$2,400	$2,400	$2,400
Beaumont	$1,679,000	$858,400	$2,268,500	$2,924,200	$2,887,100	$2,850,200	$2,813,900
Beckville	$6,000	$500	$500	$100	$100	$100	$100
Berryville	$6,000	$600	$600	$100	$200	$200	$200
Bethel Ash WSC	$228,000	$17,100	$17,200	$1,200	$1,200	$1,300	$1,300
Bevil Oaks	$6,000	$600	$600	$200	$100	$100	$100
Blackjack WSC	$8,000	$1,700	$1,700	$1,100	$1,100	$1,100	$1,100
Bon Wier WSC	$6,000	$1,600	$1,500	$100	$100	$100	$0
Bridge City	$71,000	$6,900	$7,000	$2,100	$2,100	$2,200	$2,200
Brookeland FWSD	$14,000	$3,300	$3,300	$1,200	$1,200	$1,200	$1,200
Brownsboro	$9,000	$3,000	$3,000	$2,400	$2,400	$2,400	$2,400
Brushy Creek WSC	$351,000	$30,100	$31,100	$6,900	$6,900	$6,900	$6,800
Bullard	$122,000	$17,200	$18,500	$10,000	$11,200	$12,300	$12,500
Caro WSC	$32,000	$6,800	$6,800	$4,600	$4,600	$4,600	$5,700
Carthage	$173,000	$23,600	$23,600	$11,400	$11,400	$11,300	$11,300
Center	$125,000	$39,300	$85,100	$97,000	$94,700	$92,500	$89,300
Centerville WSC	$10,000	$3,100	$5,400	$5,200	$4,800	$4,200	$2,700
Central WCID of Angelina County	$48,000	$4,300	$4,300	$1,000	$1,000	$1,000	$1,000
Chalk Hill SUD	$15,000	$1,400	$1,400	$300	$300	$300	$300
Chandler	$38,000	$9,700	$11,900	$10,500	$12,900	$16,300	$19,900
Chester WSC	$12,000	$2,000	$2,000	$1,200	$1,200	$1,200	$1,200
China	$13,000	$2,200	$2,200	$1,300	$1,300	$1,300	$1,300
Choice WSC	$8,000	$700	$700	$200	$200	$200	$200
Clayton WSC	$32,000	$2,600	$2,600	$500	$500	$500	$500
Colmesneil	$14,000	$2,200	$2,200	$1,200	$1,200	$1,200	$1,200
Corrigan	$18,000	$6,700	$14,200	$17,100	$17,600	$19,100	$19,700
County-Other, Anderson	$70,000	$5,800	$5,800	$900	$800	$800	$700
County-Other, Angelina	$54,000	$4,600	$4,600	$800	$800	$800	$900
County-Other, Cherokee	$43,000	$3,700	$3,600	$400	$300	$200	$0
County-Other, Hardin	$120,000	$10,100	$10,000	$1,300	$1,100	$900	$600

Table 5C.9: Estimated Water Conservation Cost (Cont.)

Water User Group	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
County-Other, Houston	$53,000	$8,400	$7,200	$2,300	$1,200	$1,100	$0
County-Other, Jasper	$115,000	$9,800	$9,700	$1,400	$1,300	$1,100	$1,000
County-Other, Jefferson	$250,000	$20,700	$20,300	$1,700	$1,600	$1,400	$1,300
County-Other, Nacogdoches	$59,000	$5,000	$5,000	$900	$1,000	$1,000	$1,100
County-Other, Newton	$69,000	$5,900	$5,800	$800	$700	$600	$500
County-Other, Orange	$197,000	$16,700	$16,500	$2,400	$2,100	$1,800	$1,400
County-Other, Panola	$107,000	$9,100	$9,100	$1,500	$1,400	$1,300	$1,300
County-Other, Rusk	$97,000	$8,300	$8,100	$1,100	$800	$500	$200
County-Other, Sabine	$9,000	$800	$800	$100	$100	$100	$100
County-Other, San Augustine	$19,000	$1,600	$1,500	$200	$100	$100	$100
County-Other, Shelby	$97,000	$8,200	$8,200	$1,400	$1,400	$1,300	$1,200
County-Other, Smith	$216,000	$17,400	$17,100	$1,800	$1,600	$1,400	$1,300
County-Other, Trinity	$51,000	$3,900	$3,900	$300	$300	$300	$300
County-Other, Tyler	$87,000	$7,300	$7,100	$800	$700	$500	$400
Craft Turney WSC	$44,000	$25,400	$55,300	$66,000	$64,800	$63,400	$61,100
Crockett	$35,000	$46,900	$111,200	$128,000	$124,500	$118,800	$113,100
Cross Roads SUD	$31,000	$2,700	$2,700	$500	$600	$600	$600
Crystal Farms WSC	$8,000	$800	$800	$200	$300	$300	$300
Cushing	$21,000	$2,800	$3,400	$2,300	$2,400	$2,400	$2,500
Cypress Creek WSC	$20,000	$2,600	$2,900	$1,600	$1,500	$500	$400
D & M WSC	$131,000	$21,800	$22,800	$13,700	$14,800	$14,800	$15,900
Damascus-Stryker WSC	$13,000	$3,200	$4,200	$3,300	$3,300	$3,300	$3,400
Dean WSC	$65,000	$12,700	$12,700	$9,200	$9,300	$9,300	$10,400
Deberry WSC	$7,000	$1,600	$1,600	$1,100	$100	$100	$100
Denning WSC	$1,000	$3,400	$8,900	$10,600	$9,900	$9,100	$8,400
Diboll	$60,000	$12,200	$12,200	$8,100	$8,100	$8,100	$8,100
East Lamar WSC	$8,000	$700	$700	$200	$200	$200	$200
Ebenezer WSC	$16,000	$2,400	$2,400	$1,200	$1,200	$1,200	$1,200
Elkhart	$22,000	$5,000	$5,000	$3,400	$3,400	$3,400	$3,400
Emerald Bay MUD	$6,000	$2,800	$2,800	$2,400	$2,400	$2,400	$2,400
Etoile WSC	$31,000	$4,700	$4,700	$2,500	$2,600	$3,600	$3,600
Federal Correctional Complex Beaumont	$51,000	$11,500	$11,500	$7,900	$7,900	$7,900	$7,900
Five Way WSC	$11,000	$3,000	$3,000	$2,200	$2,200	$2,200	$2,200
Flat Fork WSC	$9,000	$1,800	$1,800	$1,100	$100	$100	$100
Four Pines WSC	$26,000	$2,200	$2,200	$400	$400	$400	$400
Four Way SUD	$131,000	$9,800	$9,900	$700	$700	$700	$700
Frankston	$19,000	$3,700	$3,700	$2,300	$2,300	$2,300	$1,300

Table 5C.9: Estimated Water Conservation Cost (Cont.)

Water User Group	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Frankston Rural WSC	$19,000	$3,700	$3,700	$2,300	$2,300	$2,300	$2,300
G M WSC	$48,000	$18,200	$44,000	$49,400	$46,500	$43,500	$40,600
Garrison	$6,000	$9,400	$26,000	$34,600	$36,000	$37,300	$39,600
Gaston WSC	$10,000	$900	$900	$200	$200	$200	$200
Goodsprings WSC	$19,000	$1,700	$1,700	$300	$300	$300	$300
Grapeland	$19,000	$3,700	$3,700	$2,400	$2,400	$2,400	$2,400
Groves	$118,000	$85,700	$189,900	$233,800	$233,800	$233,800	$233,800
Gum Creek WSC	$11,000	$900	$900	$100	$100	$100	$100
Hardin County WCID 1	$10,000	$900	$900	$200	$200	$200	$200
Hemphill	$55,000	$5,600	$5,500	$1,600	$1,600	$1,500	$1,500
Henderson	$87,000	$29,700	$28,700	$22,500	$22,500	$22,500	$23,500
Hollands Quarter WSC	$45,000	$3,300	$3,300	$200	$200	$200	$100
Hudson WSC	$91,000	$7,900	$7,900	$1,500	$1,600	$1,600	$1,600
Huntington	$50,000	$9,500	$15,700	$15,300	$15,400	$15,500	$15,700
Huxley	$17,000	$3,600	$3,500	$2,300	$2,300	$1,200	$1,200
Jackson WSC	$89,000	$7,000	$7,000	$800	$800	$900	$900
Jacksonville	$257,000	$68,700	$128,600	$137,400	$134,900	$132,500	$129,000
Jacobs WSC	$24,000	$2,200	$2,200	$500	$600	$600	$600
Jasper	$585,000	$54,900	$53,700	$12,400	$11,200	$11,100	$10,000
Jasper County WCID 1	$45,000	$4,300	$6,500	$4,400	$4,500	$4,600	$4,800
Jefferson County WCID 10	$172,000	$19,000	$19,000	$6,900	$6,900	$6,900	$6,900
Joaquin	$10,000	$1,900	$1,800	$1,100	$100	$100	$100
Kelly G Brewer	$31,000	$4,600	$4,700	$2,500	$2,500	$2,500	$2,400
Kirbyville	$13,000	$4,500	$4,500	$3,600	$3,600	$3,600	$3,700
Kountze	$26,000	$2,200	$2,200	$400	$400	$300	$300
Leagueville WSC	$24,000	$2,000	$2,100	$400	$400	$400	$400
Lilly Grove SUD	$149,000	$21,600	$36,500	$34,200	$35,600	$37,000	$38,400
Lovelady	$24,000	$2,800	$2,800	$1,200	$1,100	$1,100	$1,100
Lufkin	$740,000	$133,400	$176,800	$147,000	$147,800	$148,700	$149,500
Lumberton MUD	$1,516,000	$107,100	$108,300	$2,500	$2,400	$2,400	$2,300
M & M WSC	$16,000	$1,500	$1,500	$400	$400	$400	$400
Mauriceville SUD	$362,000	$26,600	$26,700	$1,200	$1,300	$1,200	$1,200
McClelland WSC	$27,000	$8,300	$17,300	$16,900	$14,700	$12,400	$10,000
Meeker MWD	$273,000	$23,800	$23,800	$4,600	$4,600	$4,600	$4,600
Melrose WSC	$95,000	$11,900	$11,900	$5,300	$5,400	$5,400	$6,500
Minden Brachfield WSC	$54,000	$4,200	$4,200	$300	$300	$300	$300
Moore Station WSC	$36,000	$6,100	$6,100	$3,600	$4,600	$4,600	$4,700
Moscow WSC	$13,000	$1,100	$1,100	$200	$200	$200	$200
Mt Enterprise WSC	$42,000	$5,300	$5,300	$2,300	$2,300	$2,300	$2,300

Table 5C.9: Estimated Water Conservation Cost (Cont.)

Water User Group	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Murchison	$8,000	$1,800	$1,800	$1,200	$1,200	$1,200	$1,200
Nacogdoches	$652,000	$188,100	$370,300	$425,000	$440,900	$454,600	$468,400
Neches WSC	$12,000	$3,100	$3,100	$2,200	$2,200	$2,200	$2,200
Nederland	$115,000	$85,800	$183,800	$224,100	$221,700	$219,400	$216,100
New London	$28,000	$3,400	$3,400	$1,400	$1,400	$1,300	$1,300
New Prospect WSC	$12,000	$2,000	$1,000	$200	$200	$200	$1,200
New Summerfield	$26,000	$2,000	$2,000	$200	$200	$200	$200
New WSC	$19,000	$3,900	$8,400	$8,700	$8,000	$7,600	$7,100
Newton	$31,000	$12,300	$26,300	$28,300	$25,400	$21,500	$18,900
Nome	$16,000	$5,400	$11,900	$13,900	$13,900	$13,700	$13,500
North Cherokee WSC	$131,000	$15,900	$15,900	$6,700	$6,700	$6,700	$5,600
North Hardin WSC	$65,000	$5,300	$5,400	$900	$900	$900	$900
Norwood WSC	$103,000	$7,500	$7,500	$200	$200	$200	$200
Orange	$120,000	$155,200	$395,600	$507,900	$502,000	$497,200	$492,500
Orange County WCID 1	$212,000	$41,500	$57,400	$49,600	$46,500	$43,400	$40,500
Orange County WCID 2	$31,000	$16,900	$36,000	$43,500	$41,400	$40,200	$39,100
Orangefield WSC	$78,000	$17,900	$20,000	$15,800	$19,000	$21,300	$24,700
Overton	$48,000	$7,100	$7,100	$3,700	$3,600	$3,600	$3,600
Palestine	$1,029,000	$113,600	$143,800	$85,800	$85,000	$84,300	$82,600
Panola-Bethany WSC	$22,000	$7,900	$13,600	$13,800	$12,200	$10,800	$9,700
Pennington WSC	$43,000	$5,400	$5,300	$2,300	$1,200	$1,200	$1,200
Pinehurst	$16,000	$4,600	$4,600	$3,500	$3,500	$3,500	$3,500
Pineland	$16,000	$3,000	$4,600	$4,000	$3,800	$3,600	$3,400
Pleasant Springs WSC	$10,000	$2,000	$2,000	$1,300	$1,300	$1,300	$1,300
Pollok-Redtown WSC	$47,000	$3,600	$3,600	$300	$300	$300	$300
Port Arthur	$1,518,000	$194,300	$194,500	$87,600	$87,300	$86,900	$86,600
Port Neches	$577,000	$42,700	$46,800	$8,200	$8,100	$8,000	$7,900
Rayburn Country MUD	$25,000	$6,100	$12,400	$13,000	$12,300	$11,500	$10,800
Redland WSC	$11,000	$1,100	$1,100	$300	$300	$300	$300
Rehobeth WSC	$6,000	$1,500	$1,500	$1,100	$1,100	$100	$100
Rural WSC	$6,000	$600	$600	$100	$100	$100	$100
Rusk	$38,000	$12,000	$12,000	$9,300	$9,300	$9,300	$9,300
Rusk Rural WSC	$351,000	$26,500	$29,900	$6,800	$6,700	$6,600	$6,400
San Augustine	$24,000	$5,700	$5,600	$3,900	$2,900	$2,900	$3,900
San Augustine Rural WSC	$322,000	$29,100	$40,200	$23,600	$23,200	$22,600	$22,100
Sand Hills WSC	$7,000	$12,700	$34,900	$52,800	$57,000	$61,300	$66,700
Seneca WSC	$9,000	$1,800	$1,800	$1,200	$1,200	$1,200	$1,100
Silsbee	$257,000	$34,500	$44,100	$32,800	$34,900	$37,100	$38,300
Slocum WSC	$25,000	$2,300	$2,300	$500	$500	$500	$500

Table 5C.9: Estimated Water Conservation Cost (Cont.)

Water User Group	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Sour Lake	$26,000	$4,300	$4,300	$2,400	$2,400	$2,400	$2,400
South Jasper County WSC	$14,000	$1,300	$1,300	$300	$300	$200	$200
South Kirbyville Rural WSC	$6,000	$500	$500	$200	$200	$200	$200
South Newton WSC	$87,000	$10,800	$10,800	$4,600	$4,500	$4,500	$3,500
South Rusk County WSC	$23,000	$10,700	$24,200	$28,000	$26,500	$24,900	$23,300
Southern Utilities	$931,000	$313,100	$723,500	$891,700	$916,900	$941,800	$966,300
Swift WSC	$20,000	$6,000	$6,000	$4,700	$4,700	$4,700	$5,800
Tatum	$24,000	$4,100	$4,100	$2,400	$2,300	$2,300	$2,300
TDCJ Beto Gurney & Powledge Units	$214,000	$23,700	$23,700	$8,600	$8,600	$8,600	$8,600
TDCJ Coffield Michael	$419,000	$43,700	$43,700	$14,200	$14,200	$14,200	$14,200
TDCJ Eastham Unit	$134,000	$15,100	$15,100	$5,600	$5,600	$5,600	$5,600
Tenaha	$27,000	$11,200	$24,900	$25,200	$21,500	$17,700	$12,900
The Consolidated WSC	$167,000	$30,400	$30,500	$19,900	$19,900	$21,000	$21,000
Timpson	$15,000	$2,300	$2,300	$1,200	$1,200	$1,100	$100
Troup	$77,000	$9,000	$9,000	$3,600	$3,600	$3,600	$3,600
Tucker WSC	$9,000	$800	$800	$200	$200	$200	$200
Tyler	$6,731,000	$613,000	$799,600	$457,100	$480,000	$504,400	$530,200
Tyler County SUD	$207,000	$23,500	$29,800	$18,400	$18,000	$17,700	$17,300
Upper Jasper County Water Authority	$105,000	$12,200	$21,100	$17,200	$16,200	$15,200	$14,200
Virginia Hill WSC	$74,000	$10,800	$10,800	$5,600	$5,600	$5,600	$5,600
Walnut Grove WSC	$631,000	$62,300	$63,400	$20,100	$20,200	$21,300	$21,300
Walston Springs WSC	$23,000	$7,300	$7,400	$6,800	$6,900	$8,000	$8,000
Warren WSC	$22,000	$4,900	$4,900	$3,400	$3,400	$3,400	$3,400
Wells	$27,000	$2,100	$2,100	$200	$200	$200	$200
West Hardin WSC	$91,000	$7,100	$7,100	$600	$600	$600	$600
West Jacksonville WSC	$53,000	$12,900	$26,800	$29,400	$28,900	$28,300	$27,700
West Jefferson County MWD	$74,000	$6,600	$6,600	$1,400	$1,400	$1,400	$1,500
Whitehouse	$52,000	$16,200	$16,200	$12,500	$12,500	$12,500	$12,500
Wildwood POA	$15,000	$3,400	$2,400	$1,300	$1,300	$1,200	$1,200
Woden WSC	$27,000	$6,600	$10,200	$11,300	$11,700	$12,000	$12,400
Woodlawn WSC	$18,000	$1,600	$1,600	$400	$400	$400	$400
Woodville	$82,000	$13,100	$14,200	$8,500	$8,500	$9,600	$9,700
Wright City WSC	$170,000	$15,300	$16,000	$4,400	$4,400	$4,500	$4,500
Zavalla	$7,000	$700	$700	$200	$200	$200	$200

Note**:** Draft values are subject to change and represent WUG total, including splits. All Region I primary WUGs are presented above.

5C.3.2 Non-Municipal Water User Groups

Water conservation measures for non-municipal water user groups are described in the following sections.

Manufacturing. Industrial water users include large petrochemical industries as well as smaller local manufacturers. The current state of water conservation at existing manufacturing facilities is unknown. Conservation measures associated with manufacturing are highly industry- and site-specific. For example, some industries can utilize brackish water supplies or wastewater effluent while others require only potable water. In addition, the water demand types of future industries are unknown.

It is important in evaluating conservation strategies for industries to balance the water savings from conservation to economic benefits to the industry and the region. In the ETRWPA, where water is readily available, requiring costly changes to processes and equipment may not be practical economically. However, the region recommends water conservation as a BMP, encouraging manufacturers to implement water reuse and other conservation measures. Many water providers have a tiered rate structure, so it will be in the manufacturers' best interest to continue promoting water conservation should water rates increase due to limited supply. Despite the expectation manufacturers will adopt these measures during the planning period, the ETRWPG lacks the specific information needed to assess the current status of water conservation in manufacturing or to prescribe specific measures. Consequently, the ETRWPG has not recommended specific water conservation strategies for manufacturing WUGs. The ETRWPG will evaluate potential strategies and savings in the next planning cycle should any new information become available. Manufacturing customers can refer to the latest TWDB website for the best management practices for industrial, commercial, and institutional water users: https://www.twdb.texas.gov/conservation/BMPs/index.asp.

Irrigation. Most irrigation occurs in the lower parts of the Neches and Sabine Basins. Much of the irrigation water is delivered by canals and is used for rice farming along the coast. The LNVA is the largest provider of agricultural irrigation water in the ETRWPA. LNVA has implemented significant irrigation water conservation measures, including:

- Information and education program.
- Meter repair and replacement program.
- Water billing based on water usage: In 2005, LNVA began billing rice farmers based on metered water use rather than farmed acreage. After implementation of this measure, average water consumption was reduced from 3.79 ac-ft per acre farmed in 2004 to 2.84 ac-ft per acre farmed in 2005, a reduction of about 25 percent.
- Canal water loss reduction: From 2009 to 2013, LNVA reduced its canal water loss from 25 percent to 14 percent through aggressive leak detection and repair along with vegetation control. This represents a reduction in canal water loss of more than 23,000 ac-ft per year.
- Neches River Saltwater Barrier: This measure is estimated to conserve an average of 200,000 ac-ft per year of stored fresh water that does not have to be released to prevent saltwater intrusion into the river.

Individual farmers also apply measures such as minimization of water loss from on-farm water distribution, irrigation scheduling, land leveling, and tailwater recovery. As described above, significant increases in efficiency have already been achieved. In addition, the appropriate water conservation strategies for individual farms are site-specific. The ETRWPG encourages Region I irrigation WUGs to consider the implementation of irrigation water conservation measures, although the ETRWPG does not have the farm-specific information necessary to identify the status of on-farm water conservation or to recommend specific measures. The ETRWPG will evaluate potential strategies and savings in the next planning cycle should any new information become available. Farmers can refer to the latest TWDB website for best management practices for agricultural water users: https://www.twdb.texas.gov/conservation/BMPs/index.asp.

Other. Steam-electric power, livestock, and mining WUGs together account for 19 percent of the total 2030 water demand in the Region I RWPA. Although the cost of water in these industries comprises a small percentage of the overall business cost, it is still important to consider the benefits of water conservation. Implementing water conservation measures can contribute to the sustainability of water resources and ensure long-term availability as water becomes more severe. Therefore, the ETRWPG encourages steam-electric power, livestock, and mining WUGs to adopt water conservation strategies. These customers can refer to the latest TWDB website for best management practices: https://www.twdb.texas.gov/conservation/BMPs/index.asp.

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Chapter 6: IMPACTS OF THE REGIONAL WATER PLAN AND CONSISTENCY WITH PROTECTION OF RESOURCES

2026 Initially Prepared Plan

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LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ETRWPA	East Texas Regional Water Planning Area
IPP	Initially Prepared Plan
RWP	Regional Water Plan
TAC	Texas Administrative Code
TWDB	Texas Water Development Board
WMS	Water Management Strategy
WUG	Water User Group

6 IMPACTS OF THE REGIONAL WATER PLAN AND CONSISTENCY WITH PROTECTION OF RESOURCES

The development of viable strategies to meet the demand for water is a primary focus of regional water planning. However, another important goal of water planning is the long-term protection of resources that contribute to water availability, and to the quality of life in the State. The purpose of this chapter is to describe how the 2026 Regional Water Plan (2026 Plan) is consistent with the long-term protection of the State's water resources, agricultural resources, and natural resources. The requirement to evaluate the impact of the regional water plan and its consistency with protection of resources is found in 31 Texas Administrative Code (TAC) Chapter 357.40 & 41, which require the following:

- A description of potential impacts of the regional water plan regarding agricultural resources; other water resources; threats to agricultural and natural resources; third-party social and economic impacts resulting from voluntary redistributions of water; major impacts of recommended water management strategies (WMS) on key water quality parameters; and effects on navigation (§357.40(b)).
- A description of how the 2026 Plan is consistent with the long-term protection of the state's water resources, agricultural resources, and natural resources (§357.41).
- A summary of identified water needs remaining unmet by the plan (§357.40(c)).
- A description of the socioeconomic impacts of not meeting identified water needs in the region (§357.40(a)).

These requirements are addressed by providing general descriptions of how the plan is consistent with protection of water resources, agricultural resources, and natural resources.

Additionally, the chapter will specifically address consistency of the 2026 Plan with the State's water planning requirements.

6.1 IMPACTS OF WATER MANAGEMENT STRATEGIES

As required, the 2026 East Texas Regional Water Plan (ETRWP) describes how implementing WMSs described in Chapter 5 may impact the following categories:

1. Agricultural resources,
2. Other water resources of the state including other strategies and groundwater and surface water inter-relationships,
3. Threats to agricultural and natural resources,
4. Third party social and economic impacts resulting from moving water from rural and agricultural areas,
5. Major impacts on key parameters of water quality in Texas,
6. Effects on navigation.

The impacts of each WMS to these categories are described and quantified in the Project Evaluation section of each WMS Technical Memorandum (Appendix 5B-A). Each WMS Technical Memorandum presents a quantitative rating for the potential impacts of the strategy on a scale of 1 to –5 (1 equating to the highest impact, 5 equating to no impact and/or positive impact) for each category described and a brief explanation of these impacts. Appendix 5B-B provides a summary of the methodology behind the quantitative rating system for each category presented in each Project Evaluation and a matrix summarizing the ratings for each category quantified for all WMSs.

6.1.1 Impact on Key Water Quality Parameters in the State

Most WMSs in the 2026 Plan are anticipated to have minimal to no impact on key water quality parameters and thus, received a rating of a 4 or above for this evaluation category. There are a few exceptions detailed below:

The LNVA Neches-Trinity Interconnect, LNVA Purchase from SRA (Toledo Bend), and UNRMWA Neches Run-of-River with Lake Palestine WMSs each received a rating of 3 (low to medium impacts) for this category because they involve transfers of water between river basins. Lake Columbia reservoir receives a score of 2 due to transfers of water between river basins and potential impacts from land inundation. These strategies therefore have the potential to cause changes in water chemistry, temperature, nutrients, organic particulates, and sediment in source and potentially receiving basins, depending on how the water is being used. Additional study will be required to assess the potential water quality impacts from these interbasin transfers.

6.1.2 Third-Party Socioeconomic Impacts from Moving Water from Agricultural and Rural Areas

The majority of WMSs in the 2026 Plan do not involve moving water from agricultural and/or rural areas and thus, received a rating of a 4 or above for this evaluation category. There are several exceptions detailed below:

WMSs that involve voluntary redistribution of water (i.e., purchase of water) from wholesale water providers to serve non-municipal uses (manufacturing, mining) each received a rating of 4 (low impacts) for this category because this water could be used to serve either local rural municipal and/or agricultural water users. Although, moving water to these non-municipal users will provide economic benefits to those rural areas.

The ANRA Lake Columbia and UNRMWA Neches Run-of-River with Lake Palestine WMSs each received a rating of 2 (medium impacts) for this category because they each could involve transfer of supply outside of the Neches River Basin to the Trinity River Basin for uses that are not rural or agricultural. However, substantial portions of supply from Lake Columbia are anticipated to be used by rural users in the Neches River Basin within the ETRWPA. Similarly, some supply developed from the Neches Run-of-River with Lake Palestine WMS could be used to serve rural and/or agricultural users in the Neches River Basin.

6.2 CONSISTENCY WITH THE LONG-TERM PROTECTION OF THE STATE

To be considered consistent with long-term protection of the State’s water, agricultural, and natural resources, the ETRWP must also be in compliance with provisions of 31 TAC Chapter 357. The information, data, evaluation, and recommendations included in Chapters 1 through 5C, Chapters 7 through 10 of the 2026 Plan collectively demonstrate compliance with these regulations.

6.2.1 Protection of Water Resources

The water resources in the East Texas Regional Water Planning Area (ETRWPA) include portions of three river basins providing surface water, and portions of four aquifers providing groundwater. The three major river basins within the ETRWPA boundaries are the Sabine River Basin (Basin 5), the Neches River Basin (Basin 6), and the Trinity River Basin (Basin 8). The respective boundaries of these basins are depicted in Figure 1.11, in Chapter 1.

The region’s groundwater resources include, primarily, the Gulf Coast and Carrizo-Wilcox aquifers. Lesser amounts of water are also drawn from the Sparta aquifer, Queen City aquifer, and localized aquifers, such as the Yegua-Jackson. The extents of these aquifers within the region are depicted in Figures 1.7 and 1.8, in Chapter 1.

Surface water accounts for approximately 85% of the total available water in the region. Sources within the region include 13 reservoirs in the Neches River Basin, six in the Sabine River Basin, and one in the

Trinity River Basin. If constructed, Lake Columbia and the West Beaumont Reservoir would be located in the Neches River Basin. Currently, the majority of the available surface water supply used in the ETRWPA comes from the Neches River Basin.

The Carrizo-Wilcox Aquifer and Gulf Coast Aquifer are, by far, the most important groundwater resources in the ETRWPA, accounting for approximately 79% of the available groundwater. Significant water level declines has been observed in the Carrizo-Wilcox Aquifer around the cities of Tyler, Lufkin, and Nacogdoches over the past two decades. In response, Lufkin and Nacogdoches have developed new surface water sources to reduce their reliance on groundwater, while Tyler now relies entirely on surface water. Additionally, manufacturing demand in Angelina County has declined significantly since the 2021 Plan due to the shutdown of a paper mill. As a result, recent trends in Angelina and Nacogdoches counties show stabilizing water levels, with a slight increase due to reduced groundwater use.

Protection of surface water resources and groundwater resources necessarily involves understanding potential impacts to the interrelationship between groundwater and surface water. This is particularly important in aquifer recharge (i.e., outcrop) areas and contributing zones to recharge areas. The Carrizo-Wilcox Aquifer outcrops in the northeastern area of the region, predominantly in Panola, Shelby, and Rusk counties. In addition, the Queen City Aquifer outcrop is found in the northwestern area of the region, mostly in Henderson, Smith, Cherokee, and Anderson counties. All of these counties support surface water supplies that are likely located on a portion of an aquifer outcrop.

Hence, water management strategy impacts on surface water sources could affect supplies in these important groundwater supplies. Strategies to manage impacts in the ETRWPA need to consider protection of the groundwater-surface water interfaces, where it may be possible to do so.

To be consistent with the long-term protection of water resources, the 2026 Plan must recommend strategies that minimize threats to the region's sources of water over the planning period. The WMSs identified in Chapter 5B were evaluated for threats to water resources. The recommended strategies represent a comprehensive plan for meeting the needs of the region while effectively minimizing threats to water resources. Threats to water resources are minimized in the 2026 Plan in the following ways:

- **Water conservation**. Strategies for water conservation have been recommended that will help reduce the demand for water, thereby reducing the impact on the region's groundwater and surface water sources. Water conservation practices by Region I WUGs are expected to save approximately 24,000 ac–ft of water annually by 2080, reducing impacts on both groundwater and surface water resources. The plan also assumes up to 2.9% savings in municipal demands due to the implementation of plumbing codes. Water conservation benefits the State's water resources by reducing the volumes of water withdrawals necessary to support human activity. This can benefit surface water, groundwater, and groundwater-surface water relationships.
- **Development of Lake Columbia**. This strategy will increase surface water supplies available for cities, industry, and agriculture in the ETRWPA.
- **Interbasin Transfers.** The ETRWP includes several recommended WMSs that involve interbasin transfers. These transfers will have impacts on environmental flows in the basin of origin, but these impacts will be limited through prescribed environmental flow standards and where applicable, the permitting process through the TCEQ.
- **Optimized use of existing surface water resources**. WMSs that involve existing surface water resources work to optimize the utilization of these resources. The Water Availability Model, a part of the regional planning process, assesses how the increased use of surface water resources will impact the Region's water resources. The Water Availability Models developed for the ETRWPA indicate adequate availability of surface water in the region. As with conservation,

optimized use of existing surface water resources can help protect groundwater-surface water relationships where surface waters extend across an aquifer outcrop.

- **Optimized use of groundwater**. This strategy has generally been recommended for entities with sufficient groundwater supply available to meet needs, but currently without adequate infrastructure (i.e., well capacity). Groundwater availability reported in the plan is based on the long-term sustainability of the aquifer. No strategies are recommended to use water above currently identified sustainable levels, e.g., Modeled Available Groundwater.

6.2.2 Consistency with Protection of Agricultural Resources

Agriculture is an important economic cornerstone of the ETRWPA. Even with adequate rainfall, irrigation is a critical aspect of some agriculture in the region. Rice irrigation in the coastal counties is supplied by Lower Neches Valley Authority, primarily, with water from the Rayburn/Steinhagen system. The Water Availability Models indicate adequate availability of surface water to meet most of the projected irrigation demands for the planning period. Localized groundwater use from aquifers in the ETRWPA can meet any remaining projected irrigation demands not met through surface water. A WMS is recommended for irrigation water users in Trinity County to drill additional groundwater wells in the Yegua-Jackson Aquifer to address any potential water supply needs. Additionally, the Neches-Trinity Basin Interconnect WMS will enable LNVA to provide water supply to agricultural users in Chambers and Liberty County.

Most WMSs in the ETRWPA are estimated to have a small permanent acreage impact and minimal to no impact to agricultural acreage. Any potential impacts to agricultural acreage could be mitigated during planning and design of individual projects. Both recommended reservoir WMSs, Lake Columbia and the West Beaumont Reservoir, impact substantial acreage on a permanent basis, some of which could be agricultural land. Additional study will be needed to assess these impacts and determine potential mitigation efforts during planning and design phases of these projects.

6.2.3 Consistency with Protection of Natural Resources

The ETRWPA contains many natural resources including threatened or endangered species; local, state, and federal parks and public land; and energy/mineral reserves. Following is a brief discussion of how the 2026 Plan is consistent with the long-term protection of these resources.

Threatened/Endangered Species. A list of species (contained in Appendix 1-A) of special concern, including threatened or endangered species, located within the ETRWPA includes 10 species of birds, 9 mammals, 8 reptiles, 6 fish, 7 mollusks, and 8 plants.

In general, most WMSs planned for the ETRWPA will not affect threatened or endangered species. Development of new reservoirs in the region could affect threatened or endangered species and their habitats. However, the development of any reservoir requires extensive environmental impact studies that address potential effects on threatened or endangered species. Any such impacts indicated by these studies would need to be mitigated in accordance with federal and state environmental regulations in order for the reservoir project to be allowed.

Parks and Public Lands. The ETRWPA contains national forests, wildlife refuges, and a preserve, as well as state parks, forests, and wildlife management areas. In addition, there are numerous local (e.g., city or county) parks, recreational facilities, and other local public lands located throughout the region. None of the WMSs currently proposed for the ETRWPA are expected to adversely impact state or local parks or public land.

In general, federal lands (i.e., national forests, wildlife refuges, or preserves) cannot be subjugated by state or local projects. Therefore, a proposed WMS for the ETRWPA would not be permitted to adversely impact such properties unless adequate mitigation measures were planned, and the plans approved by the appropriate federal agencies.

Timber Resources. Timber is an important economic resource for the ETRWPA. Although the development of Lake Columbia would inundate some forested areas, this loss in timber resources would be partially offset by gains in wetland areas, aquatic habitat and water recreation areas. A full environmental assessment is part of the planning process for development of reservoirs. The results of such environmental assessments identify any significant effects on timber resources and propose mitigation, as necessary.

Energy Reserves. Numerous hydrocarbon production wells are located within the ETRWPA, including the East Texas Oil Field, and four of the top 10 producing gas fields in the state. Producing oil wells and top producing oil fields are depicted in Chapter 1 Figures 1.18 and 1.19, respectively. In addition, significant lignite coal resources can be found in the ETRWPA under portions of 12 counties. Lignite coal resources are depicted in Figure 1.20. These resources represent an important economic base for the region. None of the WMSs is expected to significantly impact oil, gas, or coal production in the region.

6.3 UNMET MUNICIPAL NEEDS

Texas Water Development Board (TWDB) guidance requires for any unmet municipal needs included in the 2026 Plan to include:

1. documentation that all potentially feasible WMS were considered to meet the need, including drought management WMS;
2. explanations as to why additional conservation and/or drought management WMS were not recommended to address the need;
3. descriptions of how, in the event of a repeat of the drought of record, the Water User Group (WUG) associated with the unmet need shall ensure the public health, safety, and welfare in each planning decade with an unmet need; and,
4. explanation as to whether there may be an occasion, prior to the development of the next IPP, to amend the RWP to address all or a portion of the unmet municipal need.

The ETRWPA is a water-rich region that has existing infrastructure in place and future strategies projected to tap into water resources that can supply growing projected demands across the region. After considering existing supplies and recommended water management strategies in the 2026 ETRWP, there are no unmet municipal needs. The only unmet need shown in the 2026 ETRWP is for the steam electric power WUG in Henderson County; however, there is no longer a water demand or need associated with this WUG. As discussed in Chapter 5B, the demand projected for the steam electric power WUG in Henderson County is associated with a planned facility, the Halyard Henderson Energy Center, that is cancelled.

6.4 SOCIOECONOMIC IMPACTS OF NOT MEETING IDENTIFIED NEEDS

[This section will be updated upon the release of the Socioeconomic Impact Report by TWDB in August 2025.]

Administrative rules in 31 TAC §357.10 require regional water planning groups to evaluate socioeconomic impacts of not meeting water needs as a part of the regional water planning process. The TWDB conducts a comprehensive socioeconomic analysis to assess the impacts of failing to meet projected water needs within the region. This analysis calculates the impacts of a severe drought occurring in a single year at each decadal period within Region I. Notable findings from the TWDB socioeconomic impact analysis will be summarized in this section as part of the final plan. The full socioeconomic impact analysis performed by the TWDB will be attached as Appendix 6-A upon completion.

Chapter 7: Drought Response Information, Activities, and Recommendations

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Prepared for:

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LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
DCP	Drought Conservation Plan
DWW	Drinking Water Watch
ETRWPA	East Texas Regional Water Planning Area
ETRWPG	East Texas Regional Water Planning Group
HCWCID	Houston County Water Conservation Independent District
LNVA	Lower Neches Valley Authority
LP	Limited Partnership
MGD	Million Gallons per Day
MGL	Mean Sea Level
MUD	Municipal Utility District
MWD	Municipal Water District
PHDI	Palmer Hydrological Drought Index
PWS	Public Water Systems
SRA	Sabine River Authority
SUD	Special Utility District
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
UNRMWA	Upper Neches River Municipal Water Authority
USGS	United States Geological Survey
WCID	Water Control and Improvements District
WSC	Water Supply Corporation
WUG	Water User Group

7 DROUGHT RESPONSE INFORMATION, ACTIVITIES, AND RECOMMENDATIONS

Drought response and management have long been important aspects of regional water planning. The extensive drought experienced in Texas during the 2010-2012 timeframe, however, served to re-focus attention on the need for comprehensive consideration of drought management measures. Requirements for improved drought planning in the State through the regional water planning process are found in Title 31 of the Texas Administrative Code, Part 10, Chapter 357, Subchapter D. Specifically, §357.42 of Subchapter D includes requirements related to drought response information, activities, and recommendations. This chapter addresses the requirements found in §357.42.

While the East Texas Regional Water Planning Area (ETRWPA) is generally less prone to extreme drought compared to other regions across Texas, there have been significant historical droughts identified throughout the region. These have tended to be sub-regional in nature, meaning a significant or extreme drought is more likely to be localized than in other, drier regions of the State. This limited geographic extent affects how the region prepares for and responds to drought when it does occur.

7.1 DROUGHTS OF RECORD

A central principle of regional water planning is that the availability of water sources is determined for drought-of-record conditions. State-wide, the drought of the 1950's is often considered the drought of record, but on regional or sub-regional bases, droughts during other periods of time may actually be demonstrated to have been more severe. Chapter 7 includes a detailed examination of preparations for and responses to drought conditions in the region, as required by §357.42. Such examination begins with identification of significant recent droughts within the region.

7.1.1 Historical Droughts of Record

As described in Chapter 3, the surface water supplies for the regional water plans were determined using the Texas Commission on Environmental Quality (TCEQ)-approved Water Availability Models (WAMs).[1] The WAMs can be used to simulate the response of existing and proposed water supply reservoirs to historical hydrologic conditions assuming all water rights utilize their maximum authorized amounts in priority date order. The firm yield of a reservoir is the greatest amount of water the reservoir can supply on an annual basis without shortage during a repeat of historical drought-of-record conditions. The WAMs incorporate historical hydrologic conditions that occurred between 1940 and 2018 in the Neches River Basin and between 1940 and 1996 in the Sabine and Trinity River Basins. Table 7.1 shows the historical drought of record for each major reservoir in the ETRWPA.

Table 7.1 Historical Droughts of Record for Major Water Supply Reservoirs

Reservoir Name	Counties	Drought of Record[a]	
		Start Date	End Date
Trinity River Basin			
Houston County	Houston	Jul 1953	Apr 1957
Neches River Basin			
Lake Athens	Henderson	May 1947	Jan 1957
Lake Jacksonville	Cherokee	May 1953	Mar 1957
Lake Palestine	Anderson, Cherokee, Henderson, Smith	May 1962	Dec 1964
Sam Rayburn	Angelina, Jasper, Nacogdoches, Sabine, San Augustine	Apr 2010	Nov 2011
B. A. Steinhagen	Jasper, Tyler		
Lake Columbia[b]	Cherokee, Smith	Jul 1962	Dec 1967
Lake Naconiche	Nacogdoches	Mar 2010	Nov 2011
Striker Creek Reservoir	Cherokee, Rusk	Apr 2010	Nov 2011
Lake Nacogdoches	Nacogdoches	May 1969	Oct 1972
Lake Pinkston	Shelby	May 1962	Oct 1972
Lake Tyler/Tyler East	Smith	Apr 2010	Sep 2013
Sabine River Basin			
Lake Cherokee	Gregg, Rusk	May 1962	Nov 1964
Lake Murvaul	Panola	Jun 1962	Jan 1965
Toledo Bend Reservoir	Newton, Panola, Sabine, Shelby	May 1962	Dec 1967

[a] For each location, the drought of record refers to a set of hydrologic conditions that is used to evaluate the firm yield of an existing or proposed reservoir.

[b] Lake Columbia is permitted but not yet constructed and is in the process of U.S. Army Corps of Engineers permitting.

The drought of record can be different for different geographic locations. There have been four primary droughts of record in the East Texas Region:

- The drought of the 1950s in the western and central portions of the region.
- The drought beginning in about 1962 and spanning the mid-1960s for eastern and north central portions of the region.
- The drought period in the late 1960s to early 1970s in the north central portion of the region.
- The drought of the early 2010s in the north central portion of the region.

7.1.2 Recent Droughts in the Region

There are several ways to measure drought, including the U.S. Drought Monitor index, the Palmer Hydrological Drought Index (PHDI), and reservoir water levels. These indicators were used in an attempt to identify significant new droughts in the ETRWPA since the mid-1990's.

The Drought Monitor is a composite index that is calculated weekly based on measurements of climatic, hydrologic, and soil conditions, as well as reported impacts and observations from more than 350 contributors around the country.[2] The Drought Monitor was initiated in 2000, and data can be obtained for each county in the United States. Figure 7.1 shows a composite Drought Monitor index calculated for the 20 counties in the ETRWPA over the period of record. This composite index shows the percentage of the land area in the affected counties experiencing different levels of drought. Approximately 15 to 30 percent of the region experienced extreme drought in 2006, 2007, and for a brief period in 2013. The Drought Monitor index indicates the region experienced extreme/exceptional drought conditions from late 2010 through early 2012. In October 2011, the entire region experienced exceptional drought conditions. Since 2011 no major periods of drought have been recorded; however, a short period of drought during late 2023 and early-mid 2024 was observed in Region I area.

Compared to climatic effects of drought, the hydrological effects, such as lower reservoir and groundwater levels, may take longer to develop and take longer to recover from. The PHDI was developed as an indicator of the long-term cumulative moisture supply. The monthly PHDI has been developed since 1900 for ten climatic zones in each state.[3] The East Texas climatic zone includes most of the ETRWPA, as well as parts of Regions C, G, H, and the Northeast Texas Regional Water Planning Area. Figure 7.2 shows the PHDI for the East Texas climatic zone. The PHDI reflects extreme droughts in this area during the 1950s, as well as in 1981, 1998, 2005-06, and 2010-12. According to the PHDI, the 2010-2012 drought was more severe than any of the individual droughts in the 1950s.

Since construction of the Sam Rayburn and Toledo Bend Reservoirs in the late 1960s, reservoirs in the ETRWPA reached minimum conservation storage during the droughts of 1995-1996 and 2010-2012, with several smaller droughts occurring during the period (Figure 7.3).[4]

Each of the three drought indicators suggests that the 2010-2012 period was one of significant droughts for the ETRWPA. However, each of these indicators applies to the ETRWPA as a whole, and more localized hydrologic information is necessary to evaluate whether accounting for recent droughts would change the estimates of available surface water supplies. In 2021, the TCEQ Neches River Basin WAM was updated, which included the extension of hydrology data (e.g., inflows, evaporation) from 1996 to 2018. The updated Neches WAM was used to analyze surface water supply availability in the Neches River Basin for the 2026 ETRWP. As shown in Table 7.1, the updated Neches WAM analysis for the ETRWP indicated there are several major reservoirs in the Neches River Basin with new droughts of record during the early 2010s period. For a full evaluation of the impact of a potential new drought of record on surface water supply availability across the region, the Sabine and Trinity River Basin WAMs should be updated to incorporate the hydrologic conditions that have occurred since 1996.

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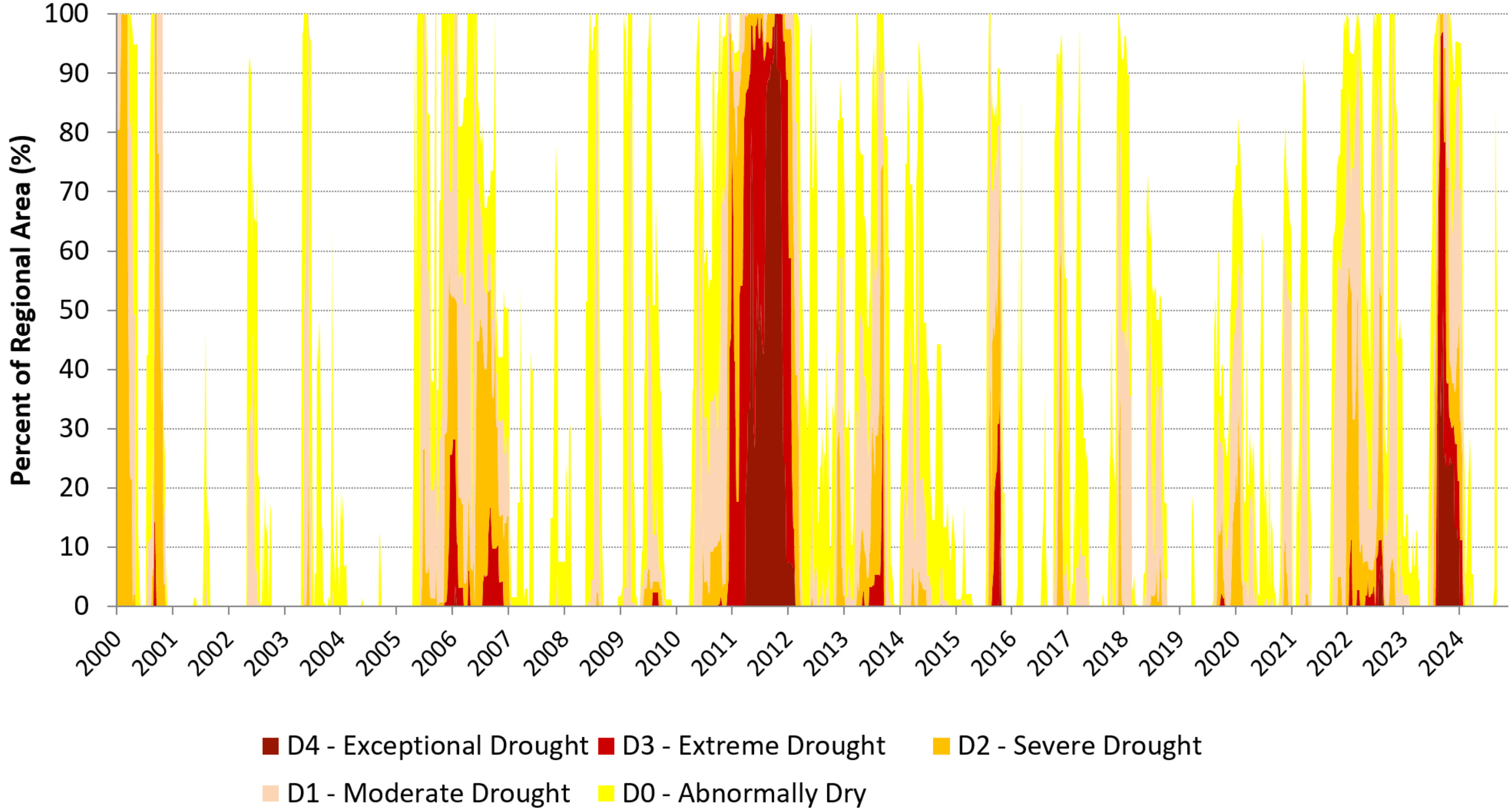

Figure 7.1 Composite Drought Monitor Index for Counties in the East Texas Regional Water Planning Area

Note: Obtained from the U.S. Drought Monitor, September 2024.
https://droughtmonitor.unl.edu/DmData/DataDownload/ComprehensiveStatistics.aspx

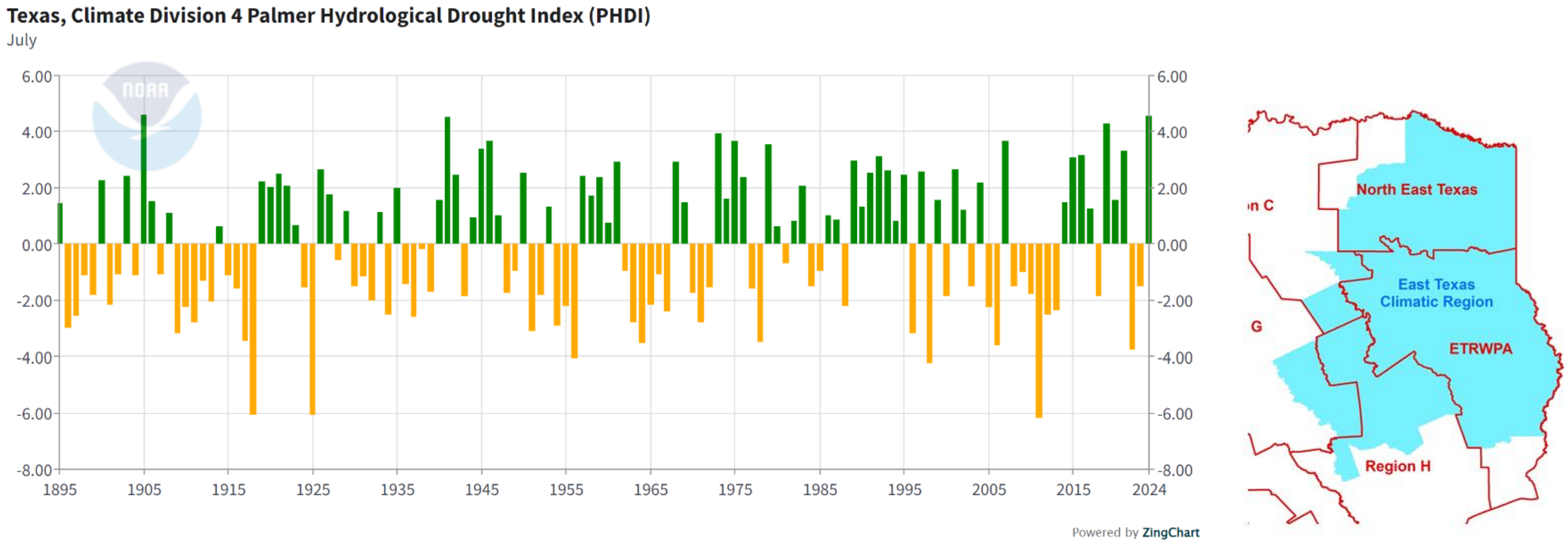

Figure 7.2 Palmer Hydrological Drought Index for the East Texas Climatic Zone

Note: Data sourced from NOAA, National Centers for Environmental Information
https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/divisional/time-series/4104/phdi/1/7/1895-2024

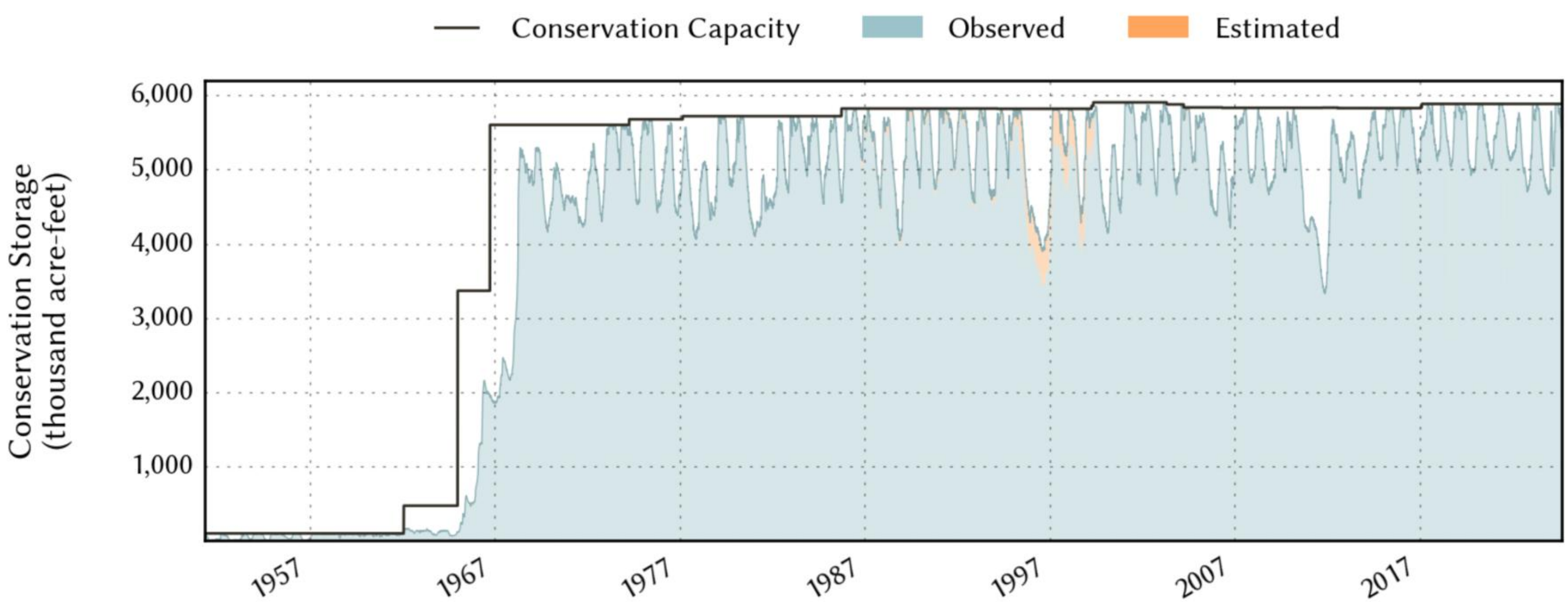

Figure 7.3 Composite Reservoir Storage in the East Texas Regional Water Planning Area

Note: Sourced from Texas Water Development Board: East Texas Planning Region Reservoirs, URL: HTTPS://WWW.WATERDATAFORTEXAS.ORG/RESERVOIRS/CLIMATE/EAST-TEXAS, accessed September 2024.

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7.2 UNCERTAINTY AND DROUGHT(S) WORSE THAN THE DROUGHT OF RECORD

This section highlights Region I's approach to addressing uncertainty and preparing for extreme drought conditions and summarizes the measures to enhance resilience against drought(s) worse than the drought of record (DWDOR).

7.2.1 Planning for Uncertainty

The RWPG acknowledges the inherent uncertainties associated with planning factors such as population, demand, and supply during the planning process. To address these potential uncertainties and mitigate future drought conditions, the RWP utilizes several conservative planning assumptions. For example, baseline water demands used to develop demand projections for the ETRWP reflect demands during recent high-use, dry year conditions.

Additionally, the WAM used to determine surface water supply availability has several conservative assumptions built into it, including assuming water right holders attempt to divert their full permitted amounts and full consumptive use (no return flows). In reality, water users typically do not divert 100 percent of their permitted amounts, which leaves more water available for others, and some percentage of water is typically returned to the river in the form of wastewater discharges.

Furthermore, if DWDOR conditions occurred, recommended water management strategies in the 2026 ETRWP could potentially be implemented earlier than what is shown. Alternative strategies currently impractical for Water User Groups (WUGs) or Major Water Providers (MWPs) in Region I, such as brackish groundwater desalination or seawater desalination, may become more feasible in response to DWDOR conditions. Given that the RWP is updated every five years, the ETRWPG will closely monitor and review demand, supply, and future strategy conditions, ensuring ongoing preparedness.

7.2.2 Existing Measures for Preparation of the DWDOR

Section 7.2.2 outlines two existing measures that Region I has implemented to prepare for DWDOR conditions. These measures are described below:

Total Supply Greater Than Water Demand

One approach to mitigate planning uncertainties and DWDOR impacts is to ensure that total water supply exceeds projected water demand, as reflected by a management supply factor[1] greater than one. The majority of Major Water Providers in Region I are projected to maintain available supplies that exceed their current and projected demands, i.e., they have a management supply factor greater than one.

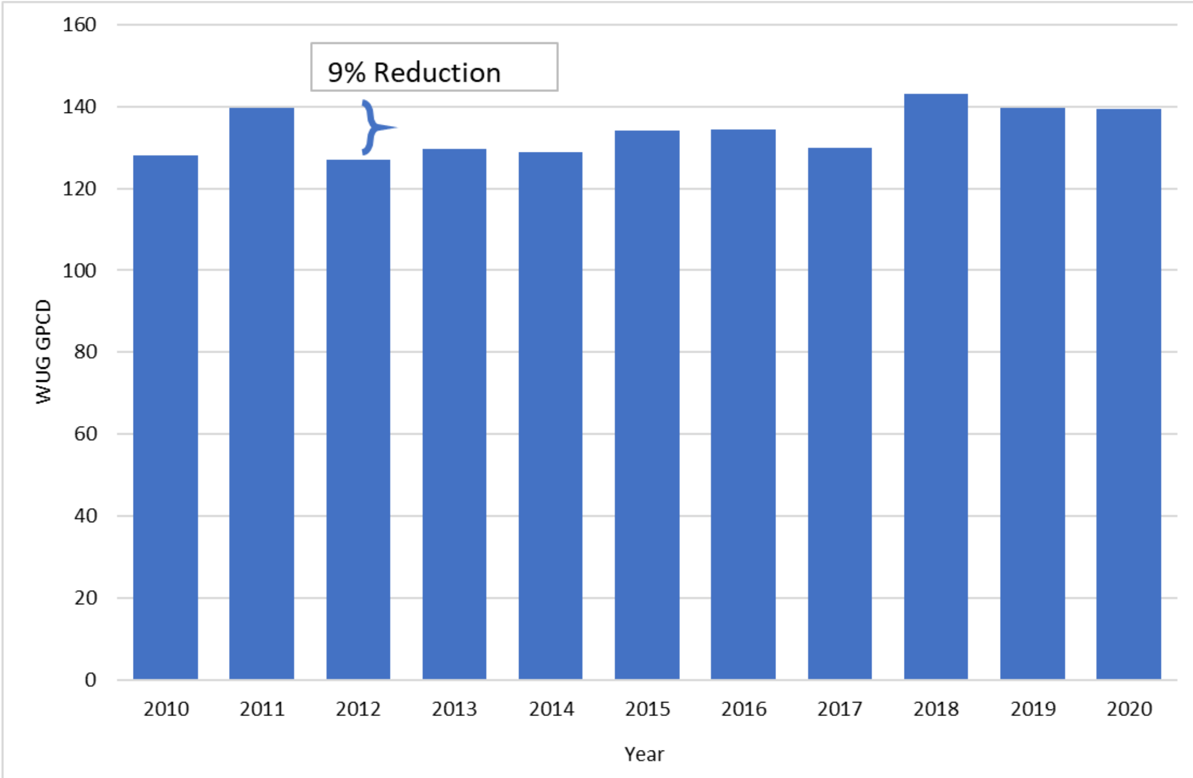
Drought and Emergency Management Measures

The Region I RWPG does not recommend drought management strategies to meet projected long-term water needs. Instead, these strategies are reserved for water providers to address DWDOR conditions or other emergency water supply situations. The DCPs are also updated every five years and have refined evolving triggers and measures based on experiences during drought conditions.

Existing and potential drought and emergency management measures are expected to be available to Region I WUGs during a DWDOR. As shown in Figure 7.4, Region I WUGs achieved an average demand

[1] The management supply factor is the ratio of the projected available supply to the projected demand. A factor greater than one indicates a supply surplus.

reduction of 9% in 2012 compared to 2011 during the drought of the 2010s.



Note: Data sourced from TWDB-provided spreadsheet dated March 2022 (CORRECTED - WUG_HistoricalData_2026RWPs.xlsx)

Figure 7.4 Average Per Capita Water Use of Region I WUGs

7.2.3 Potential Additional Measures for DWDOR Resilience

Water providers in Region I may have other tools to address DWDORs not specifically addressed in this plan. For example, water providers with multiple sources may have the potential to gain extra yield from system operations of their supplies. Emergency interconnects with and/or interim emergency purchases from other providers provide another potential option for obtaining water during a DWDOR. More discussion regarding existing and potential emergency interconnects in Region I can be found in Section 7.5.

7.3 CURRENT DROUGHT PREPARATIONS AND RESPONSES IN REGION I

The TCEQ requires the following types of water providers to submit drought contingency plans to the agency:

- Retail public water suppliers serving 3,300 connections or more
- Wholesale public water suppliers
- Irrigation districts
- Applicants for new or amended water rights
- Investor-owned or privately-owned water utilities

In addition, TCEQ requires retail public water suppliers serving fewer than 3,300 connections to prepare and adopt a drought contingency plan (DCP) and make the plan available upon request. A list of water users, totaling 49 entities, required by Texas Water Code Section 11.1272 to submit a drought contingency plan is included in Table 7.2. For retail public water suppliers, the current number of connections was obtained from the TCEQ Water Utility Database. Drought contingency plans were to be updated and submitted to the TCEQ and East Texas Regional Water Planning Group (ETRWPG) by May 1, 2024. Failure to submit a drought contingency plan is a violation of the Texas Water Code, Section 11.1272 and the Texas Administrative Code, Section 288.30, and is subject to enforcement by the TCEQ.

7.3.1 Summary of Current Drought Triggers, Goals, and Response Measures

The majority of the DCPs in the ETRWPA use trigger conditions based on a combination of water supply and demands placed on the water distribution system.

Utilities use water supply-based triggers to identify the onset of drought and to reduce water usage accordingly. Typical supply-based triggers depend on water levels in wells, water levels in reservoirs, and/or water system storage capacity.

Demand-based triggers are based on limitations in a utility's ability to treat and/or convey water to its customers. Demand-based triggers are typically expressed as a percentage of water production capacity.

Drought contingency plans typically identify different stages of drought and specific triggers and responses for each stage. In addition, the plan must specify quantifiable targets for water use reductions for each stage, and a means and method for enforcement.

Table 7.3 lists the 55 entities who have either submitted their plans to the ETRWPG during these two planning cycles[2] or have plans available online. As shown in Table 7.3, the recent DCPs of the Region I WUGs include 3 to 6 stages, typically with voluntary measures beginning in Stage 1 and mandatory measures beginning in Stage 2. Some DCPs include an emergency stage not directly related to drought but based on system rupture or failure. Other DCPs have a water rationing section, apparently for situations that are more severe than the final drought contingency stage. In these instances, water rationing is listed as the final stage.

[2] The 2019 DCPs are the most recent plans available online for many WUGs, suggesting that the information in the 2019 DCPs might still serve as a good indicator of the drought responses of Region I WUGs. Although some entities are required to update their DCPs in 2024 per the TCEQ requirements, some might elect not to update their DCPs due to other considerations that are not discussed herein.

Table 7.2 East Texas Regional Water Planning Area Water Suppliers Required to Submit Drought Contingency Plans

Angelina & Neches River Authority	City of Silsbee
Athens Municipal Water Authority	City of Tyler
Carolynn Estates [(1)]	Four Pines WSC
City of Athens	G M WSC
City of Beaumont	Houston County WCID 1
City of Bridge City	Hudson WSC
City of Carthage	Lake Livingston WSC
City of Diboll	Leveretts Chapel WSC [(1)]
City of Groves	Lindale Rural WSC
City of Hemphill	Lower Neches Valley Authority
City of Henderson	Lumberton MUD
City of Jacksonville	Mauriceville SUD
City of Jasper	Orange County WCID 1
City of Joaquin	Orangefield WSC
City of Kilgore	Panola County FWSD 1
City of Lufkin	Pennington WSC
City of Nacogdoches	Sabine River Authority
City of Nederland	Slocum WSC
City of Newton	South Sabine WSC[(1)]
City of Orange	Southern Utilities
City of Palestine	The Consolidated WSC
City of Port Arthur	Trinity River Authority
City of Port Neches	Upper Neches River Municipal Water Authority
City of Rusk	West Jefferson County MWD
City of San Augustine	

Note: (1) Entities are too small to be classified as a water user group in the 2026 RWP,
Source: TWDB provided the required DCP submittal list to the RWPG in 2024.

Table 7.3 Drought Trigger Conditions and Strategies Documented in Drought Contingency Plans (Cont.)

Table 7.3 Drought Trigger Conditions and Strategies Documented in Drought Contingency Plans

Entity	Plan Date	Trigger Based On:		No. of Stages	First Stage with Mandatory Measures	Retail Water Sales	Wholesale Water Sales	Water Use Reduction Goals by Stage: (Percent Reduction in Total Use Unless Otherwise Specified) [a]				
		Supply	Demand					1	2	3	4	5
Angelina and Neches River Authority	2019	•	•	5	2	•	•	5%	10%	10%	10%	10%
Angelina Nacogdoches WCID 1	2019	•		4	2		•	0%	10%	25%	50%	n/a
Athens Municipal Water Authority	2019	•	•	6	2		•	10%	4 MGD[b]	4 MGD[b]	4 MGD[b]	4 MGD[b]
B C Y WSC	2024	•	•	4	2	•		n/a	n/a	n/a	n/a	n/a
Bevil Oaks	2022	•		5	2	•		5%	10%	20%	40%	50%
Cherokee Water Company	2024	•		4	2	•		5%	10%	15%	n/a	n/a
City of Beaumont	2019	•	•	5	2	•	•	8%	10%	12.5%	17.5%	30%
City of Bridge City	2015	•	•	6	2	•		5%	10%	15%	25%	40%
City of Carthage	2019	•	•	5	2	•	•	5%	10%	15%	20%	25%
City of Center	2019	•	•	4	2	•	•	5%	10%	15%	n/a	n/a
City of Crockett	2014	•	•	4	2	•	•	10%	20%	30%	n/a	n/a
City of Garrison[C]	2022	•		5	2	•	•	15%	25%	50%	60%	50%[b]
City of Grapeland	2019	•	•	4	2	•	•	10%	20%	30%	n/a	n/a
City of Groves	2019	•	•	6	2	•		5%	10%	12.5%	15%	15%
City of Hemphill	2019	•	•	4	2	•	•	10%	15%	20%	25%	n/a
City of Henderson	2014	•	•	3	2	•		10%	10%	10%[c]	n/a	n/a
City of Huntington	2017	•	•	4	3	•		n/a	n/a	n/a	n/a	n/a
City of Jacksonville	2014	•	•	3	2	•	•	5%	10%	12.5%	12.5%	n/a
City of Jasper	2019	•	•	2	2	•		10%	n/a	n/a	n/a	n/a
City of Kountze	2017	•	•	5	2	•		5%	10%	15%	20%	25%
City of Lufkin	2019	•	•	6	2	•	•	5%	10%	10%	10%	10%

Table 7.3 Drought Trigger Conditions and Strategies Documented in Drought Contingency Plans (Cont.)

Entity	Plan Date	Trigger Based On:		No. of Stages	First Stage with Mandatory Measures	Retail Water Sales	Wholesale Water Sales	Water Use Reduction Goals by Stage: (Percent Reduction in Total Use Unless Otherwise Specified) [a]				
		Supply	Demand					1	2	3	4	5
City of Nacogdoches	2024	•	•	4	2	•		5%	7%	9%	n/a	n/a
City of Orange	2019	•	•	4	2	•		10%	15%	25%	n/a	n/a
City of Palestine	2019	•	•	4	2	•		n/a	n/a	n/a	n/a	n/a
City of Pinehurst[C]	2020	•	•	4	2	•		25%	50%	75%	100%	n/a
City of Pineland	2019	•	•	5	2	•	•	5%	7%	10%	15%	20%
City of Port Arthur	2019	•	•	3	2	•		n/a	n/a	n/a	n/a	n/a
City of Port Neches	2019	•	•	5	2	•		n/a	n/a	n/a	n/a	n/a
City of Rusk	2014	•	•	4	2	•	•	10%	15%	20%	n/a	n/a
City of San Augustine	2021	•		4	2	•	•	5%	15%	25%	n/a	n/a
City of Silsbee	2024	•	•	4	2	•		5%	15%	25%	n/a	n/a
City of Tyler	2024	•	•	4	2	•	•	5%	10%	15%	n/a	n/a
Craft Turney WSC	2019	•	•	5	2	•		5%	10%	15%	20%	75%
DeBerry	2024	•	•	3	1	•		n/a	n/a	n/a	n/a	n/a
Four Pines WSC	2014	•	•	3	2	•	•	20%	30%	40%	n/a	n/a
G M WSC	2024	•		5	2	•		5%	10%	20%	30%	40%
Houston County WCID No. 1	2019	•	•	4	2	•	•	10%	20%	30%	n/a	n/a
Lindale Rural WSC	2019	•	•	4	2	•		10%	15%	20%	25%	n/a
Lower Neches Valley Authority	2022	•		4	n/a		•	10%	20%	30%	n/a	n/a
Lumberton MUD	2019	•	•	6	2	•		25%	30%	50%	60%	70%
Mauriceville MUD	2019	•	•	6	2	•		20%	30%	40%	50%	60%
Meeker MWD	2023	•		6	2	•		10%	15%	20%	25%	30%
New Prospect WSC [C]	2024		•	4	2	•		10%	10%	9%	50%	n/a
North Cherokee WSC	2000	•		6	2	•		n/a	n/a	n/a	n/a	n/a
Orange County WCID 1	2024	•	•	6	2	•		10%	15%	20%	25%	30%

Table 7.3 Drought Trigger Conditions and Strategies Documented in Drought Contingency Plans (Cont.)

Entity	Plan Date	Trigger Based On:		No. of Stages	First Stage with Mandatory Measures	Retail Water Sales	Wholesale Water Sales	Water Use Reduction Goals by Stage: (Percent Reduction in Total Use Unless Otherwise Specified) [a]				
		Supply	Demand					1	2	3	4	5
Redland WSC	2023		•	5	2	•		10%	20%	30%	40%	50%
Sabine River Authority	2024	•		3	2		•	n/a	10%	20%	n/a	n/a
Slocum WSC	2019	•	•	3	1	•	•	n/a	n/a	n/a	n/a	n/a
South Jasper WSC	2023		•	4	2	•	•	10%	25%	50%	n/a	n/a
South Sabine WSC	2023	•	•	4	2	•	•	10%	15%	50%	n/a	n/a
Southern Utilities	2019	•	•	5	2	•		5%	5%[e]	7%	10%	15%
Upper Neches River Municipal Water Authority	2024	•		4	2		•	5%	10%	15%	n/a	n/a
West Jefferson County MUD	2024	•	•	4	2	•		16%	23.3%	28.3%	n/a	n/a

[a] Blank cell indicates entity does not have reduction goal.

[b] Only the first five stages are shown herein, as the sixth stage is typically the emergency stage without quantified savings. As noted by the City of Garrison's DCP, a saving goal of 50% was listed as the goal for stage 5.

[C] These saving goals are not typo.

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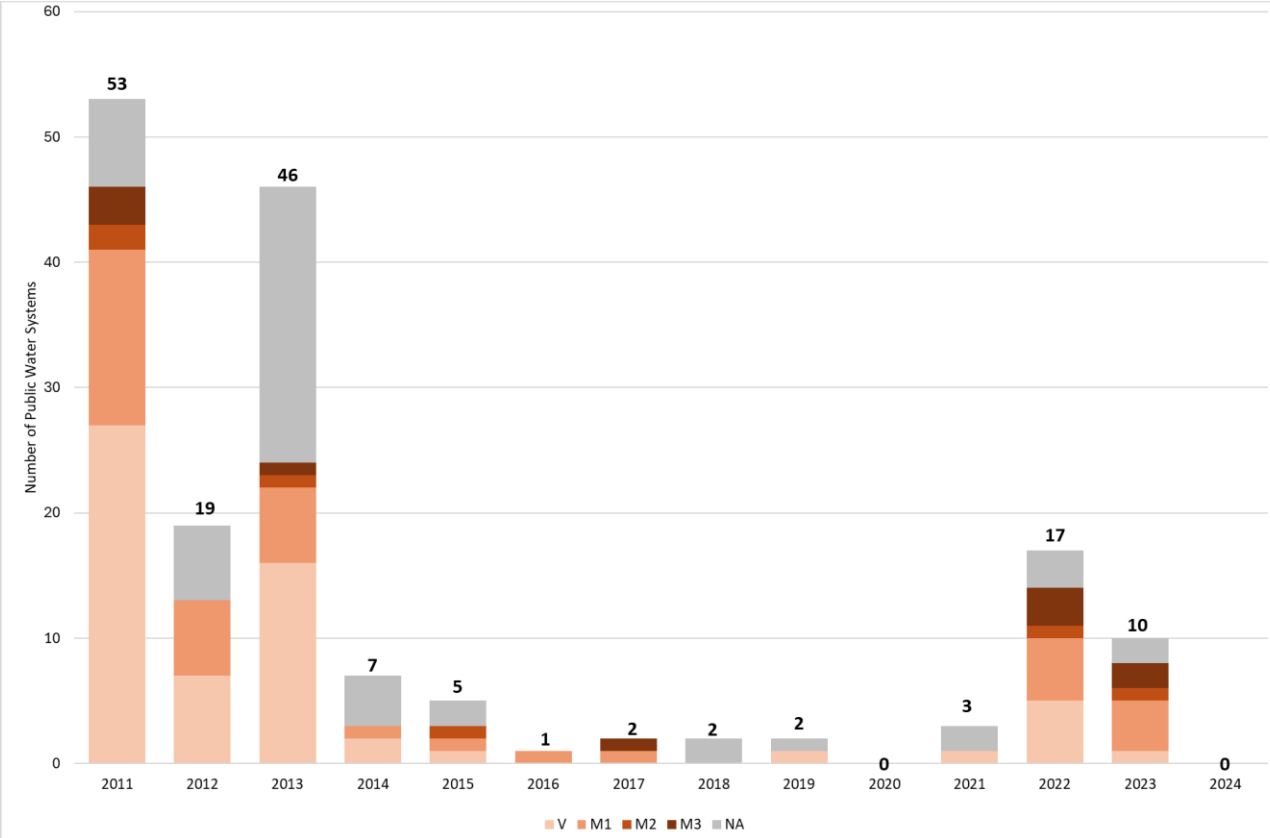
One of the primary drought response measures for retail water suppliers is restricting irrigation. Many plans include the following progression of irrigation limits:

- Stage 1: Voluntary limits on irrigation days (maximum of twice per week, odd/even schedule, etc.) and hours (no irrigation in the middle of the day).
- Stage 2: Mandatory limits on irrigation days and hours.
- Stage 3: No use of hose-end sprinklers.
- Stage 4: No use of automatic irrigation systems.
- Stage 5: No irrigation.

TCEQ collects data on Texas public water systems (PWSs) that have reported water use restrictions and priority levels due to drought or emergency conditions. The most recent list of Texas PWSs limiting water use is found here: https://www.tceq.texas.gov/drinkingwater/trot/droughtw.html.

The Region I RWPG analyzed records available from the TCEQ website to determine which Region I PWSs implemented water restrictions and to what extent the restrictions were implemented (Figure 7.5). The ETRWPG conducted an analysis of TCEQ records between May 2011 and August 2024 to determine which Region I PWSs implemented water restrictions and to what extent the restrictions were implemented.

The results of this analysis are shown in Figure 7.5. The impacts of the 2011 drought and continuing dry conditions through 2013 are apparent, as nearly 118 Region I PWSs reported water use restrictions during that time span. Reports decreased significantly since 2014, with zero reports in 2020, before increasing again in 2022. As of December 2024, no Region I PWS has reported any water use restrictions.



Note:
V: Voluntary watering schedule
M1: Mandatory limited watering schedule
M2: Mandatory limited to hand-held hose only
M3: Mandatory no outside watering
NA: Not applicable; not currently implementing DCP

Figure 7.5 Region I Public Water Systems Restricting Outdoor Water Use

7.3.2 Drought Contingency Plan Recommendations

During the review of submitted DCPs, eight common water sources were identified. In the following sections, DCPs are compared for entities that sell or receive water from these common water sources. The comparison focuses on the number of response stages, the triggers that initiate the stages, the water savings goals, and the response measures.

Lake Athens

The Athens Municipal Water Authority supplies treated water from Lake Athens to the City of Athens. The 2019 DCPs for Athens Municipal Water Authority and Athens are identical. The City of Athens adopted its 2019 DCPs in their 2024 Water Conservation Plan.

Houston County Lake

The Houston County Water Control and Improvement District No. 1 (HCWCID 1) supplies treated water from Houston County Lake to the Cities of Crockett and Grapeland. In the 2019 DCPs for HCWCID 1 and Crockett, the triggers, stages, and goals are aligned, and the response measures are complementary. In the DCPs for HCWCID 1 and Grapeland, the triggers, stages, and goals are aligned, and the response measures are the same. However, response measures for the HCWCID 1 are general in nature and not necessarily appropriate for a retail water provider. Grapeland should consider adding details about the specific response measures that will be used to achieve its goals for each response stage. No updated DCPs were available this cycle.

Lake Jacksonville

The City of Jacksonville[3] supplies treated water from Lake Jacksonville to the North Cherokee water supply corporation (WSC). Jacksonville’s 2019 DCP has three stages (i.e., the current DCP on the City website), while the North Cherokee WSC 2019 DCP has six stages. Neither plan specifies water savings goals for any of the stages. Response measures are not well-aligned, probably due to the different numbers of stages. For example, the third stage in each plan is labeled "Severe Conditions," but Jacksonville's plan bans all outdoor water use, while North Cherokee WSC's plan appears to allow twice-weekly irrigation by hand or drip irrigation system.

Both Jacksonville and North Cherokee WSC should specify water savings goals by response stage. In addition, North Cherokee WSC and Jacksonville should consider revising their plans to have the same number of response stages and commensurate response measures.

Sam Rayburn Reservoir-Steinhagen Lake System

The Lower Neches Valley Authority (LNVA) supplies raw water from the Sam Rayburn Reservoir-Steinhagen Lake System and their Neches Run-of-River supplies to the cities of Beaumont, Groves, Nederland, Nome, Port Arthur, Port Neches, and Woodville, as well as Bolivar Peninsula Special Utility District (SUD), Jefferson County Water Control and Improvement District (WCID) 10, and West Jefferson County MWD. The triggers in the 2022 LNVA and 2019 Groves DCPs are aligned, but the Groves water savings goal for Stages 3 is significantly lower than LNVA's goal (12.5 percent vs. 30 percent for Stage 3). Groves should consider revising response measures for Stages 3 through 5 to achieve water savings goals matching LNVA's goals.

The Port Arthur 2019 DCP has three stages, while the LNVA 2022 DCP has four stages. Some of the Port Arthur triggers depend on LNVA declarations of "mild", "moderate", or "severe" conditions, and LNVA's stages are labeled “mild", "moderate", “severe”, or "emergency". Port Arthur and LNVA should consider revising plans to have the same number of response stages and commensurate response measures, and Port Arthur should specify water savings goals by response stage. There are also other LNVA customers whose DCPs were not readily available and therefore not discussed in the 2026 RWP.

Lake Fork Reservoir

The Sabine River Authority (SRA) Iron Bridge/Lake Fork Division supplies raw water from Lake Fork Reservoir to the Cities of Henderson and Kilgore. The Henderson 2019 DCP has three stages, while the SRA Iron Bridge/Lake Fork DCP has four stages (not counting the emergency stage). Henderson's water savings goals appear to be commensurate with or more stringent than SRA's, so the response measures appear to be complementary. Henderson's triggers are based on its treatment/distribution capacity and not on raw water supply conditions. Henderson and SRA should consider revising the plans to have the

[3] The City of Jacksonville also supplies water to Craft Turney WSC, Afton Grove WSC, and Gum Creek WSC. However, no DCPs were available for those entities.

same number of response stages, and Henderson should consider adding triggers based on raw water supply conditions.

The Kilgore 2019 DCP has six stages, while the 2024 SRA Iron Bridge/Lake Fork DCP has four stages (not counting the emergency stage). Kilgore's triggers consider the SRA response stages. However, there is no mention of SRA Stage 5 or SRA "Emergency Water Shortage Conditions", partly due to different numbers of stages between the plans. Kilgore's water savings goals appear to be commensurate with or more stringent than SRA's, so the response measures appear to be complementary. Kilgore and SRA should consider revising the plans to have the same number of response stages, and Kilgore should consider amending triggers to acknowledge SRA Stage 5 and SRA "Emergency Water Shortage Conditions".

Toledo Bend Reservoir

The Sabine River Authority (SRA) Toledo Bend/Gulf Coast Division supplies raw water from Toledo Bend Reservoir to the City of Hemphill, which in turn provides treated water to the G M WSC. No drought contingency plan was available for the City of Hemphill.

The G M WSC 2019 DCP has five stages, while the SRA Toledo Bend/Gulf Coast 2019 DCP has three stages (not counting the emergency stage). G M WSC's water savings goals are commensurate with or more stringent than SRA's, so the response measures appear to be complementary. For each response stage, the SRA DCP contains triggers based on the water surface elevation in Toledo Bend Reservoir (165.1 feet in Stage 1, 162.2 feet in Stage 2, and 156 feet in Stage 3). The G M WSC DCP only contains trigger based on the Toledo Bend Reservoir elevation in Stage 1 (168 feet). The other stages are triggered based only on demands.

In coordination with the City of Hemphill, G M WSC and SRA should consider revising the plans to have the same number of response stages. In addition, G M WSC should consider adding Stage 2 and Stage 3 triggers based on raw water supply conditions (similar or complementary to SRA's and/or Hemphill's triggers).

Lake Palestine

The Upper Neches River Municipal Water Authority (UNRMWA) supplies raw water from Lake Palestine to the City of Tyler, which in turn provides treated water to the Southern Utilities. Tyler's triggers, presented in its 2024 DCP, are based on its treatment/distribution/storage capacity as well as raw water supply conditions. Tyler's water savings goals align with UNRMWA's goals in its 2024 DCP. The latest Southern Utilities DCP was not available online.

The UNRMWA also supplies raw water from Lake Palestine to the City of Palestine via the Neches River. The UNRMWA and Palestine DCPs have the same number of response stages. Palestine’s triggers are based on demand volume, water levels in storage tanks, and UNRMWA drought stage. Although Palestine has not listed water savings goals for its drought stages, the response measures for each stage appear to be commensurate with UNRMWA's goals. Therefore, the triggers, stages, and goals in the UNRMWA and Palestine DCPs are aligned.

Yegua-Jackson Aquifer

The City of Pineland supplies treated water from the Yegua-Jackson Aquifer to the G M WSC. The G M WSC triggers are based on its Toledo Bend Reservoir and Carrizo-Wilcox Aquifer supplies but not on Pineland water supply conditions. The G M WSC 2019 DCP has five stages, and the Pineland 2019 DCP has four stages. G M WSC's water savings goals in the latter stages (5-15 percent) are also smaller than Pineland's (5-20 percent).

However, the water purchased from Pineland comprises only a small amount of the G M WSC water supply (4.3 percent in 2023 per their Water Use Survey). For this reason, major changes to the GM-WSC plan do not appear to be necessary.

7.3.3 Summary of Unnecessary or Counterproductive Drought Response Efforts

House Bill 807, was passed by the 86th Texas Legislature in 2019, amended Section 16.053 of the Texas Water Code to include the requirement that RWPGs “identify unnecessary or counterproductive variations in specific drought response strategies, including outdoor watering restrictions, among user groups in the regional water planning area that may confuse the public or otherwise impede drought response efforts” (TWC §16.053(e)(3)(E)).

The TWDB provided the following guidance to meet this requirement: “consider drought contingency plans from each WUG, as necessary, to inform WMS evaluations and recommendations and to determine which drought response efforts are unnecessary or counterproductive.” This information has been reviewed, and this chapter has been updated with the following information showing how Region I water providers have made efforts to reduce any confusing or counterproductive variations in drought response strategies, including the DCP recommendations presented in Sections 7.3.1 and 7.2.2.

7.4 REGION-SPECIFIC RECOMMENDATIONS REGARDING TRIGGERS AND ACTIONS TO BE TAKEN IN DROUGHT

Region-specific drought response recommendations regarding the management of existing surface water and groundwater sources are presented in the following sections. These recommendations include:

- Factors specific to each source of water supply to be considered in determining whether to initiate a drought response for each water source, including specific recommended drought response triggers;
- Actions to be taken as part of the drought response by the manager of each water source and the entities relying on each source, including the number of drought stages;
- Triggers and actions consider existing triggers and actions associated with existing drought contingency plans.

7.4.1 Drought Trigger Conditions for Reservoirs

The major recommended triggers and potential actions for reservoirs in the ETRWPA are presented in this section. Where possible, the ETRWPG has incorporated triggers and major actions from drought contingency plans that have been developed for these water sources. A summary of triggers and actions for 12 reservoir systems in the ETRWPA is provided in Tables 7.4 through 7.16. An additional five reservoirs in the region have not submitted drought contingency plans. Therefore, generic drought triggers and actions have been developed by the consulting team for the reservoirs in the region that have not submitted drought contingency plans in Table 7.16. These drought contingency plans may require more actions than shown in this section and may contain exceptions to these potential actions. These additional potential actions and exceptions are also endorsed by the ETRWPA.

The potential actions are generally cumulative between stages: actions implemented in Stage 1 remain in effect in Stage 2 and so on.

Lake Athens (Athens Municipal Water Authority)

The Athens Municipal Water Authority adopted its drought contingency plan in May 2019. The triggers and actions are related to water demand and the elevation of Lake Athens and are summarized below in Table 7.4.

Table 7.4 Lake Athens Triggers and Potential Actions

Drought Stage	Trigger	Potential Action
Mild	Total daily usage of potable water exceeds 4.5 million gallons per day (MGD).	Request voluntary conservation measures, including odd/even watering schedule and limited irrigation hours. Request customers to practice water conservation and to minimize or discontinue water use for nonessential purposes.
Moderate	Total daily usage of potable water exceeds 4.5 MGD and the storage facilities do not refill to a level above 80% capacity overnight.	Implement mandatory conservation measures, including odd/even watering schedule and limited irrigation hours. Limit water use for vehicle washing and filling pools. Prohibit operation of ornamental fountains or ponds except where necessary to support aquatic life or those equipped with a recirculation system. Limit water use from fire hydrants. Prohibit non-essential water use.
Severe	Total daily usage of potable water exceeds 4.5 MGD and the storage facilities do not refill to a level above 65% capacity overnight.	Implement mandatory conservation measures, including continued odd/even watering schedule and limited irrigation hours. Prohibit oil/gas/construction water use from fire hydrants. Prohibit irrigation of golf course tees and greens. Restaurants serve water only on request.
Critical	Total daily usage of potable water exceeds 4.5 MGD and the storage facilities do not refill to a level above 50% capacity overnight.	Implement mandatory conservation measures, including continued odd/even watering schedule and curtailed irrigation hours. Prohibit use of hose end sprinklers and permanently installed automatic sprinkler systems. Prohibit adding water to pools and spas. Prohibit vehicle washing not occurring at commercial facilities. Prohibit operation of ornamental fountains or ponds except where necessary to support aquatic life or those equipped with a recirculation system. No new, additional, expanded, or increased-in size connections, meters, service lines, pipeline extensions, mains, or water service facilities.
Emergency	• Major water line breaks or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or • Natural or man-made contamination of the water supply source(s) occurs	Prohibit irrigation of landscaped areas. Prohibit vehicle washing.

Note: To be confirmed upon receipt of the most recent DCP. The information above reflects the 2019 DCP.

Lake Center and Lake Pinkston (Center)

Center adopted its latest Drought Contingency Plan in 2019 per the available information. The triggers are associated with water demands and total storage in the reservoirs. The triggers and actions related to Lake Center and Lake Pinkston are outlined below in Table 7.5.

Table 7.5 Lake Center and Lake Pinkston Triggers and Potential Actions

Drought Stage	Trigger	Potential Action
Mild	Water demand reaches 90% of production capacity; or Distribution limitations	Implement mandatory maximum twice-weekly watering schedule. Request that customers discontinue non-essential water uses.
Moderate	Water demand reaches 95% of production capacity; Water storage falls to 50% of storage capacity; or Distribution limitations	Implement mandatory maximum once-weekly watering schedule. Require that customers discontinue non-essential water uses. Expand enforcement.
Severe	Water demand reaches 100% of production capacity; Water storage falls to 25% of storage capacity; or Major distribution limitations	Prohibit all landscape, non-essential, and discretionary water uses. Continued enforcement. Examine alternative sources.

Houston County Lake (Houston County WCID No. 1)

The Houston County WCID No. 1 adopted its latest Drought Contingency Plan in January 2019 per the available information. The triggers are associated with water demands, weather conditions, and the reservoir's elevation. The triggers and actions related to Houston County Lake are outlined below in

Table 7.6.

The Consolidated WSC and the Cities of Crockett, Lovelady and Grapeland purchase water from the Houston County WCID No. 1. Recommendations for aligning their DCPs with the Houston County WCID No. 1 DCP are presented in Section 7.3.3.

Table 7.6 Houston County Lake Triggers and Potential Actions

Drought Stage	Trigger	Potential Action
Mild	a) Water demand has reached 90% of the capacity of the system for three consecutive days with the plant operating at 100% of the rated production; or b) Weather conditions that will result in reduced water supply available from the Houston County Lake for an extended period of time; or c) Water level at the Lake drops below 258 feet above mean sea level, which is 2 feet below pool (260 feet mean sea level).	Request voluntary conservation measures.
Moderate	a) Water demand has reached 100% of the capacity of the system for three consecutive days with the plant operating at 100% of the rated production; or b) Weather conditions that result in Lake levels falling to 256 mean sea level, which is 3 feet below pool; or c) Water supply storage facilities are not maintaining a	Implement mandatory conservation measures, limiting outdoor watering to hand-held hose use only. Require wholesale customers to initiate Stage 2 of their DCPs. Prepare for curtailment by preparing a

Drought Stage	Trigger	Potential Action
	constant level with the plant operating at 100% of the rated production.	monthly usage allocation for each wholesale customer.
Severe	a) The treatment plant is non-operational due to a malfunction at the site; or b) Water levels drop at the reservoir to a point where pumping equipment will not function properly.	Implement additional mandatory conservation measures, including prohibition of outdoor watering except for livestock. Initiate pro-rata curtailment of water sales to each wholesale customer.
Emergency	a) A major water line breaks which causes considerable water loss; or b) Pumps or system failures occur which causes the inability to obtain the water from the Lake, treat the water adequately, or supply the water to our customers; or c) Natural or man-made contamination of the water supply source.	Assess the severity of the problem, and identify actions needed and time required to solve the problem. If necessary, notify city, county, and/or state emergency response officials for assistance. Undertake necessary actions as needed.

Lake Jacksonville (Jacksonville)

The City of Jacksonville adopted its current Drought Contingency Plan on September 10, 2019 per the City website. The triggers are associated with water demands and the status of water supply facilities such as storage tanks and pumps. The triggers and actions related to Lake Jacksonville are outlined below in Table 7.7.

The North Cherokee, Afton Grove, Gum Creek, and Craft Turney WCSs purchase water from the City of Jacksonville. Recommendations for aligning the DCPs for these entities are presented in Section 7.3.3.

Table 7.7 Lake Jacksonville Triggers and Potential Actions

Drought Stage	Trigger	Potential Action
Mild	a) Water demand is approaching the safe capacity of the system on a sustained basis. Sustained water usage over 85% of safe capacity, or 7.04 million gallons per day (MGD) (five consecutive days) should be taken as a trigger condition for mild conditions. b) Mild contamination is noted in the water supply, but water can still be treated by existing facilities by means such as increasing chlorine dosage; or contamination is reported in updip portions of aquifer. c) Additional well drilling in the vicinity threatens interference with water wells. d) Water levels in tanks are consistently below 75% full (five days uninterrupted). e) Local power failures are imminent as a result of power station failures, storms, transmission problems, or excessive power demand in the area. f) Performance of well water pumps, high service pumps, or other equipment indicates imminent failure. g) Transmission line from surface water plant to Dorothy St. tank is in danger of failure.	Warn customers to reduce water use. Recommend a voluntary lawn watering schedule. Explore the possibility of interconnection with other systems. Take steps toward increasing system capacity, including repair of wells not currently in use.
Moderate	a) Water demand occasionally reaches the safe limit of system (two days within a 30-day period), and failure of any pump or chlorine feeder could reduce the level of service to the system. Safe limit is 8.38 MGD as discussed above. b) Contamination of supply water is approaching limit of treatability with existing facilities; or brackish water is very near the well. c) Additional wells in vicinity are drawing water at a rate which interferes with production rate of City's wells. d) Over 20% of storage tank capacity is out of service due to structural failure, leakage, maintenance, or contamination. e) Water level in tanks is consistently below half full (three days uninterrupted). f) Water emergencies in adjacent communities require diversion of so much water that the level of service to any part of the Jacksonville system is threatened. g) Severe freezing conditions have resulted in widespread damage to home plumbing or distribution lines.	Implement mandatory lawn watering schedule. Prohibit wasteful water uses. Seek reduced usage from commercial users and industries. Take steps toward interconnection with other systems. Impose system surcharge. Take steps toward increasing system capacity, including repair of wells not currently in use.
Severe	a) Water demand is exceeding safe capacity (8.38 MGD) on a regular basis (more than five consecutive days). b) Supply water is so contaminated that it cannot be treated with existing facilities or such contamination is imminent because of nearby aquifer pollution. c) Rupture of transmission lines from the raw water pumps or from the water treatment plant. d) An immediate health or safety hazard could result from actual or imminent failure of system components. e) Water levels in elevated tanks are too low to provide adequate fire protection (generally less than 1/4 full). f) Over half of storage tank capacity is out of service. g) All service pumps are out of service. h) Water emergencies in adjacent communities require so much water diversion that service to portions of the Jacksonville system is severely disrupted.	Prohibit all outdoor use and all wasteful use. Impose system surcharge. Impose rationing. Require commercial users and industries to stop using City water for processes, cooling, or recreation. Implement interconnection with other systems. Implement increased system capacity.

Lake Murvaul (Panola County Fresh Water Supply District No. 1

The Panola County Fresh Water Supply District No. 1 did not submit a drought contingency plan. Therefore, recommendations are based on the drought contingency plan for the City of Carthage, which purchases water from the Panola County Fresh Water Supply District No. 1. Carthage adopted its most recent drought contingency plan in 2019. The triggers and actions are based on water demands, weather conditions, and reservoir storage. These are outlined in

Table 7.8 below

Table 7.8 Lake Murvaul Triggers and Potential Actions

Drought Stage	Trigger	Potential Action
Mild	a) Average daily water consumption reaches 90% of the water treatment plant's production capacity for three consecutive days. b) Water level in Lake Murvaul is declining at a rate that could disrupt water supply in the future. c) Weather conditions are considered in drought classification determination. Predicted long, cold, or dry periods are to be considered in impact analysis.	Encourage voluntary reduction of water use. Discuss conservation with industrial and commercial customers. Implement system oversight. Discuss conservation/ rationing with wholesale customers and request voluntary measures.
Moderate	a) Average daily water consumption reaches 100% of the water treatment plant's production capacity for three consecutive days. b) Water levels in Lake Murvaul continue to decline or are declining at a rate that makes supply problems imminent. c) Weather conditions indicate mild drought will exist for five or more consecutive days.	Implement mandatory conservation measures, including odd/even watering schedule and limited watering hours. Discontinue irrigation of parks and public areas. Limit water use for vehicle washing. Prohibit water use from fire hydrants except for firefighting. Request wholesale customers implement mandatory conservation/ rationing measures. Prepare monthly water usage allocations for wholesale customers in advance of pro rata curtailment.
Severe	a) Average daily water consumption reaches 110% of the water treatment plant's production capacity for three consecutive days. b) Water storage levels are drained daily and recover only during overnight periods of low demand. c) Lake Murvaul water levels have declined to the point where any additional loss of water will expose an intake point to the atmosphere. d) Lake Murvaul water levels have declined to the point where water withdrawal is impeded. e) e. A clear well at the water treatment plant is taken out of service during a mild or moderate water shortage period.	Prohibit use of hose-end sprinklers. Prohibit use of water for street washing, filling pools, water athletic fields and courses, and dust control. Initiate development of alternative supply sources. Initiate pro rata curtailment for wholesale customers.
Critical	a) Average daily water consumption reaches 115%	Prohibit vehicle washing.

Table 7.8 Lake Murvaul Triggers and Potential Actions (Cont.)

Drought Stage	Trigger	Potential Action
	of the water treatment plant's production capacity for any one day. b) Water storage levels do not fully recover even during overnight periods of low demand. c) Lake Murvaul water levels have declined to the point where water withdrawal is impeded due to exposed water inlets on the intake structure. d) System demand exceeds available high service pump capacity.	
Emergency	a) Average daily water consumption reaches 120% of the water treatment plant's production capacity for any one day. b) Lake Murvaul water levels have declined to the point where water withdrawal is impeded or equipment could be damaged by normal operation of water supply system facilities and equipment due to water supply deficiency. c) Water system is contaminated, either accidentally or intentionally. Severe condition is reached immediately upon detection. d) Water system fails-- from acts of God (tornados, hurricanes) or man. Severe condition is reached immediately upon detection.	Prohibit all non-essential water uses, including landscape watering and vehicle washing. Implement alternative supply sources. Implement pro-rata water allocation.

Lake Nacogdoches (Nacogdoches)

Nacogdoches adopted its latest drought contingency plan in 2019 per available information. The triggers and actions are based on water demands and production capacity. These are outlined in Table 7.9 below.

Table 7.9 Lake Nacogdoches Triggers and Potential Actions

Drought Stage	Trigger	Potential Action
Mild	When total daily water demand equals or exceeds 90% of the daily water production capacity for 4 consecutive days or 92% of water capacity production on a single day.	Reduce flushing of water mains. Discontinue water hydrant testing. Repair major water main leaks and breaks. Discuss conservation/ rationing with wholesale customers; request voluntary measures.
Moderate	When total daily water demand equals or exceeds 92% of the daily water production capacity for 4 consecutive days or 94% of the daily production capacity on a single day.	Implement mandatory conservation measures, including maximum twice-weekly watering schedule and limited watering hours. Prohibit non-essential water use. Limit water use for vehicle washing and filling of pools. Limit water use from fire hydrants. Limit irrigation of golf course greens, tees and fairways. Discontinue irrigation of public areas. Prepare monthly water usage allocations for wholesale customers in advance of pro rata curtailment. Prohibit non-essential water uses. Restaurants serve water only on request.
Severe	When total daily water production capacity equals or exceeds 94% of the daily production capacity for 4 consecutive days or 96% of the daily water production capacity on a single day.	Initiate pro rata curtailment for wholesale customers.
Emergency	When the City Manager, or designee, determines a water supply emergency exists based on: Major water line breaks, or pump or system failures occur which cause unprecedented loss of capability to provide water service; or b. Natural or man-made contamination of water supply source(s).	Assess the severity of the problem and identify the actions needed and time required to solve the problem. Prepare a post-event assessment report on the incident and critique of emergency response procedures and actions. If appropriate, notify city, county, and/or state emergency response officials for assistance. Undertake necessary actions, including repairs and/or clean-up as needed. Inform the utility director or other responsible official of each wholesale water customer by telephone or in person and suggest actions, as appropriate, to alleviate problems

Lake Palestine (Upper Neches River Municipal Water Authority)

The UNRMWA adopted its most recent drought contingency plan in 2024. The triggers and actions are based on water elevations in the reservoir. These are outlined in Table 7.10 below.

In the ETRWPA, the Cities of Tyler and Palestine purchase water from the UNRMWA. In addition, Southern Utilities purchases water from Tyler. Recommendations for aligning these DCPs are presented in Section 7.3.3.

Table 7.10 Lake Palestine Triggers and Potential Actions

Drought Stage	Trigger	Potential Action
Mild	When the stage elevation of Lake Palestine reaches or drops below 339.5 feet for three consecutive days.	Minimize unnecessary releases from Lake Palestine. Encourage wholesale customers to use alternative water sources. Request that wholesale customers implement voluntary conservation measures and Stage 1 of drought contingency plan (DCP).
Moderate	When the stage elevation of Lake Palestine reaches or drops below 336 feet for three consecutive days.	Request that wholesale customers implement mandatory conservation measures and Stage 2 of DCP. Prepare monthly water usage allocation in preparation for pro-rata curtailment. Provide a weekly report to news media regarding the drought stage information.
Severe	When the stage elevation of Lake Palestine reaches or drops below 333 feet for three consecutive days.	Coordinate with authorities to reduce or eliminate releases downstream. Request that wholesale customers implement additional mandatory conservation measures and Stage 3 of DCP. Initiate pro-rata curtailment of water diversions/deliveries. Provide a weekly report to news media regarding the drought stage information.
Emergency	When any of the following occur: a) A dam, spillway, or outlet works and associated appurtenances failure occurs, which cause unprecedented loss of capability to provide water service; or b) Natural or man-made contamination of the water supply source occurs.	Assess the severity of the problem, and identify actions needed and time required to solve the problem. If necessary, notify city, county, and/or state emergency response officials for assistance. Undertake necessary actions as needed. Prepare a post-event assessment report on the incident and critique of emergency response procedures and actions. Inform the utility director or other responsible official of each wholesale water customer by telephone or in person and suggest actions, as appropriate, to alleviate problems.

Rusk City Lake (Rusk)

Rusk adopted its most recent drought contingency plan in 2014 per the latest information. The triggers and actions are based on water demands. These are outlined in Table 7.11 below.

Table 7.11 Rusk City Lake Triggers and Potential Actions

Drought Stage	Trigger	Potential Action
Mild	When total daily water demand equals or exceeds 800,000 gallons for five consecutive days or 1,600,000 gallons on a single day.	Request that wholesale customers implement voluntary conservation measures and Stage 1 of drought contingency plan (DCP).
Moderate	When total daily water demand equals or exceeds 1,600,000 gallons for five consecutive days or 1,900,000 gallons on a single day.	Request that wholesale customers implement mandatory conservation measures and Stage 2 of DCP. Prepare monthly water usage allocation in preparation for pro-rata curtailment.
Severe	When total daily water demand equals or exceeds 1,900,000 gallons for five consecutive days or 2,200,000 gallons on a single day.	Request that wholesale customers implement additional mandatory conservation measures and Stage 3 of DCP. Initiate pro-rata curtailment of water diversions/deliveries.
Emergency	When there exist major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or natural or man-made contamination of the water supply source(s).	Assess the severity of the problem, and identify actions needed and time required to solve the problem. If necessary, notify city, county, and/or state emergency response officials for assistance. Undertake necessary actions as needed.

Sam Rayburn/B.A. Steinhagen System (Lower Neches Valley Authority)

The LNVA adopted its most recent drought contingency plan in 2022. The triggers and actions are based on water elevations in the Sam Rayburn Reservoir. These are outlined in Table 7.12 below.

The cities of Beaumont, Groves, Nederland, Nome, Port Athur, Port Neches, and Woodville, as well as Boliver Peninsula SUD, Jefferson County WCID 10, and West Jefferson County MWD purchase water from the LNVA. In addition, LNVA supplies water from their Sam Rayburn/Steinhagen system to several public water systems and industrial and irrigation users. Recommendations for aligning these DCPs are presented in Section 7.3.3.

Table 7.12 Sam Rayburn/B. A. Steinhagen System Triggers and Potential Actions

Drought Stage	Trigger	Potential Action
Mild	When the water surface elevation in Sam Rayburn Reservoir falls below 153.0 MSL for a continuous period of five (5) days.	Inform customers and news media. Request municipal customers evaluate the need for mandatory water use restrictions. Request industrial customers minimize process water use to the extent feasible and encourage basic water conservation practices among employees. Monitor irrigation field levees, laterals, drains and other water delivery facilities to prevent wasting of water.
Moderate	When the water surface elevation in Sam Rayburn Reservoir falls below 151.5 MSL for a continuous period of five (5) days.	Inform customers and news media. Request its municipal customers initiate mandatory water use restrictions. These restrictions may include prohibited outdoor water use and implementation of applicable conservation measures to minimize indoor uses. Request industrial customers minimize process water use to the extent feasible and encourage basic water conservation practices among employees. Monitor irrigation field levees, laterals, drains and other water delivery facilities to prevent wasting of water. No longer allow keep up streams to be supplied for irrigation customers, and field top-offs will be utilized. No new water sales contracts for low priority customers, such as small water sales, or issue and permits for irrigation and temporary construction.
Severe	When the water surface elevation in Sam Rayburn Reservoir falls below 149.00 MSL for a continuous period of five (5) days.	Inform customers and news media. Direct its municipal customers initiate mandatory water use restrictions. These restrictions may include prohibited outdoor water use and implementation of applicable conservation measures to minimize indoor uses. Direct industrial customers minimize process water use to the extent feasible and encourage basic water conservation practices among employees. All interconnects delivering water from the Neches basin to the Devers South will be closed. All interruptible water supplies will

Table 7.12 Sam Rayburn/B. A. Steinhagen System Triggers and Potential Actions (Cont.)

Drought Stage	Trigger	Potential Action
		be evaluated to determine availability on March 1st of every year. No stored water will be released from the Sam Rayburn Reservoir to provide water for interruptible uses.
Emergency	The LNVA will recognize that an Emergency Water Shortage Condition is in progress upon the failure of a major component of the water supply including the pumps or canals in the LNVA's distribution system, or the contamination of the canals or source water supply which substantially curtails LNVA's ability to supply water to its customers.	Inform customers and depending on extent of area affected, the news media. Notify affected customers and make operational changes as needed until the situation is resolved. Assess the severity of the problem, and identify actions needed and time required to solve the problem. Inform the utility director or other responsible official of each wholesale water customer by telephone or in person and suggest actions, as appropriate, to alleviate problems. If necessary, notify city, county, and/or state emergency response officials for assistance. Undertake necessary actions as needed.

Lake Striker (Angelina Nacogdoches WCID)

The Angelina Nacogdoches WCID adopted its most recent drought contingency plan in 2019 per their website. The triggers and actions are based on water elevations in the lake. These are outlined in Table 7.13 below.

Table 7.13 Lake Striker Triggers and Potential Actions

Drought Stage	Trigger	Potential Action
Mild	When the water level in Lake Striker Reservoir drops to 290.00 annual mean sea level (amsl).	Request that customers implement voluntary conservation measures and Stage 1 of their drought contingency plans (DCP)
Moderate	When the water level in Lake Striker Reservoir drops to 288.00 amsl.	Initiate contact with water customers to discuss water supply and pro rata allocation of water diversion. Request that customers initiate mandatory conservation measures and Stage 2 of their DCPs. May initiate pro rata allocations of water diversions for each customer.
Severe	When the water level in Lake Striker Reservoir drops to 286.00 amsl.	Initiate additional pro-rata curtailment of diversions/deliveries. Request that customers initiate additional mandatory conservation measures and Stage 3 of their DCPs.
Emergency	When the water level in Lake Striker Reservoir is at 284.00 amsl.	Initiate additional pro-rata curtailment of diversions/deliveries. Request that customers initiate additional mandatory conservation measures and additional stages of their DCPs.

Toledo Bend Reservoir (Sabine River Authority)

The SRA adopted its most recent drought contingency plan in 2024. The triggers and actions are based on water elevations in the reservoir and downstream flows in the Sabine River. These are outlined in Table 7.14 below.

The cities of Hemphill and Huxley, as well as G M WSC and El Camino WSC purchase water from Toledo Bend through the Sabine River Authority. In addition, SRA currently has contracts to supply water from the Toledo Bend Reservoir to a steam electric power facility in Rusk County, an industrial facility in Orange County, and mining in Panola, Shelby, and Sabine counties. Recommendations for aligning these DCPs are presented in 7.3.3

Table 7.14 Toledo Bend Reservoir Triggers and Potential Actions

Drought Stage	Trigger	Potential Action
Mild	a) The water surface elevation in Toledo Bend falls to and remains at or below 165.1 feet for fourteen consecutive days, or b) The flow measured by the U.S. Geological Survey (USGS) gage on the Sabine River near Ruliff, Texas falls to and remains at or below the mild conditions flow in Table 10 of the Sabine River Authority of Texas' (SRA) drought contingency plan (DCP) for fourteen consecutive days. The trigger flow at the Ruliff gage depends on the amount of water SRA is contracted to deliver.	Inform customers of drought conditions and advise customers of Toledo Bend Reservoir elevation and river level at USGS gage near Ruliff every business day on SRA website. Request each customer entity to follow its individual measures for mild water shortage conditions. Representatives of SRA and its customers will initiate discussion of the drought condition and its impact on the water supply situation with the news media.
Moderate	a) The water surface elevation in Toledo Bend falls to and remains at or below 162.2 feet for fourteen consecutive days, or b) The flow measured by the USGS gage on the Sabine River near Ruliff, Texas, falls to and remains at or below the moderate conditions flow in Table 10 of the SRA DCP for fourteen consecutive days. The trigger flow at the Ruliff gage depends on the amount of water SRA is contracted to deliver.	Inform customers of drought conditions and advise customers of Toledo Bend Reservoir elevation and river level at USGS gage near Ruliff every business day on SRA website. SRA may curtail water delivered to its customers, if necessary. May request that customers prohibit non-essential outdoor uses, such as lawn irrigation, vehicle washing, filling of swimming pools, or routine maintenance of facilities. Notify TCEQ Executive Director within five business days of implementing any mandatory provisions of DCP.
Severe	a) The water surface elevation in Toledo Bend falls to and remains at or below 156 feet for fourteen consecutive days, or b) The flow measured by the USGS gage on the Sabine River near Ruliff, Texas, falls to the severe conditions flow in Table 10 of the SRA DCP for fourteen consecutive days. The trigger flow at the Ruliff gage depends on the amount of water SRA is contracted to deliver.	Inform customers and news media of drought conditions. Issue situation reports weekly to customers and news media. May call emergency meetings with customers, if necessary. Advise customers of Toledo Bend Reservoir elevation and river level at USGS gage near Ruliff every business day on SRA website. SRA may request that customers prohibit all outdoor water use (except for livestock watering) and initiate measures to reduce indoor water use. SRA may reduce water delivered to its customers, as the situation dictates. Notify TCEQ Executive Director within five business days of implementing any mandatory provisions of DCP.
Emergency	a) There is a major contamination or a major required drawdown of Toledo Bend for emergency repairs of major infrastructure, or b) The failure of a major component of the pumps or canals in the John W. Simmons Gulf Coast Canal System significantly impacts the supply of water to its customers.	Inform customers and news media of conditions. Issue situation reports weekly to customers and news media. May call emergency meetings with customers, if necessary. Advise customers of Toledo Bend Reservoir elevation and river level at USGS gage near Ruliff every business day on SRA website. SRA may reduce water delivery to its customers as the situation dictates. Request that customers prohibit all outdoor water use (except for livestock watering) and initiate measures to reduce indoor water use. Specific to John W. Simmons Gulf Coast Canal System and Early Williams Pump Station, SRA will notify customers and make such operational changes it finds necessary while emergency condition exists.

Lake Tyler/Lake Tyler East/Lake Bellwood (Tyler)

Tyler adopted its most recent drought contingency plan in 2024. The triggers and actions are based on water demands, production and storage capacity, and weather conditions. These are outlined in Table 7.15 below.

The Southern Utilities, Walnut Grove WSC, City of Whitehouse, , and Community Water Co. Montgomery Garden purchase water from Tyler. Recommendations for aligning these DCPs are presented in Section 7.3.3.

Table 7.15 Lake Tyler/Lake Tyler East/Lake Bellwood Triggers

Drought Stage	Trigger	Potential Action
Mild	a) Average daily water consumption reaches 85% of production capacity. Production capacity is defined as online capacity in case of failure of a water source. b) Consumption (85%) has existed for a period of three days. c) Weather conditions are considered in drought classification determination. Predicted long, hot or dry periods are to be considered in the impact analysis.	Encourage voluntary reduction of water use of 5%. Contact commercial and industrial users and explain necessity for implementation of the Drought Contingency Plan and initiation of strict conservation methods. Implement corrections to system oversights and make adjustments required to meet changing conditions.
Moderate	a) Lake Tyler storage is less than 60% of conservation storage. b) Average daily water consumption reaches 90% of rated production capacity for a three-day period. Production capacity is defined as online capacity in case of failure or shut down of one or both water treatment plants. c) Weather conditions indicate drought conditions will persist. d) One or more ground storage tanks are taken out of service during mild drought period. e) Storage capacity (water level) is not being maintained during period of 100% rated production period. f) Existence of any one listed condition for a duration of 36 hours.	Implement mandatory water conservation measures, including twice-a-week outdoor water use schedule and limited outdoor water use hours. Wholesale water customers during this stage will be required to reduce their average daily demand. The following uses of water are defined as non-essential and are prohibited: wash down of any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas; use of water to wash down buildings or structures for purposes other than immediate fire protection; use of water for dust control; flushing gutters or permitting water to run or accumulate in any gutter or street; and failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).
Severe	a) Water demand exceeds 98% of production capacity for one (1) day. b) Water demand exceeds the storage tank capacity. c) System demand exceeds available high service pump capacity. d) Any two (2) conditions listed in moderate drought classification occur at the same time for a 24-hour period. e) Water system is contaminated either accidentally or intentionally. Severe condition is reached immediately upon detection. f) Water supply system is unable to deliver water due to failure or damage to major water system components. g) A portion of the water distribution system has a shortage in supply or experiences equipment damage. Measures may be implemented for the portion of the system impacted.	The City Manager will ban the use of water for: Vehicle washing, window washing, and outside watering (lawn, shrub, faucet dripping, garden, etc.). Public water uses which are not essential for health, safety and sanitary purposes. Street washing, fire hydrant flushing, filling of pools, watering of athletic fields and golf courses, and dust control sprinkling. The average daily water consumption will be reduced by 25% or 6.25 MGD. Irrigation of landscaped areas shall be limited to designated watering days between the before 10:00 a.m. and after 6:00 p.m. and shall be by means of hand-held hoses, hand-held buckets, or drip irrigation only. The use of hose end sprinklers or permanently installed automatic sprinkler systems are prohibited at all times.

Surface Water Supplies without Site-Specific Drought Contingency Plans

The ETRWPG did not receive drought contingency plans from suppliers that use water from other lakes that are not discussed in Tables 7.4 through 7.15. Therefore, the ETRWPG recommends drought triggers and response actions based primarily on the water volume stored in the reservoir (Table 7.16). These recommendations are generic in nature, and no site-specific studies have been performed to develop them. They are meant to provide guidance until site-specific drought contingency plans are developed and submitted. Drought response actions in addition to those recommended in Table 7.16 may also be appropriate. Site-specific plans may include other types of triggers, including those related to local water demands and the operation of water supply systems.

Table 7.16 Recommended Triggers and Potential Actions for Lakes Without Site-Specific Drought Contingency Plans

Drought Stage	Trigger	Potential Action
Mild	Water volume stored in the lake drops to 80% of the conservation storage capacity	Increase public education efforts on ways to reduce water use. Encourage reduction of non-essential water use and auditing of irrigation systems. Implement maximum twice per week watering for hose-end sprinklers and automatic irrigation systems. Limit hours of irrigation to reduce evaporative losses. Prohibit water waste, such as operating an irrigation system with broken spray heads or excessive runoff.
Moderate	Water volume stored in the lake drops to 60% of the conservation storage capacity	Continue actions implemented in the previous stage. Initiate engineering studies to evaluate water supply alternatives. Accelerate public education efforts on ways to reduce water use. Eliminate non-essential water use. Implement maximum once per week watering for hose-end sprinklers and automatic irrigation systems.

Table 7.16 Recommended Triggers and Potential Actions for Lakes Without Site-Specific Drought Contingency Plans (Cont.)

Drought Stage	Trigger	Potential Action
Severe	Water volume stored in the lake drops to 40% of the conservation storage capacity	Continue actions implemented in the previous stage. Implement water supply alternatives. Increase frequency of media releases explaining water supply conditions. Prohibit outdoor watering with hose-end sprinklers and automatic irrigation systems. Prohibit washing of paved areas or hosing of buildings (exceptions for public health and safety). Limit vehicle washing to commercial car washes. Prohibit permitting of new swimming pools. Prohibit operation of ornamental fountains or ponds that use potable water except where necessary to support aquatic life. Initiate measures to reduce indoor water use. Initiate surcharge on excessive water use Establish water allocations for each customer to be used if conditions worsen.
Emergency	a) Water volume stored in the lake drops to 30% of the conservation storage capacity; or b) Major water line breaks or pump or system failures occur; or c) Natural or man-made contamination of the water supply source(s) occurs; d) Water levels have declined to the point where water withdrawal is impeded or equipment could be damaged by normal operation; or e) Other emergency conditions exist	Implement water supply alternatives. Increase frequency of media releases explaining water supply conditions. Increase surcharge on excessive water use. Initiate water allocation by customer.

7.4.2 Drought Trigger Conditions for Run-of-River and Ground Water Supplies

Run-of-river and ground water supplies typically serve many water users over a broad geographical area. Some water providers may have drought contingency plans, while other water users, particularly agricultural or industrial users, may not have drought contingency plans. For these water supplies, the ETRWPG proposes to use the U.S. Drought Monitor for Texas as a trigger for drought response actions. This information is easily accessible through the U.S. Drought Monitor web site and is updated regularly. It does not require monitoring of well water levels or stream gages, and drought triggers can be identified on a local basis.

Table 7.17 shows the drought severity classifications adopted by the U.S. Drought Monitor and the associated Palmer Drought Index.

Table 7.17 Drought Severity Classification

Category	Description	Possible Impacts	Palmer Drought Index
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered	-1.0 to -1.9
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested	-2.0 to -2.9
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed	-3.0 to -3.9
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions	-4.0 to -4.9
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less

Note: Sourced from U.S. Drought Monitor
HTTPS://DROUGHTMONITOR.UNL.EDU/ABOUT/WHATISTHEUSDM.ASPX

The ETRWPG recommends the following actions based on each of the drought classifications listed above:

- Abnormally Dry – Entities should review the status of supplies and demands to determine if implementation of a DCP stage is necessary.
- Moderate Drought – Entities should review the status of supplies and demands to determine if implementation of a DCP stage is necessary. Other potential actions include voluntary water conservation measures, such as restrictions on lawn watering days and hours, vehicle washing, pool filling, and non-essential water uses.

- Severe Drought – Entities should review the status of supplies and demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. Entities should begin considering alternative supplies. Other potential actions include mandatory water conservation measures, such as restrictions on lawn watering days and hours, vehicle washing, pool filling, and non-essential water uses.

- Extreme Drought – Entities should review the status of supplies and demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. Entities should begin to plan implementation of alternative supplies and prepare monthly water usage allocations in preparation for water rationing. Other potential actions include additional mandatory water conservation measures, such as more stringent restrictions on lawn watering days and hours, vehicle washing, pool filling, and non-essential water uses.

- Exceptional Drought – Entities should review the status of supplies and demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. Entities should implement alternative supplies. Other potential actions include additional mandatory water conservation measures, such as prohibition of outdoor watering and non-essential water uses. If necessary, entities should implement water rationing.

7.5 EXISTING AND POTENTIAL EMERGENCY INTERCONNECTS

Regional water planning requirements include collection of information on existing major water infrastructure facilities that could be used for interconnections with water user groups (WUG) in the event of an emergency shortage of water (§357.42(d)). However, Texas Water Code §16.053(c) requires such information to be confidential and may not be released to the public. Texas Water Development Board guidance on the subject states that the regional water planning group will collect such information confidentially and separately from the 2026 Plan. However, a general description in the plan that does not divulge details such as interconnect locations is acceptable. This section of Chapter 7 provides the required general information regarding the use of interconnections in the region and how they are or may be used as potential drought management measures, the methodology used to collect emergency interconnect information, the methodology for determining potential future emergency interconnects, and a summary of the evaluations performed.

In a region where drought may be more geographically limited, emergency interconnects become an effective tool to mitigate its effects. As emergency interconnects become more common in the region, it may be necessary to encourage the connected communities to coordinate closely on their individual drought planning processes to that when emergency interconnections are utilized, all affected communities are aware of the need and can help facilitate water transfers with a minimum of adverse impact on all parties.

Interconnecting with another water system is a potential drought response measure. The drought contingency plans reviewed in Section 7.3 establish the following interconnection drought response measures.

- Evaluate the potential for interconnecting with other neighboring systems (Stage 1)
- Implement protocols to establish interconnections with other neighboring systems, if appropriate (Stage 2)
- Interconnect with other neighboring systems/implement agreements with adjacent water providers (Stage 3)

Section 7.5 of this chapter discusses the methodology for identifying potential future emergency interconnects and Table 7.21.

reports on the 274 potential interconnects identified by this evaluation.

Existing emergency interconnect information was obtained from the Texas Commission on Environmental Quality, Texas Drinking Water Watch available at https://dww2.tceq.texas.gov/DWW/ and by soliciting such information from wholesale water providers regarding their own water distribution systems as well as those of their customers. The ETRWPG found that 23 WUGs have an existing emergency interconnect with another utility as shown in Table 7.18. At this time, the RWPG does not have detailed information on local Drought Contingency Plans that involve emergency connections between water systems or Wholesale Water Provider (WWP) systems. However, it is understood that some water suppliers may include provisions for emergency interconnections as part of their contingency planning to enhance regional water reliability. While general descriptions of such plans can be incorporated into the Regional Water Plan, no specific location or facility details are included in accordance with confidentiality requirements. The RWPG will continue to coordinate with relevant entities to gather and document applicable information where available.

Table 7.18. Emergency Interconnect

WUG	Emergency Interconnect
Angelina WSC	City of Lufkin
Appleby WSC	City of Nacogdoches
Central WCID of Angelina County	City of Lufkin
Craft Turney WSC	City of Jacksonville
D & M WSC	City of Nacogdoches
East Lamar WSC	City of Center
Flat Fork WSC	City of Center
Four Pines WSC	City of Palestine
Four Way SUD	City of Huntington
City of Grapeland	Houston County WCID 1
City of Groves	City of Port Neches
City of Huntington	City of Lufkin
Lilly Grove SUD	City of Nacogdoches
City of Lufkin	Central WCID
M & M WSC	City of Lufkin
Meeker MWD	City of Beaumont
Melrose WSC	City of Nacogdoches
City of Port Neches	City of Nederland
Sand Hills WSC	City of Center
Tyler County SUD	City of Colmesneil
Walston Springs WSC	Slocum WSC
Woden WSC	City of Nacogdoches

7.6 DROUGHT MANAGEMENT WATER MANAGEMENT STRATEGIES

Drought management and emergency response measures are important planning tools for all water suppliers. They are temporary measures implemented when certain criteria are met and are terminated when these criteria are no longer met. They are intended to preserve water resources for the most essential uses when water supplies are threatened by extraordinary conditions, such as:

- A multi-year drought,
- An unexpected increase in demand,
- The inability to use a water supply due to a chemical spill or due to invasive species,
- A water supply system component failure, or
- A water management strategy is not fully implemented when it is needed.

The ETRWPG supports implementation of DCPs under appropriate conditions by water providers to prolong the availability of existing water supplies and reduce impacts to water users and local economies. However, drought management and emergency response measures are not a reliable source of additional supplies to meet growing demands. Therefore, drought management measures are not recommended as a water management strategy to provide additional supplies for the ETRWPA.

7.7 EMERGENCY RESPONSES TO LOCAL DROUGHT CONDITIONS OR LOSS OF MUNICIPAL SUPPLY

For all County-Other WUGs and for municipal WUGs with 2020 population less than 7,500 that rely on a sole water source, regional water planning rules require an evaluation of potential emergency response to local drought conditions or temporary loss of existing water supplies.

Of the 146 municipal WUGs with a 2020 Census population of less than 7,500 people, 117 of them rely on a single water source. Of these municipal WUGs, most rely on groundwater (108) and nine purchase surface water from other entities. Figure 7.6shows the relative distribution of sole water supplies for these municipal WUGs.

The ETRWPG conducted a limited, screening-level review of emergency response options available to the WUGs described in the previous section. The results are to serve as a general indicator of the potential options that might be considered in the event of a local emergency and should be investigated in greater detail by the subject WUG(s) before implementation. For the purposes of this analysis, it is assumed that the emergency response option must provide additional water within 180 days.

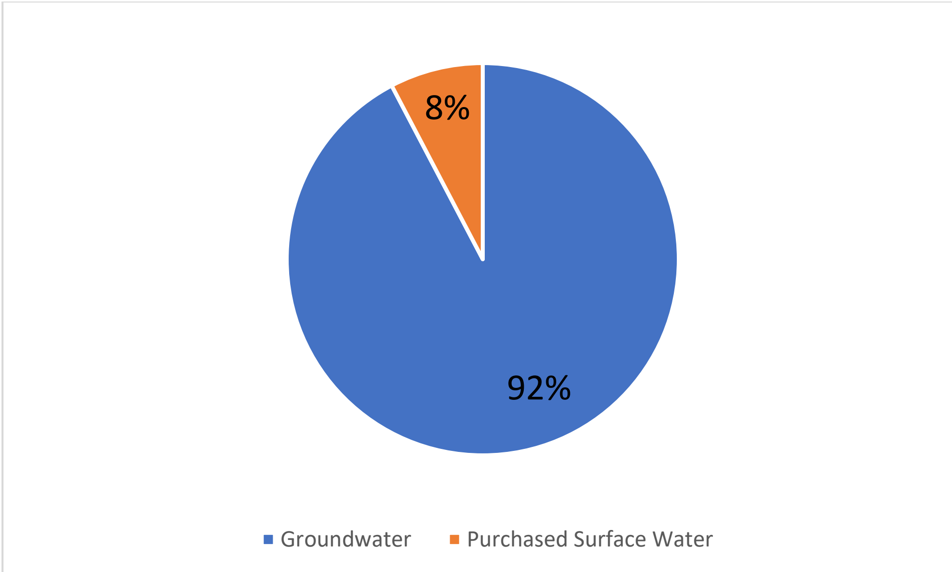


Figure 7.6 Summary of Sole-Source Water Supplies for Municipal Water User Groups with Population Less Than 7,500

Emergency response options considered include:

- Additional local groundwater well(s),
- Use of brackish groundwater,
- Voluntary redistribution,
- Emergency interconnect(s), and
- Trucked-in water.

7.7.1 Additional Local Groundwater Wells

Depending on the emergency, drilling one or more wells may be a potential option for obtaining an emergency water supply. Since virtually the entire region is underlain by water supply aquifers, this is a potential option each of the subject WUGs should evaluate in more detail.

The required infrastructure would include a new well and additional conveyance facilities. If the subject WUG is located within a Groundwater Conservation District, additional rules may apply.

7.7.2 Brackish Groundwater

Brackish water has total dissolved solids (TDS) concentrations between 1,000 and 10,000 milligrams per liter (mg/L). Brackish groundwater can be obtained from two locations in the ETRWPA: (1) relatively narrow bands of the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers cross the middle of the ETRWPA in an east-west orientation and (2) a narrow band of the Gulf Coast aquifer crosses Jefferson and Orange Counties near the coast in an east-west orientation.[5] Subject WUGs located in these bands should evaluate the emergency use of brackish groundwater in more detail (Table 7.19).

The required infrastructure would include a new well into the brackish part of the formation and additional conveyance facilities. Treatment to remove dissolved salts might also be included. However, such treatment is very expensive, and disposal of treatment residuals is often difficult. Therefore, treatment is considered as a viable component of using brackish groundwater only in extraordinary circumstances.

For brackish groundwater at the lower end of elevated TDS concentrations, the brackish water could be blended with existing non-brackish supplies to create an emergency potable supply. As the TDS of a brackish source increases or as fresh water supplies diminish, blending may become less practical. For reasons noted above, brackish groundwater at the higher end of TDS concentrations would likely not be a viable alternative, even for emergency situations.

Table 7.19 Potential Brackish Groundwater Sources for Subject Water User Groups

Subject WUG	Aquifer			
	Carrizo-Wilcox	Gulf Coast	Queen City/ Sparta	Yegua-Jackson
Angelina Water Supply Corporation (WSC)	x		x	
Colmesneil				x
Diboll	x		x	
Four Way Special Utility District	x		x	
Groveton	x			
Hemphill	x		x	
Hudson WSC	x		x	
Lufkin	x		x	
Pineland	x		x	
Tyler County WSC				x
Woodville				x
Angelina County-Other	x		x	
Houston County-Other	x		x	
Jasper County-Other				x
Jefferson County-Other		x		
Nacogdoches County-Other	x		x	
Newton County-Other				x
Orange County-Other		x		
Polk County-Other				x
Sabine County-Other	x		x	
San Augustine County-Other	x		x	
Trinity County-Other	x		x	x
Tyler County-Other				x

Brackish groundwater availability, productivity, and production costs are summarized for each aquifer in Table 7.20. In the counties where brackish groundwater is located, availability is moderate to high. The major aquifers (Carrizo-Wilcox and Gulf Coast) have greater productivity than the minor aquifers. The production cost for the Carrizo-Wilcox aquifer is moderate to high, since the depth to the brackish groundwater may be 3,000 to 6,000 feet.

Table 7.20 Summary of East Texas Regional Water Planning Area Potential Emergency

Aquifer	Availability	Productivity	Source Water Production Cost	Primary Counties
Carrizo-Wilcox	High	Moderate	Moderate to High	Houston, Trinity, Angelina, Nacogdoches, San Augustine, Sabine
Queen City/ Sparta	High	Low	Moderate	
Gulf Coast	High	High	Low to Moderate	Jefferson, Orange
Yegua-Jackson	Moderate	Low	Moderate	Trinity, Polk, Tyler, Jasper, Newton

Note: Sources:

1) *LBG-GUYTON ASSOCIATES IN ASSOCIATION WITH NRS CONSULTING ENGINEERS:*
2) *BRACKISH GROUNDWATER MANUAL FOR TEXAS REGIONAL WATER PLANNING GROUPS, PREPARED FOR TEXAS WATER DEVELOPMENT BOARD, AUSTIN, FEBRUARY 2003.*

7.7.3 Voluntary Redistribution

Another emergency response option for WUGs that already treat surface water is a voluntary redistribution of water from upstream water right holders. This option requires a contract with an upstream entity for water to release from an upstream reservoir for diversion by the subject WUG downstream. For purposes of this evaluation, if a watercourse downstream of a major reservoir flows through or within close proximity to the Certificate of Convenience and Necessity of a subject WUG that treats surface water and has an existing surface water intake, then a release from an upstream reservoir is considered a potential emergency response alternative (Table 7.21). The TCEQ’s Water Utilities Map Viewer was used to identify subject WUGs and potential emergency releases from upstream reservoirs.[6]

Required infrastructure may include upgrades to existing intake and conveyance facilities. It has been assumed that WUGs that would use this emergency response option already treat surface water, but improvements to treatment processes may also be necessary. This option would require an agreement with one or more water right holders or their contracts in the upstream reservoir and would require approval of the treatment facilities by the TCEQ. This option would also require a new or amended water right permit from the TCEQ that authorizes the use of stream bed and banks for conveyance of the water and a new diversion point.

Table 7.21 Potential Supplies from Releases from an Upstream Reservoir for Subject Water User Groups

Subject WUG	Upstream Reservoir	Water Right Holders
Cherokee County-Other	Lake Palestine; Lake Jacksonville; Striker Lake; Lake Tyler; Lake Tyler East	Upper Neches River Municipal Water Authority; Jacksonville; Angelina Nacogdoches WCID 1; Tyler; Tyler
Houston County-Other	Lake Palestine; Lake Jacksonville; Various Region C Reservoirs	Upper Neches River Municipal Water Authority; Jacksonville; Various
Nacogdoches County-Other	Striker Lake; Lake Tyler; Lake Tyler East; Lake Naconiche	Angelina Nacogdoches WCID 1; Tyler; Tyler; County of Nacogdoches
Panola County-Other	Lake Cherokee; Martin Lake; Lake Tawakoni/Lake Fork	Cherokee Water Company; Luminant Generation Company LLC; SRA, North Texas Municipal Water District
San Augustine County-Other	Lake Pinkston; Lake Naconiche; San Augustine City Lake	Center; County of Nacogdoches; San Augustine
Shelby County-Other	Lake Murvaul; Lake Cherokee; Martin Lake; Lake Tawakoni/Lake Fork	Panola County FWSD 1; Cherokee Water Company; Luminant Generation Company LLC; SRA, North Texas Municipal Water District
Trinity County-Other	Lake Palestine; Lake Jacksonville	Upper Neches River Municipal Water Authority; Jacksonville

WCID – water control & improvement district
LNVA – Lower Neches Valley Authority
SRA – Sabine River Authority of Texas

7.7.4 Emergency Interconnect

An emergency interconnect is an alternative for subject WUGs located in close proximity to another water provider. For purposes of this evaluation, it is assumed an emergency interconnect is a potential emergency response option if there is another Certificate of Convenience and Necessity located contiguous to or within proximity to the subject WUG's Certificate of Convenience and Necessity. Potential emergency interconnects are summarized in Table 7.22. Some of these potential emergency interconnects may already be in place. Subject WUGs should investigate further the potential for obtaining potable water through emergency interconnects with neighboring water systems.

Table 7.22 Potential Emergency Interconnect Sources for Subject Water User Groups

Subject WUG	Potential Emergency Interconnects
Alto	Alto Rural WSC
Alto Rural WSC	Alto, Rusk Rural WSC, Rusk, Iron Hill WSC, Lilbert-Looneyville WSC, D & M WSC, Forest WSC
Angelina WSC	Lufkin, Beulah WSC, M & M WSC, Four Way SUD
Appleby WSC	Nacogdoches, Caro WSC, Swift WSC, Libby WSC, Garrison
Arp	Jackson WSC, Wright City WSC,
Beckville	Fairplay WSC, Rock Hill WSC, Hollands Quarter, Riderville WSC
Berryville	Frankston Rural WSC, Monarch Utilities I LP
Bethel Ash WSC	Eustace, Quality Water of East Texas, Monarch Utilities I LP, Leagueville WSC, Virginia Hill WSC, Athens, Payne Springs WSC
Bevil Oaks	Water Necessities Inc., Hardin County WCID 1, Lumberton MUD, Meeker MWD
Brownsboro	Leagueville WSC, Edom WSC, Union Hill WSC, Moore Station WSC

Table 7.22 Potential Emergency Interconnect Sources for Subject Water User Groups (Cont.)

Subject WUG	Potential Emergency Interconnects
Brushy Creek WSC	BBS WSC, Virginia Hill WSC, Poynor Community WSC, Dogwood Springs WSC, Frankston Rural WSC, Norwood WSC, Montalba WSC
Bullard	Southern Utilities, Walnut Grove WSC, North Cherokee WSC
Central WCID Of Angelina County	Woodlawn WSC, Hudson WSC, Pollok Redtown WSC, D & M WSC, Redland WSC, Angelina County FWSD 1, Lufkin
Chalk Hill SUD	New Prospect WSC, Crims Chapel WSC, Elderville WSC, Crystal Farms WSC, Tatum
Chandler	R P M WSC, Chandler Water Company, Three Community WSC, Dean WSC
China	Meeker MWD
Colmesneil	Tyler County WSC, Lakeside Water Supply
Corrigan	Damascus Stryker Water Supply, Moscow WSC
Cross Roads SUD	Kilgore, Elderville WSC, Kennedy Road WSC, Leveretts Chapel WSC, Jacobs WSC
Crystal Systems Texas	Texas Water Systems Inc., Carroll WSC, Lindale Rural WSC, Lindale, Tyler, Southern Utilities
Cushing	Lilbert-Looneyville WSC, Sacul WSC, Caro WSC, South Rusk County WSC
Dean WSC	Southern Utilities, Tyler, R P M WSC, Chandler Water Company, Chandler
Diboll	Prairie Grove WSC, Lufkin
Elderville WSC	Chalk Hill SUD
Elkhart	Slocum WSC, Walston Springs WSC
Four Pines WSC	Palestine, BCY WSC, Tucker WSC, Pleasant Springs WSC, Lone Pine WSC
Four Way SUD	Zavalla, Angelina WSC, Huntington, M & M WSC
Frankston	Frankston Rural WSC,
Garrison	Appleby WSC, Timpson Rural WSC, Arlam Concord WSC
Gill WSC	Marshall, Deadwood WSC, Dewberry WSC, Elysian Fields WSC, Blocker-Crossroads WSC
Groveton	Pennington WSC, Centerville WSC, Woodlake-Josserand WSC, Trinity Rural WSC, Glendale WSC
Hemphill	G M WSC
Hudson WSC	Lufkin, Woodlawn WSC, Central WCID of Angelina County
Jackson WSC	Wright City WSC, Lakeshore Utility Co. Inc., Southern Utilities, Tyler, Star Mountain WSC, Starrville WSC, West Gregg WSC
Jasper County WCID 1	South Jasper County WSC, Cougar Country Water System
Jefferson County WCID 10	Beaumont, Nederland
Joaquin	Deadwood WSC, Paxton WSC,
Kirbyville	Upper Jasper County Water Authority, South Kirbyville Rural WSC
Kountze	West Hardin WSC, Johnson Water Service, Ranchland POA Inc.
Lilly Grove SUD	Nacogdoches, D & M WSC, Lilbert-Looneyville WSC, Caro WSC
Lindale	Tyler, Lindale Rural WSC, Crystal Systems Texas
Lufkin	Hudson WSC, Diboll, Woodlawn WSC, Central WCID of Angelina County
Meeker MWD	Beaumont, West Jefferson County MWD, China, Bevil Oaks, Lumberton MUD
Melrose WSC	Nacogdoches, Woden WSC, Swift WSC, New WSC, Denning WSC
Murchison	Bethel Ash WSC, Leagueville WSC
New London	Overton, Wright City WSC, Gaston WSC, Pleasant Hill WSC, Jacobs WSC
Silsbee	North Hardin WSC, Johnson Water Service, Lumberton MUD
Sour Lake	Hardin County WCID 1, Water Necessities Inc.
South Newton WSC	Orange, Mauriceville SUD
Southern Utilities	Algonquin Water Resources, Tyler, Dean WSC, Jackson WSC, Lakeshore Utility Co. Inc., Wright City WSC, Walnut Grove WSC
Swift WSC	Melrose WSC, Nacogdoches, Woden WSC, Appleby WSC, Libby WSC, Sand Hills WSC

Table 7.22 Potential Emergency Interconnect Sources for Subject Water User Groups (Cont.)

Subject WUG	Potential Emergency Interconnects
Tatum	Crystal Farms WSC, Chalk Hill SUD, Rock Hill WSC
Tenaha	Tennessee WSC, Paxton WSC, Flat Fork WSC, Buena Vista WSC
Timpson	Timpson Rural WSC, Tennessee WSC, Buena Vista WSC,
Troup	Blackjack WSC, Wright City WSC,
Tyler County WSC	North Hardin WSC, Colmesneil, Warren WSC, Monarch Utilities I LP, Seneca WSC, Woodville, Chester WSC, Upper Jasper County Water Authority
Virginia Hill WSC	Aqua Texas Inc., Brushy Creek WSC, Athens, Double Diamond Utilities Co, Leagueville WSC, Bethel Ash WSC, Moore Station WSC, Poynor Community WSC
Walston Springs WSC	Slocum WSC, Anderson County Cedar Creek WSC, Pleasant Springs WSC, Neches WSC, Palestine
Wells	Pollok Redtown WSC, Forest WSC
West Gregg SUD	Kilgore, Jackson WSC, Starrville WSC, Liberty City WSC, Southern Utilities
West Hardin WSC	Hardin WSC, Lake Livingston Water Supply and Sewer Service Company, Johnson Water Service
Woden WSC	Nacogdoches, Melrose, WSC, Swift WSC, D & M WSC
Woodville	Cypress Creek WSC, Doucette Water System, Tyler County WSC,
Wright City WSC	Southern Utilities, Jackson WSC, Price WSC, New Concord WSC, Blackjack WSC, Troup
Zavalla	Four Way SUD, Raylake WSC

WSC - water supply corporation
WCID - water control & improvements district
MUD - municipal utility district
MWD - municipal water district

Potential emergency interconnects were not identified for County-Other WUGs. In a given county, the County-Other WUG may represent many small utilities, and an emergency interconnect that may be a feasible emergency source for one of these utilities may not be a feasible source for another. Therefore, an extensive list of potential emergency interconnects in each county will not be sufficiently “local” to assist an individual utility that is a component of the County-Other WUG. Utilities not named in Table 7.22, one should consult local maps/data to identify nearby utilities that may be potential emergency interconnect supplies.

Required infrastructure would include piping and valving necessary to connect the systems. If the relative system pressures are not appropriate for the proposed connection, additional pressurization and/or conveyance facilities may be needed. This option would require an agreement with one or more neighboring utilities. Construction would require authorization from the TCEQ.

7.7.5 Trucked-In Water

Trucked-in water is considered as an emergency response option for every subject WUG. Although this would likely require little infrastructure, it would require agreements with a treated water provider and a water transporter.

Findings for the subject WUGs and the County-Other WUGs are briefly summarized in Table 7.23.

Table 7.23 Summary of Potential Emergency Supplies for Subject Water User Groups

Entity		Potential Emergency Water Supply Source(s)					
Water User Group Name	County (a)	Local groundwater well	Brackish groundwater	Other named local supply	Release from upstream reservoir	Emergency interconnect	Trucked-in water
Alto	Cherokee	X				X	X
Alto Rural WSC	Cherokee	X		X	X	X	X
Anderson County Cedar Creek WSC	Anderson	X					X
Angelina WSC	Angelina	X	X	X		X	X
Arp	Smith	X		X		X	X
B B S WSC	Henderson, Anderson	X					X
B C Y WSC	Anderson	X					X
Beckville	Panola	X				X	X
Berryville	Anderson, Henderson	X		X		X	X
Bethel Ash WSC	Henderson	X		X		X	X
Bevil Oaks	Jefferson	X		X		X	X
Blackjack WSC	Cherokee	X					X
Bon Wier WSC	Newton	X					X
Brownsboro	Henderson	X				X	X
Brushy Creek WSC	Henderson	X		X		X	X
Caro WSC	Nacogdoches	X					X
Centerville WSC	Trinity	X					X
Central WCID Of Angelina County	Angelina	X		X		X	X
Chalk Hill SUD	Gregg, Rusk	X		X		X	X
Chandler	Henderson	X		X		X	X
Chester WSC	Polk, Tyler	X					X
China	Jefferson	X		X	X	X	X
Choice WSC	San Augustine, Shelby	X					X
Colmesneil	Tyler	X	X	X		X	X
Corrigan	Polk	X				X	X
Crystal Farms WSC	Rusk	X					X
Cushing	Nacogdoches	X		X		X	X
Cypress Creek WSC	Tyler	X					X
Damascus-Stryker WSC	Polk	X					X
Dean WSC	Smith	X		X		X	X
Deberry WSC	Panola	X					X
Denning WSC	San Augustine	X					X
East Lamar WSC	Shelby	X				X	X
Ebenezer WSC	Rusk	X					X
Elkhart	Anderson	X		X		X	X
Emerald Bay Mud	Smith	X		X			X
Etoile WSC	Nacogdoches	X		X			X

Table 7.23 Summary of Potential Emergency Supplies for Subject Water User Groups (Cont.)

Entity		Potential Emergency Water Supply Source(s)					
Water User Group Name	County (a)	Local groundwater well	Brackish groundwater	Other named local supply	Release from upstream reservoir	Emergency interconnect	Trucked-in water
Federal Correctional Complex Beaumont	Jefferson	X					X
Five Way WSC	Shelby	X					X
Flat Fork WSC	Shelby	X				X	X
Four Pines WSC	Anderson	X		X		X	X
Four Way SUD	Angelina	X	X	X		X	X
Frankston	Anderson, Henderson	X		X		X	X
Frankston Rural WSC	Anderson	X				X	X
Garrison	Nacogdoches, Rusk	X		X		X	X
Gaston WSC	Rusk	X					X
Goodsprings WSC	Rusk	X					X
Hardin County WCID 1	Hardin	X					X
Hemphill	Sabine	X	X	X		X	X
Huxley	Shelby	X					X
Jackson WSC	Smith	X		X		X	X
Jacobs WSC	Rusk	X					X
Jasper County WCID 1	Jasper	X				X	X
Jefferson County WCID 10	Jefferson	X		X	X	X	X
Joaquin	Shelby	X		X	X	X	X
Kelly G Brewer	Orange	X					X
Kirbyville	Jasper	X				X	X
Kountze	Hardin	X				X	X
Leagueville WSC	Henderson	X					X
Lilly Grove SUD	Nacogdoches	X				X	X
M & M WSC	Angelina	X		X		X	X
Mcclelland WSC	Shelby	X					X
Minden Brachfield WSC	Panola, Rusk	X					X
Moore Station WSC	Henderson	X		X			X
Moscow WSC	Polk, Tyler	X					X
Mt Enterprise WSC	Rusk	X					X
Murchison	Henderson	X		X		X	X
Neches WSC	Anderson	X					X
New London	Rusk	X		X		X	X
New Prospect WSC	Rusk	X					X
New Summerfield	Cherokee	X				X	X
New WSC	Sabine, Shelby	X		X			X
Newton	Newton	X				X	X
Nome	Jefferson	X					X
North Hardin WSC	Hardin	X		X	X	X	X
Norwood WSC	Anderson	X					X

Table 7.23 Summary of Potential Emergency Supplies for Subject Water User Groups (Cont.)

Entity		Potential Emergency Water Supply Source(s)					
Water User Group Name	County (a)	Local groundwater well	Brackish groundwater	Other named local supply	Release from upstream reservoir	Emergency interconnect	Trucked-in water
Orange County WCID 2	Orange	X		X		X	X
Orangefield WSC	Orange	X				X	X
Overton	Smith	X		X		X	X
Pennington WSC	Trinity	X					X
Pinehurst	Orange	X		X		X	X
Pineland	Sabine	X	X	X		X	X
Pollok-Redtown WSC	Angelina, Cherokee	X					X
Rayburn Country Mud	Jasper	X		X			X
Redland WSC	Angelina	X					X
Rehobeth WSC	Panola	X					X
Rural WSC	Jasper	X		X			X
Rusk Rural WSC	Cherokee	X					X
San Augustine	San Augustine	X				X	X
San Augustine Rural WSC	San Augustine	X		X			X
Seneca WSC	Tyler	X					X
Silsbee	Hardin	X		X	X	X	X
Slocum WSC	Anderson	X					X
Sour Lake	Hardin	X		X		X	X
South Jasper County WSC	Jasper	X					X
South Kirbyville Rural WSC	Jasper, Newton	X					X
South Newton WSC	Newton, Orange	X		X	X	X	X
South Rusk County WSC	Cherokee, Rusk	X		X			X
Swift WSC	Nacogdoches	X		X	X	X	X
Tatum	Panola, Rusk	X		X	X	X	X
Tdcj Beto Gurney & Powledge Units	Anderson	X					X
Tdcj Coffield Michael	Anderson	X					X
Tdcj Eastham Unit	Houston	X					X
Tenaha	Shelby	X		X		X	X
Timpson	Shelby	X		X		X	X
Troup	Cherokee, Smith	X		X	X	X	X
Tucker WSC	Anderson	X					X
Tyler County SUD	Tyler	X		X		X	X
Walston Springs WSC	Anderson	X		X	X	X	X
Warren WSC	Tyler	X					X
Wells	Cherokee	X				X	X
West Hardin WSC	Liberty, Hardin	X		X		X	X
West Jacksonville WSC	Cherokee	X					X
Wildwood POA	Hardin, Tyler	X					X
Woodlawn WSC	Angelina	X					X

Table 7.23 Summary of Potential Emergency Supplies for Subject Water User Groups (Cont.)

Entity		Potential Emergency Water Supply Source(s)					
Water User Group Name	County (a)	Local groundwater well	Brackish groundwater	Other named local supply	Release from upstream reservoir	Emergency interconnect	Trucked-in water
Wright City WSC	Cherokee, Smith	X		X		X	X
Zavalla	Angelina	X		X		X	X
Anderson County-Other	Anderson	x		n/a[b]	x	n/a	x
Angelina County-Other	Angelina	x	x	n/a	x	n/a	x
Cherokee County-Other	Cherokee	x		n/a	x	n/a	x
Hardin County-Other	Hardin	x		n/a		n/a	x
Henderson County-Other	Henderson	x		n/a	x	n/a	x
Houston County-Other	Houston	x	x	n/a	x	n/a	x
Jasper County-Other	Jasper	x	x	n/a	x	n/a	x
Jefferson County-Other	Jefferson	x	x	n/a		n/a	x
Nacogdoches County-Other	Nacogdoches	x	x	n/a	x	n/a	x
Newton County-Other	Newton	x	x	n/a	x	n/a	x
Orange County-Other	Orange	x	x	n/a	x	n/a	x
Panola County-Other	Panola	x		n/a	x	n/a	x
Polk County-Other	Polk	x	x	n/a		n/a	x
Rusk County-Other	Rusk	x		n/a	x	n/a	x
Sabine County-Other	Sabine	x	x	n/a		n/a	x
San Augustine County-Other	San Augustine	x	x	n/a	x	n/a	x
Shelby County-Other	Shelby	x		n/a	x	n/a	x
Smith County-Other	Smith	x		n/a		n/a	x
Trinity County-Other	Trinity	x	x	n/a	x	n/a	x
Tyler County-Other	Tyler	x	x	n/a	x	n/a	x

Note:

[a] A WUG might be located in more than one county.

[b] "n/a" indicates that this potential emergency water supply was not evaluated for a given WUG. Additional discussion is provided in Section 7.4.

7.8 OTHER DROUGHT RELATED CONSIDERATIONS AND RECOMMENDATIONS

This section discusses other drought-related considerations and recommendations.

7.8.1 Drought Preparedness Council

Title 31 of the Texas Administrative Code, §357.42(h), requires each regional water planning group to consider recommendations from the Drought Preparedness Council. On February 8, 2024, the Drought Preparedness Council provided the ETRWPG with a letter with the following three recommendations:

- "The regional water plans and state water plan shall serve as water supply plans under drought of record conditions. The DPC encourages regional water planning groups to consider planning for drought conditions worse than the drought of record, including scenarios that reflect greater rainfall deficits and/or higher surface temperatures."
    - Region I Response: Region I has utilized the Chapter 7 template provided by TWDB staff and has addressed the requirements related to a DWDOR, as shown in Section 7.2.
- "The Drought Preparedness Council encourages regional water planning groups to incorporate projected future reservoir evaporation rates in their assessments of future surface water availability."
    - Region I Response: While it is possible to quantitatively assess a range of input variables including hydrology worse than the drought of record, the existing regional water planning framework does not support evaluating a range of possible futures (e.g., future evaporation rates) for the 2026 regional water plans. However, the 2026 ETRWP accounts for several conservative assumptions to plan for and mitigate against potential droughts worse than the drought of record, as discussed in Section 7.2. For example, the RWP evaluates needs and strategies based on high use, dry-year water demand projections and water supply availability based on historical drought-of-record conditions. Furthermore, management supply factors above one, supply diversification, regionalization, and drought contingency response measures are all part of the region's efforts to plan for droughts worse than the drought of record.
- "The Drought Preparedness Council encourages regional water planning groups to identify in their plans utilities within their boundaries that reported having less than 180 days of available water supply to the Texas Commission on Environmental Quality during the current or preceding planning cycle. For systems that appeared on the 180-day list, RWPGs should perform the evaluation required by Texas Administrative Code Section 357.42(g), if it has not already been completed for that system."
    - Region I Response: Region I has utilized the Chapter 7 template provided by TWDB staff and has addressed the requirements consistent TAC §357.42(g), as shown in Section 7.7.

7.9 REGION-SPECIFIC MODEL DROUGHT CONTINGENCY PLANS

Model DCPs for use by WUGs in the ETRWPA are provided on the planning group's website at https://www.etexwaterplan.org/dc/drought-contingency-plan/. Model DCPs were developed for a Public Water Supplier (municipal water use), Irrigation District (irrigation water use), and Manufacturer (manufacturing water use).

REFERENCES

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[2] National Drought Mitigation Center: U.S. Drought Monitor. Accessed December 2024. http://droughtmonitor.unl.edu/

[3] National Climatic Data Center: PHDI Divisional Data. Accessed December 2024. http://www1.ncdc.noaa.gov/pub/data/cirs/drd/drd964x.phdi.txt

[4] Texas Water Development Board: East Texas Planning Region Reservoirs. Accessed December 2024. http://waterdatafortexas.org/reservoirs/region/east-texas

[5] LBG-Guyton Associates in association with NRS Consulting Engineers: Brackish Groundwater Manual for Texas Regional Water Planning Groups. Prepared for Texas Water Development Board, Austin, February 2003.

[6] Texas Commission on Environmental Quality: Water Utilities Map Viewer. Accessed December 2024. https://www.tceq.texas.gov/gis/iwudview.html

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Chapter 8: Unique Stream Segments, Unique Reservoir Sites, and Legislative and Regulatory Recommendations

2026 Initially Prepared Plan

Prepared for:

East Texas Regional Water Planning Group

February 2025

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LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ANRA	Angelina and Neches River Authority
CE	Categorical Exclusions
DFCs	Desired Future Conditions
DPR	Direct Potable Reuse
EDAP	Economically Distressed Areas Program
EDF	Environmental Defense Fund
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ETRWPA	East Texas Regional Water Planning Area
ETRWPG	East Texas Regional Water Planning Group
ft msl	feet mean sea level
GCD	Groundwater Conservation District
GMAs	Groundwater Management Areas
HB	House Bill
LAR	Legislative Appropriations Request
MAG	Modelled Available Groundwater
NEPA	National Environmental Policy Act
RWPG	Regional Water Planning Group
SB	Senate Bill
SRF	State Revolving Fund
SWIFT	State Water Implementation Fund for Texas
TAC	The Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks and Wildlife Department
TWDB	the Texas Water Development Board
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
WAM	Water Availability Model
WMS	Water Management Strategies
WUG	Water User Group

8 UNIQUE STREAM SEGMENTS, UNIQUE RESERVOIR SITES, AND LEGISLATIVE AND REGULATORY RECOMMENDATIONS

Per Regional Water Planning Guidelines, Title 31, Part 10, Chapter 357 of the Texas Administrative Code (TAC), this chapter of the 2026 East Texas Regional Water Plan (2026 Plan) documents recommendations by the East Texas Regional Water Planning Group (ETRWPG) regarding unique stream segment designation, unique site designation for reservoir construction, and regulatory, administrative or legislative action recommendations to the Texas Legislature. Information relevant to these issues was considered and approved by the ETRWPG at the February 2025 Region I Regional Water Planning Group meeting.

8.1 SUMMARY OF RECOMMENDATIONS

Recommendations within this chapter are described under one of the following three categories: Ecologically Unique River and Stream Segments, Unique Sites for Reservoir Construction; and Regulatory, Administrative, or Legislative Actions.

8.1.1 Recommendations Summary for Ecologically Unique River and Stream Segments

No recommendations were proposed for ecologically unique river and stream segments.

8.1.2 Recommendations Summary for Unique Sites for Reservoir Construction

The following are recommendations for unique sites for reservoir construction:

- Recommend that the Texas Legislature continue to designate the following sites as unique sites for reservoir construction:
    - Lake Columbia
    - Fastrill Reservoir
- Encourage continued affirmative votes by sponsors of these proposed reservoirs to make expenditures necessary to construct or apply for required permits to avoid termination of unique reservoir site designation.

8.1.3 Recommendations Summary for Policy and Legislative Recommendations

The following are recommendations for regulatory, administrative, or legislative action and are described in more detail later in this chapter:

- Flexibility in Determining Water Plan Consistency
    - TWDB and TCEQ should continue to interpret existing legislation to give the maximum possible flexibility to water suppliers as they seek to serve the public and provide new supplies.
    - Willing buyer/willing seller transactions of water rights and treated water should continue to not be controlled by this regulation.
    - TWDB and TCEQ should encourage and continue to make use of their ability to waive consistency requirements if local water suppliers elect strategies that differ from those in the regional plan.
    - RWPG will consider the creation of sub-WUG planning at the request of an existing utility, public water system, or representative of a geographic area within an ETRWPA WUG that meets the TWDB criteria for a sub-WUG.
- Continued Funding by the State of the Regional Water Planning Process on a Five-Year Cycle
    - Grassroots planning effort created by Senate Bill 1 is important to the state of Texas and

should be continued.

- ETRWPG believes that the most fair and efficient method of financing continuation of this effort for future planning cycles is to continue funding of this effort by the state with administrative expenses for the region being provided from sources within the region.

- Unique Reservoir Designation
  - Designation of unique reservoir site for Lake Columbia and Lake Fastrill be retained through the current planning horizon, 2080, or until such time as the Texas legislature alters its designation Due to the federally regulated wildlife area.
- Water Reuse
  - Current regulations as they pertain to the reuse of treated wastewater (i.e., water reuse) should continue to be reviewed and amended, as necessary, to encourage the development of these resources.
- Funding
  - Increased flexibility in categorical exclusions for Environmental Information Documents that are required for funding of water projects.
  - Increased flexibility in Economically Distressed Areas Program (EDAP) funding requirements
- Uncommitted Surface Water
  - To support adequate supply for future needs and encourage reliable water supply planning, the ETRWPG:
    - Opposes unilateral cancellation of uncommitted water contracts/rights;
    - Supports long term contracts that are required for future projects and drought periods; and
    - Supports “interruptible” water supply contracts as a way to meet seasonal and short-term needs before long-term water rights are fully utilized.
- Standardized Processes for Regional Water Plan Development
  - TWDB develops guidelines for regional water planning evaluations of federally permitted water projects that will produce documentation that can be integrated and used in the NEPA process.
  - TWDB is encouraged to continue to develop relationships with federal authorities to allow the use of the state and regional water planning population projections to streamline permitting process.
- Funding for Additional Groundwater Modeling
  - Funding for groundwater modeling for development of desired future conditions (DFCs) and modeled available groundwater (MAGs) be provided to the TWDB.
  - Funds should be made available to assist the Groundwater Management Areas (GMAs) with the expenses related to developing the DFCs.
- Clarification of Unique Stream Segment Criteria
  - The ETRWPA recommends clarifications be incorporated into the regional water planning process on a statewide basis.

8.2 UNIQUE STREAM SEGMENTS

According to §357.43(1) of the Texas Administrative Code, the ETRWPG is obligated to consider potential river or stream segments as being of unique ecological value based upon the following criteria set forth in §358.2(6):

- **Biological function** – stream segments that display significant overall habitat value including both quantity and quality considering the degree of biodiversity, age, and uniqueness observed and including terrestrial, wetland, aquatic, or estuarine habitats;

- **Hydrologic function** – stream segments that are fringed by habitats that perform valuable hydrologic functions relating to water quality, flood attenuation, flow stabilization, or groundwater recharge and discharge;

- **Riparian conservation areas** – stream segments that are fringed by significant areas in public ownership including state and federal refuges, wildlife management areas, preserves, parks, mitigation areas, or other areas held by governmental organizations for conservation purposes, or stream segments which are fringed by other areas managed for conservation purposes under a governmentally approved conservation plan;

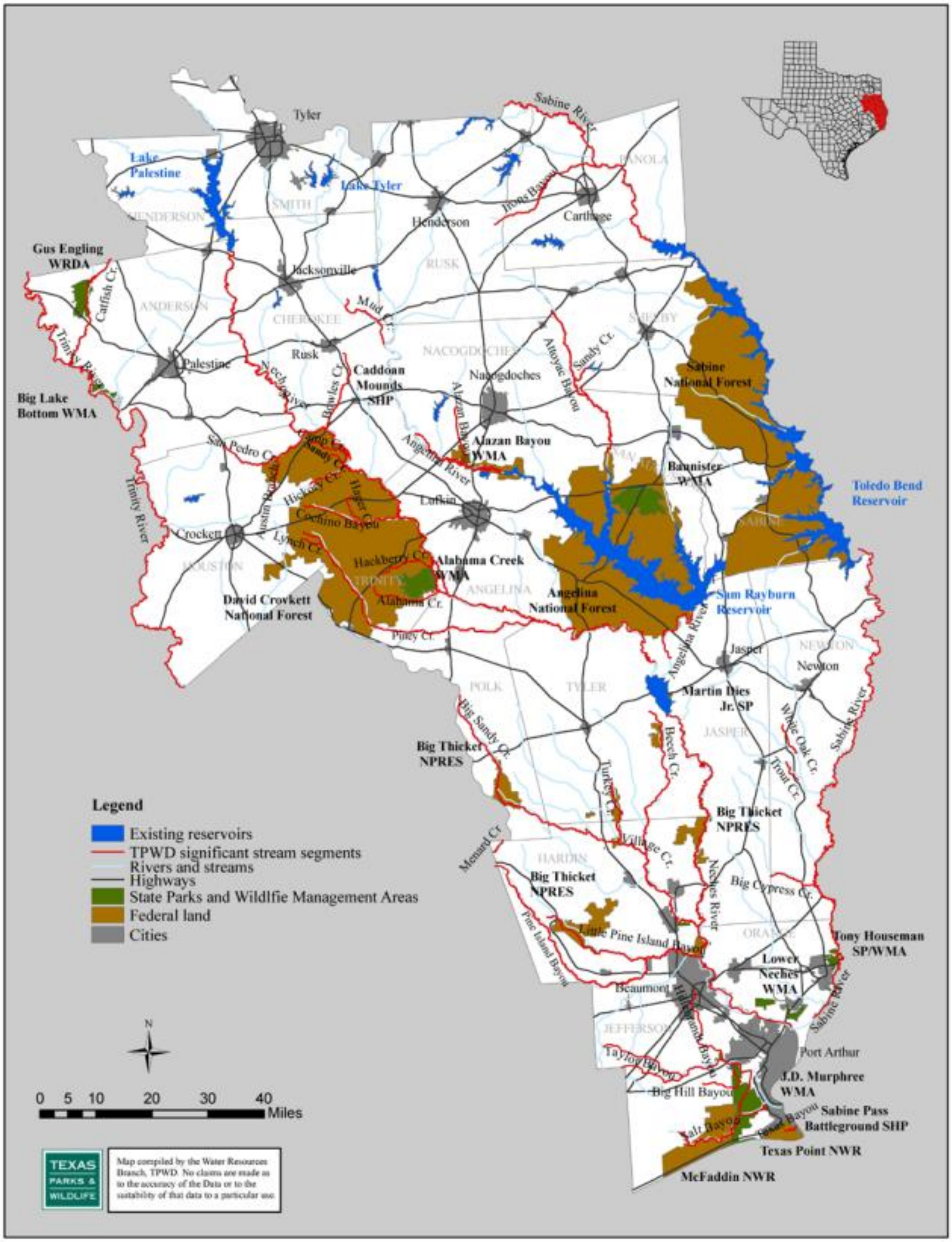
- **High water quality/exceptional aquatic life/high aesthetic value –** stream segments and spring resources that are significant due to unique or critical habitats and exceptional aquatic life uses dependent on or associated with high water quality; or

- **Threatened or endangered species/unique communities –** sites along streams where water development projects would have significant detrimental effects on state or federally listed threatened and endangered species; and sites along streams significant due to the presence of unique, exemplary, or unusually extensive natural communities.

To assist the ETRWPG with identifying potential stream segments for designation, the Texas Parks and Wildlife Department (TPWD) developed a report[1] in 2005 of ecologically significant river and stream segments in the East Texas Regional Water Planning Area (ETRWPA). The TPWD report identified 41 river and stream segments in the ETRWPA as possibly ecologically significant. A map prepared by TPWD showing the locations of the 41 river and stream segments is presented on Figure 8.1.

The planning rules do not provide guidance on how many of the criteria need to be met as a prerequisite for consideration for designation as a unique stream segment. As an initial screening tool, the ETRWPG determined that those segments that meet three or more of the criteria would be further evaluated.

Only 9 of the 41 segments have three or more applicable criteria. Table 8.1 presents a summary of the 41 segments identified by TPWD and indicates which of the five criteria are identified by TPWD for each segment. Some of the segments are categorized as having threatened or endangered species or unique communities. The specific threatened or endangered species or unique community that is the basis for this categorization is presented in Table 8.2.



Note: Figure obtained from Texas Park and Wildlife Department

Figure 8.1 Texas Parks and Wildlife Department Ecologically Significant Stream Segments

Table 8.1 Texas Parks and Wildlife Department Recommendations for Designation as Ecologically Unique River and Stream Segments

East Texas Region I River or Stream Segment	Biological Function	Hydrologic Function	Riparian Conservation Area	High Water Quality / Aesthetic Value	Threatened or Endangered Species / Unique Communities	Total # of Criteria Met
Alabama Creek			•			1
Alazan Bayou	•		•			2
Upper Angelina River (Angelina)	•		•		•	3
Lower Angelina River (Jasper)			•		•	2
Attoyac Bayou					•	1
Austin Branch			•			1
Beech Creek			•	•		2
Big Cypress Creek				•		1
Big Hill Bayou	•		•			2
Big Sandy Creek	•		•	•		3
Bowles Creek			•			1
Camp Creek			•		•	2
Catfish Creek			•	•	•	3
Cochino Bayou			•			1
Hackberry Creek			•		•	2
Hager Creek			•			1
Hickory Creek			•			1
Hillebrandt Bayou			•			1
Irons Bayou				•		1
Little Pine Island Bayou			•			1
Lynch Creek			•		•	2
Menard Creek	•		•			2
Mud Creek	•				•	2

Table 8.1 Texas Parks and Wildlife Department Recommendations for Designation as Ecologically Unique River and Stream Segments (Cont.)

East Texas Region I River or Stream Segment	Biological Function	Hydrologic Function	Riparian Conservation Area	High Water Quality / Aesthetic Value	Threatened or Endangered Species / Unique Communities	Total # of Criteria Met
Upper Neches River	•		•	•	•	4
Lower Neches River	•		•	•	•	4
Pine Island Bayou			•			1
Piney Creek			•	•	•	3
Upper Sabine River (Panola)	•			•	•	3
Middle Sabine River (Newton)	•			•		2
Lower Sabine River (Orange)	•		•			2
Salt Bayou	•		•			2
San Pedro Creek			•			1
Sandy Creek (Trinity)			•		•	2
Sandy Creek (Shelby)					•	1
Taylor Bayou	•		•			2
Texas Bayou	•		•			2
Trinity River	•		•		•	3
Trout Creek			•			1
Turkey Creek			•			1
Village Creek	•		•	•	•	4
White Oak Creek				•		1

Table 8.2 Texas Parks and Wildlife Department Threatened and Endangered Species/Unique Communities

Threatened / Endangered Species	Angelina River	Attoyac Bayou	Camp Creek	Catfish Creek	Hackberry Creek	Lynch Creek	Mud Creek	Upper Neches River	Lower Neches River	Piney Creek	Sabine River	Sandy Creek	Trinity River	Village Creek
Paddlefish	•							•	•		•			
Creek chubsucker			•		•	•		•		•		•		
Sandbank pocketbook freshwater mussel									•					
Texas heelsplitter freshwater mussel									•				•	
Neches River rose-mallow							•	•						
Rough-stem aster				•										
Triangle pigtoe freshwater mussel		•												
Blue sucker								•						
Unique community								•	•					•

The intent of the Texas Legislature regarding the purpose of the unique stream segment designation is stated in Section 16.051(f) of the Texas Water Code:

> *This designation solely means that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in a specific river or stream designated by the legislature under this subsection.*

Based on this section of the law, it would be irrelevant to consider recommending a segment for designation if it does not have potential to be a reservoir site. Five of the nine stream segments identified for further evaluation are not currently considered as potentially suitable for reservoir construction. Therefore, these segments have been eliminated from further consideration at this time. These segments are as follows:

- Upper Angelina River (Segment 0611; Nacogdoches County)
- Big Sandy Creek (Segment 0608B)
- Catfish Creek (Segment 0804G)
- Trinity River (Segment 0803/0804)
- Village Creek (Segment 0608)

Four segments include reaches that have been identified as potentially suitable for a reservoir site as follows:

- Upper and Lower Neches River (Segment 0601/0602/0604) – Rockland Reservoir
- Piney Creek (Segment 0604D) – Rockland Reservoir
- Upper Sabine River (Segment 0505; Panola County) – Lake Stateline and Lake Carthage

Limited information exists on the relative value of using these sites for a reservoir compared to maintaining a riverine environment. Prior to proceeding with the construction of a reservoir at any of these sites, extensive environmental studies must be conducted to determine the extent and nature of potential environmental impacts and whether these impacts can be effectively mitigated. The information obtained through such environmental studies is the type of data needed to provide a basis for decisions regarding the relative merits of constructing a reservoir or preserving a riverine environment. No regulatory purpose has been identified that would be served by a unique stream segment designation, other than precluding reservoir construction. Indeed, there are currently extensive regulations and programs to protect the environment in the ETRWPA.

The ETRWPA has a high proportion of land that has been assigned a special protective status; this land is summarized in Table 8.3 below. In addition to the land shown below, there are multiple state parks, state historic sites, and the Alabama and Coushatta Indian Reservation. Areas of the ETRWPA that are not part of a state or federal preserve are also protected by various regulatory programs that require environmental assessments for activities that could adversely affect the environment.

Table 8.3 Land with a Special Protective Status

Name	Acreage
Alabama Creek Wildlife Management Area	14,600
Alazan Bayou Wildlife Management Area	2,100
Angelina National Forest	153,200
Big Lake Bottom Wildlife Management Area	4,100
Big Thicket National Preserve	106,300
Davy Crockett National Forest	160,600
E.O. Siecke State Forest	1,700
Engeling Wildlife Management Area	11,000
J.D. Murphree Wildlife Management Area	24,300
Lower Neches Wildlife Management Area	8,000
McFaddin and Texas Point National Wildlife Refuges	67,800
Neches River National Wildlife Refuge	25,000*
Sabine National Forest	160,900
Tony Houseman Wildlife Management Area	3,300

*The current size of the Neches River National Wildlife Refuge is 7,000 acres; ongoing land acquisitions will potentially expand the refuge to 25,000 acres.

There continues to be concern among many regional water planning groups (including the ETRWPG) that designation of a stream segment might lead to unwarranted restrictions on the use of the segment, including water diversions and discharges of treated effluent. As in 2015 and 2021, at the January 2025 meeting, the ETRWPG considered the above information and voted not to recommend any stream segments in the region for unique status. The ETRWPG concluded that sufficient programs are already in place to protect the region's streams from inappropriate reservoir construction. In addition, the ETRWPG prefers to allow the TWDB to study issues associated with unique stream segment designation before further considering potential designations in the ETRWPA.

8.3 UNIQUE RESERVOIR SITES

Regional water planning guidelines allow regional water planning groups to recommend sites of unique value for construction where:

(1) Site-specific reservoir development is recommended as a specific water management strategy; or

(2) The location, hydrologic, geologic, topographic, water availability, water quality, environmental, cultural, and current development characteristics, or other pertinent factors make the site uniquely suited for reservoir development to provide water supply.

The ETRWPA has a long history of water supply planning and reservoir development. Numerous sites have been identified as being hydrologically and topographically ideal for reservoir development. Two sites in the ETRWPA are currently designated as unique reservoir sites: Lake Columbia and Fastrill Reservoir. Fastrill Reservoir was designated by the 79th Legislature through 2007 Texas Legislature Senate bill 3. Lake Columbia received its unique designation by the State Legislature, Senate Bill 1362. Lake Columbia is currently being pursued for development. The ETRWPG fully supports the designation of these two reservoir sites as unique.

The ETRWPG considered other potential reservoir sites for possible designation as unique but did not recommend any additional sites. The considered sites are described in Sections 8.3.1 through 8.3.13 below. The ETRWPG agrees with past evaluations of these sites as being hydrologically and topographically unique for reservoir construction. The ETRWPG recognizes that reservoirs can have major impacts on the environment and that protection of the environment is already afforded through a process that is more thorough than the regional water planning effort. The ETRWPG is not recommending these additional sites (i.e., the proposed reservoirs other than Lake Columbia and Lake Fastrill) be designated as unique reservoir sites. The ETRWPG is recommending that these sites be recognized as potential long-term water management strategies for the time period more than fifty years in the future. The ETRWPG believes that the lengthy and thorough economic and environmental review process will determine if any of these reservoirs are constructed as opposed to any decision by the ETRWPG.

The ETRWPG has voted in previous rounds of planning to not recommend any proposed reservoir sites as unique. Proposed sites, including the two sites already designated as unique, are included in Table 8.4.

Table 8.4 Potential Reservoirs for Designation as Unique Reservoir Sites

Major Water Provider	Reservoir Site
Angelina Neches River Authority	Lake Columbia (Already Unique Site)
	Ponta
Lower Neches Valley Authority	Rockland Reservoir
Sabine River Authority	Big Cow Creek
	Bon Wier
	Carthage Reservoir
	Kilgore Reservoir
	Rabbit Creek
	State Hwy. 322, Stage I
	State Hwy. 322, Stage II
	Stateline
	Socagee
Upper Neches River Municipal Water Authority	Fastrill Reservoir (Already Unique Site)

A brief description of each of the above reservoir sites follows. Appendix 8-A contains maps showing the proposed locations for each reservoir.

8.3.1 Lake Columbia (Unique Reservoir Designation)

The reservoir is a project of Angelina and Neches River Authority (ANRA) located predominantly in Cherokee County but extends into the southern portion of Smith County. Figure 8-A.2 indicates the location of Lake Columbia. The reservoir, located in the Neches River Basin in Region I, would be formed by construction of a dam on Mud Creek approximately 2.5 miles downstream of the U. S. Highway 79 crossing. The dam is expected to impound water approximately 14 miles upstream with an estimated surface area of 10,133 acres. The reservoir is permitted for 85,507 ac-ft per year of water. It has a total storage volume at normal pool elevation, 315 feet above mean sea level (msl) of 195,500 acre-feet. State of Texas Senate Bill 1362 designated the site for Lake Columbia as a site of unique value for the construction of a dam and reservoir.

To develop Lake Columbia, ANRA has:

- Secured a water right. Permit 4228, issued in June 1985, allows ANRA to impound up to 195,500 acre-feet in Lake Columbia and to divert up to 85,507 acre-feet per year for municipal, industrial, and recreation purposes.
- Applied for a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers (USACE) in 2000 but was withdrawn in 2020 for insufficient purpose and need definition per USACE. ANRA continues to seek stakeholders who can satisfy the USACE purpose and need criteria requirements and the funding to complete the Section 404 permitting process. As part of the 404 permitting process, ANRA has:
    - Completed a downstream impact analysis.
    - Completed an archaeological field survey.
    - Completed a proposed mitigation plan.

- Worked toward completion of a draft Environmental Impact Statement (EIS).

There have been several bills passed into law that have further confirmed State support of Lake Columbia, including the following:

- SB 1600, 77th (R), 2001, Staples
    - State Water Right amendment extending the deadlines for construction of the reservoir.
- SB 1362, 78th (R), 2003, Staples
    - Renamed the project Lake Columbia, in honor of the space shuttle Columbia disaster;
    - Designated the site as a Unique Reservoir site;
    - Finding by the Legislature that the project was necessary to meet water supply requirements;
    - Legislative intent for the State Participation Program;
    - Rulemaking authority for water quality purposes.
- SB 1360, 81st (R), 2009, Nichols
    - Legislative findings declaring TWDB's interest in the project and the development of the project was in the public's interest;
    - State Water Right amendment removing construction deadlines.
- HB 3861, 81st (R), 2009, Hopson
    - Legislative findings that the project is in the public's interest, the TWDB has committed to acquire an interest in the project and made the determination that the state will recover its investment in the project;
    - Provided TWDB discretion in Making Findings:
        - In making any statutory finding under Section 16.135(1), Water Code, necessary to complete financing of the project, the Board may take into account any revenue reasonably expected to be received from:
            - a political subdivision not currently under contract with the authority to participate in paying the costs of the site acquisition stage of the project; or
            - a political subdivision not currently under contract to purchase a portion of the water to be supplied by the project.
    - The Board is not required to identify a political subdivision from which revenue is reasonably expected to be received as provided by Subsection (a) of this section at the time the Board makes a finding described by that subsection.

8.3.2 Ponta Reservoir

The Ponta Reservoir would be located on Mud Creek in Cherokee County east of Jacksonville, Texas. The dam site is located approximately one mile upstream from the Southern Pacific Railroad crossing over Mud Creek. Figure 8-A.2 in Appendix 8-A indicates the proposed location. The normal pool elevation would be about 302 feet mean sea level (ft msl) and would have an area of 11,000 acres. Storage capacity at normal pool elevation would be 200,000 acre-feet. Previous studies have indicated that the reservoir could provide a dependable yield of 105,000 ac-ft per year. However, with the construction of Lake Columbia the yield would be substantially less.

8.3.3 Rockland Reservoir

The Rockland Reservoir site is located on the Neches River at River Mile 160.4. The top of the flood pool would be at elevation of 174 feet, msl with top of conservation pool of 165 feet, msl. It is estimated the reservoir site would affect 99,524 acres[2] of wildlife habitat. Rockland Reservoir was authorized for construction as a federal facility in 1945, along with Sam Rayburn, B. A. Steinhagen and Dam A lakes. A report in 1947 recommended construction of Sam Rayburn and B. A. Steinhagen with deferral of Rockland Reservoir and Dam A until such time the need develops. Rockland and Dam A were classified as inactive in 1954. A re-evaluation study performed in 1987 identified the potential for significant benefits in the areas of flood control, water supply, hydropower, and recreation.

8.3.4 Big Cow Reservoir

The Big Cow Reservoir is a proposed local water supply project on Big Cow Creek in Newton County. The Big Cow Creek dam site is located about one-half mile upstream from U.S. Hwy 190, west-northwest of the Town of Newton. It is in the Lower Sabine Basin. Figure 8-A.4 indicates the location of the proposed reservoir. The expected yield of the reservoir is 61,700 ac-ft per year with a storage capacity of 79,852 ac-ft and an area of 4,618 acres. The conservation level would be 212 feet msl.

The perennial streams that feed Big Cow Creek and abundant rainfall should provide sufficient inflow for considerable yield for a reservoir of this size.

8.3.5 Bon Wier Reservoir

The Bon Wier dam site is located on the state line reach of the Sabine River in Newton County, Texas and Beauregard Parish, Louisiana. The reservoir would extend from about 5 miles upstream of U.S. Hwy 190 to approximately Highway 63. Figure 8-A.4 indicates the location of the proposed reservoir. It was originally proposed for re-regulation of the hydropower discharges from Toledo Bend Reservoir and for the generation of hydropower. The reservoir, if constructed, would yield 440,000 ac-ft per year at a normal operating elevation of 90 feet above msl. The area and capacity would be 34,540 acres and 353,960 acre-feet, respectively.

It is estimated that the Bon Wier Reservoir would affect 35,000 acres of wildlife habitat.[2] This includes several acid bogs/baygalls, which are unique and sensitive areas of the region. Several threatened and endangered species are known to occur in this area. No cultural resource survey has been conducted, but the site is expected to affect numerous archeological and historical sites in both Texas and Louisiana. The Clean Rivers Program Water Quality data reported possible concerns for elevated total dissolved solids and low dissolved oxygen during the summer months. The site also requires congressional approval for construction of a dam, because it is on interstate navigable waters of the U.S.

8.3.6 Carthage Reservoir

The Carthage Reservoir is a proposed main stem project on the Sabine River in Panola, Harrison, Rusk and Gregg counties. It is located immediately upstream of the U.S. Highway 59 crossing and downstream of the City of Longview. Figure 8-A.1 indicates the proposed location. The yield of this reservoir, if constructed, would be approximately 537,000 ac-ft per year at a conservation pool elevation of 244 feet msl. The area and capacity would be 41,200 acres and 651,914 acre-feet, respectively.

Developmental concerns for Carthage Reservoir include bottomland hardwoods, aquatic life, lignite deposits, and cultural resources. The downstream half of the site encompasses a U.S Fish and Wildlife Service Priority 1 bottomland hardwood area. This portion of the Sabine River is designated a significant stream segment and is home to several protected aquatic species.[3] Other potential conflicts with this site include oil and gas wells. Permitting for this reservoir will require an act of Congress since the dam is located on navigable interstate waters of the U.S. There is one active lignite mine, South Hallisville Mine No. 1, near the reservoir boundary.

The water quality assessment of the Sabine River (Sabine River Authority of Texas, 1996) indicates this segment of the river has possible concerns for nutrients, but the water quality is improving. The advantage of this reservoir is its large yield. The estimated yield of 537,000 ac-ft per year would provide for all projected needs well beyond the year 2060.

8.3.7 Kilgore Reservoir

The Kilgore Reservoir is a proposed local water supply project located on the Upper Wilds Creek in Rusk, Gregg, and Smith counties. Figure 8-A.1 indicates the proposed location of the reservoir. It was originally proposed to supplement the City of Kilgore's water supply. The project would provide a yield of 5,500 ac-ft per year at the normal operating elevation of 398 feet msl. At that level, the area and capacity would be 817 acres and 16,270 acre-feet, respectively.

Construction of this reservoir has never been initiated, and the City of Kilgore is using diversions from the Sabine (purchased from Sabine River Authority of Texas and released from Lake Fork) and ground water for its water supply. However, this project still has the potential as a local water supply source in the Kilgore area should other proposed projects not be developed. Only preliminary studies have been performed on the Kilgore Reservoir and no environmental impacts have been assessed. Based on preliminary screening data, the site is not located within a priority bottomland hardwood area; there are no known water quality issues and no active mines within the reservoir site.

8.3.8 Rabbit Creek Reservoir

Several reservoir projects have been proposed on Rabbit Creek for local water supply. The latest proposal for the City of Overton and surrounding communities was completed in 1998. The proposed reservoir project is located on Rabbit Creek in Smith and Rusk counties and would have a firm yield of 3,500 ac-ft per year. Figure 8-A.1 indicates the proposed location of the reservoir. This is considerably less yield than the previous studies, which is due in part to the smaller storage capacity and conservative inflows that were assumed for the study. In the latest study, the area would be 520 acres, and the capacity would be 8,000 acre-feet at a conservation level of 406 ft msl. However, this yield is considered satisfactory to meet the regional demands of the area. Environmental review of the site reports no significant concerns that would preclude development. There are also no significant cultural resources in the area, no known water quality issues, and no active mining within the reservoir area.

The advantages of this reservoir site are the few developmental concerns. However, it was rejected as a water supply alternative in the 1998 study due to costs. A large percentage of the total costs were associated with a water treatment and distribution system. Due to the relatively low yield of Rabbit Reservoir, this project could only be considered for local water supply.

8.3.9 State Highway 322 Stage I

The Highway 322 Reservoir is a proposed local water supply project in Rusk County, upstream of Lake Cherokee. Figure 8-A.1 indicates the proposed location. The project, as originally proposed, was to be developed in two stages: 1) a dam and reservoir on Tiawichi Creek (Stage I), and 2) a separate dam and reservoir on Mill Creek (Stage II). The reservoirs were to be joined by a connecting channel that would allow one spillway to serve both dams.

The proposed Stage I dam is located on Tiawichi Creek, approximately one mile upstream of its confluence with the upper end of Lake Cherokee. The reservoir, at its normal operating elevation of 330 feet msl, would provide a net yield of 22,000 ac-ft per year. Its area and capacity would be 4,450 acres and 82,450 acre-feet, respectively. If Stage I is operated independently from Lake Cherokee, the firm yield of the reservoir would be reduced due to Lake Cherokee's superior water rights.

The primary developmental concern for the Stage I reservoir is active lignite mining. In 1995, the Oak Hill Mine expanded its current permit area to include approximately one third of the proposed Stage I reservoir area. There have been no environmental studies conducted for this site. Based on preliminary screening, the site is located outside priority bottomland hardwood areas, and there are no known water quality issues.

8.3.10 State Highway 322 Stage II

The State Highway 322 - Stage II reservoir is the second phase of the State Highway 322 water supply project in Rusk County. The Stage II dam would be located on Mill Creek, approximately one mile upstream of the existing Lake Cherokee. Figure 8-A.1 indicates the proposed location. Operated at the same level as Stage I (330 feet msl), this project would provide an increased yield to the Cherokee Lake system of 13,000 ac-ft per year with added storage capacity of 112,000 acre-feet. Stage II surface area would be 2,060 acres. The State Highway 322 project (Stages I and II) and Lake Cherokee could be operated as a system to provide a total yield of 53,000 ac-ft per year and maintain the recreational and aesthetic benefits currently provided by Lake Cherokee. If State Highway 322 project were operated independently from Lake Cherokee, the firm yield would be reduced due to Lake Cherokee's superior water rights.

The primary developmental concern for Stage II is the active lignite mining. Surface mining records indicate that the Oak Hill Mine permit encompasses much of the Stage II reservoir. Preliminary screening indicates no priority bottomland hardwoods in the reservoir area, and there are no known water quality issues. The advantages to this reservoir site are its location near the areas with projected water needs and the possibility that when mining is completed, the site will already be cleared and ready for reservoir development.

8.3.11 Stateline Reservoir

The Stateline Reservoir is a proposed main stem project on the Sabine River, approximately eight miles upstream of Logansport, Louisiana and about four miles upstream from the headwaters of Toledo Bend Reservoir. Figure 8-A.1 indicates the proposed location. The project site is located in the southeastern section of Panola County and would have an estimated yield of 280,000 ac-ft per year. At the conservation level of 187 feet msl, the area and capacity would be 24,100 acres and 268,330 acre-feet, respectively.

Developmental concerns for this site include bottomland hardwoods, oil and gas wells, water quality, and permitting issues. The northern half of the site lies in a USFWS designated Priority 1 hardwood area. The southern half is a high-quality wetland area and currently being considered for a wetland mitigation bank by the Sabine River Authority of Texas. The mineral rights associated with the Carthage Oilfield significantly affect land acquisition for the reservoir. The Clean Rivers Program Water Quality data indicated possible concerns for elevated nutrient levels, metals, low dissolved oxygen, and fecal coliform. This segment of the stream is also a known habitat for several protected aquatic species. Permitting for this reservoir will require an act of Congress since the dam is located on navigable interstate waters of the U.S. (Rivers and Harbors Act, 1899). Construction of the dam and reservoir may also require consent of Louisiana for the part that will affect the state of Louisiana (Sabine River Compact). As currently proposed, the dam site is located immediately upstream of the Stateline reach and there is minimal impact to Louisiana lands. However, due to the close proximity of Toledo Bend Reservoir, it is unlikely that Stateline Reservoir would be more economical than Toledo Bend in meeting the needs of the Upper Basin.

8.3.12 Socagee Reservoir

The Socagee Reservoir site is located in the eastern portion of Panola County on Socagee Creek, approximately six miles upstream of its mouth. Figure 8-A.1 indicates the proposed location. The reservoir, at normal pool elevation, would have a yield of 39,131 ac-ft per year. The reservoir area would be approximately 9,100 acres and the capacity would be about 160,000 acres.

Approximately 40 percent of the site overlies existing lignite deposits. As of 1986, there was no known exploitation of the lignite deposits, and there currently are no active mines within the area. One cultural resource site is reported in the reservoir boundary. There are no known water quality issues or priority bottomland hardwoods that affect this reservoir site. Socagee Reservoir could be used to meet the local needs of Panola County; however, Lake Murvaul, which has been designated for Panola County use only, has adequate yield to meet the future needs of Panola County.

8.3.13 Fastrill Reservoir

Fastrill Reservoir is a long-standing project of the City of Dallas and Upper Neches River Municipal Water Authority, and the site was designated as unique by the Texas Legislature in 2007. Subsequently, actions at the federal level to designate a wildlife refuge within the footprint of the proposed lake have called into question the lake’s ultimate viability. However, because of the site’s designation by the Texas Legislature, the ETRWPG has decided not to eliminate it from the list of proposed reservoirs in the ETRWPA at this time. The reservoir would be located on the Neches River in Anderson and Cherokee Counties downstream of Lake Palestine and upstream of the Weches Dam site. The dam would be located at River Mile 288. Figure 8-A.2 indicates the proposed location. Normal pool elevation would be at an elevation of 274 ft msl and would have an area of 24,950 acres based on digital topographic information.

8.4 LEGISLATIVE AND REGULATORY RECOMMENDATIONS

Rules in 31 Texas Administrative Code 357.43(d – f) state that regional water planning groups are to consider and make recommendations to the legislature regarding regulatory, administrative, or legislative issues that the group believes are needed and desirable to achieve the stated goals of state and regional water planning, including to:

(1) Facilitate the orderly development, management, and conservation of water resources;
(2) Prepare for and respond to drought conditions; or
(3) Facilitate more voluntary water transfers in the region.

For this update of the regional water plan, the ETRWPG discussed legislative and regulatory recommendations. The Executive Committee of the ETRWPG also reviewed previous recommendations made pursuant to the planning process and evaluated new potential recommendations. Proposed recommendations were brought to the ETRWPG at the September 18, 2024, meeting for consideration. Following is a list of recommendations adopted by the ETRWPG on January 7, 2025.

The ETRWPG offers the following policy and legislative recommendations, divided by topic.

8.4.1 Flexibility in Determining Water Plan Consistency

In previous planning cycles, the ETRWPG has expressed concerned that small cities and unincorporated areas that fall under the group of “county-other” may not have specific water needs and water management strategies identified in the regional water plan due to the nature of aggregating these entities. As such, there is concern that these entities may not be eligible for state funding assistance. The ETRWPG is also concerned that there is not sufficient flexibility in identifying and implementing water management strategies as it pertains to permitting and funding such projects. Water suppliers need to have a full range of options as they seek to provide new water supplies for Texas' future. It is impossible to foresee all the possibilities for new water supplies in a planning process such as this, and changing circumstances can change the timing, amounts, and preferred options for new supplies very quickly. The inclusion of alternate strategies in regional water planning is the first step in providing this flexibility. In addition, the ETRWPG recommends that the following steps be taken to address these concerns:

- The TWDB and the TCEQ should continue to interpret existing legislation to give the maximum possible flexibility to water suppliers as they seek to serve the public and provide new supplies. Changes in the timing of supply development, the order in which strategies are implemented, the amount of supply from a management strategy, or the details of a project should not be interpreted as making that project inconsistent with the regional plan. TWDB should continue to evaluate improvements to guidance and outreach to small systems as well as continue consistency waivers for funding commitments, taking RWPG input into consideration into such decisions.

- Willing buyer/willing seller transactions of water rights and treated water should continue to not be controlled by this regulation. Such transactions may be beneficial to all concerned and may simply not have been foreseen in the planning process.

- The TWDB and TCEQ should encourage and continue to make use of their ability to waive consistency requirements if local water suppliers elect strategies that differ from those in the regional plan. TWDB developed a January 2023 fact sheet outlining the waiver process (available at https://www.twdb.texas.gov/waterplanning/rwp/education/WaterPlanning_ConsistencyReviews.pdf)

In the previous round of planning, the TWDB has allowed for the use of sub-WUG planning, allowing for WUGs to be subdivided into sub-WUG level units for purposes of doing more detailed analysis and accounting to better account for and present water supplies and needs within, for example, county-other WUGs. The 2026 Plan does not include any sub-WUGs, but the RWPG will consider the creation of such at the request of an existing utility, public water system, or representative of a geographic area within an ETRWPA WUG that meets the TWDB criteria for a sub-WUG.

8.4.2 Continued Funding by the State of the Regional Water Planning Process on a Five-Year Cycle

The ETRWPG believes the grassroots planning effort created by Senate Bill 1 is important to the state of Texas and should be continued. In addition, the ETRWPG believes that the most fair and efficient method of financing continuation of this effort for future planning cycles is to continue funding of this effort by the state with administrative expenses for the region being provided from sources within the region. Improvement of data for the next planning cycle is very important, and state funding for those efforts needs to be made available.

The TWDB has requested additional funding for RWPGs through the agency's Legislative Appropriations Request (LAR). Additionally, the TWDB made changes to its administrative rules in 2021 to allow use of existing funds for limited administrative costs, including salaries and wages related to administrative work for the RWPG sponsors (designated political subdivision). These allowances and limitations are specified in the regional water planning grant contracts and should be continued.

8.4.3 Unique Reservoir Designation

Two unique reservoir sites are located in the ETRWPA. Lake Columbia was designated as a unique reservoir site by the 78th Texas Legislature in 2003. Lake Fastrill was designated by the 80th Texas Legislature in 2007, subject to the following provision: "unless there is an affirmative vote by a proposed project sponsor to make expenditures necessary in order to construct or file applications for permits required in connection with the construction of the reservoir under federal or state law". Loss of this designation for Lake Columbia or Lake Fastrill could unnecessarily limit the ability of sponsors of these proposed reservoirs to develop these sites. The ETRWPG recommends that the designation of unique reservoir site for Lake Columbia and Lake Fastrill be retained through the current planning horizon, 2080, or until such time as the Texas legislature alters its designation Due to the federally regulated wildlife area.

8.4.4 Water Reuse

The ETRWPG recommends that current regulations as they pertain to the reuse of treated wastewater (i.e., water reuse) should continue to be reviewed and amended, as necessary, to encourage the development of these resources.

The following updates towards water reuse have occurred since the last planning cycle:

- Direct Potable Reuse (DPR) Guidelines - Effective Date: September 1, 2021
    - Senate Bill 905 from the 87th Legislative Session required the Texas Commission on Environmental Quality (TCEQ) to develop regulatory guidance for Direct Potable Reuse (DPR). This resulted in the creation of a guidance manual dated November 2022 outlining the rules and requirements for DPR projects in Texas.
- Changes to Chapter 321- Effective Date: June 18, 2023
    - Senate Bill 1289 from the 88th Legislative Session led to amendments in Chapter 321 of the Texas Administrative Code. These changes facilitate the onsite reuse of treated wastewater by allowing reclaimed water production facilities to dispose of treated wastewater through a collection system to an associated domestic wastewater treatment facility, provided they have the necessary consents.

- Proposed Changes to Chapter 217
  - Proposed updates to Chapter 217 include new design criteria for domestic wastewater systems. These changes impact nonpotable reuse by setting minimum pressure and chlorination requirements, among other updates.

8.4.5 Funding

In order to take advantage of the variety of funding options available through the TWDB, increased flexibility by the agency is needed.

For example, the TWDB does not provide for sufficient flexibility in categorical exclusions (CE), last updated in 2016, for Environmental Information Documents that are required for funding of water projects. An Environmental Information Document is a comprehensive impact assessment report prepared by the project proponent, which is required for federally funded projects that do not qualify for CE, but fall below the threshold for preparation of an Environmental Impact Statement. Although TWDB's rules for CEs in the State Revolving Fund (SRF) programs are consistent with the SRF requirements, increasing flexibility regarding these exclusions could maximize funding opportunities available for water projects.

The TWDB offers the Economically Distressed Areas Program (EDAP) to certain areas in need of water projects. The EDAP provides grants, loans, or combination grant/loans when requirements are met:

- for water and wastewater services;
- in economically distressed areas; and
- present facilities are inadequate to meet residents' minimal needs.

Although TWDB implements the EDAP funding programs within current statutory requirements, the requirements to meet the EDAP remain unchanged since the last cycle and are very difficult for local governments and areas to administer, causing otherwise eligible local governmental entities to elect to not pursue the EDAP funding. EDAP requirements are recommended to be revised to reduce unnecessary and difficult requirements for eligibility, including requirements for model subdivision planning.

8.4.6 Uncommitted Surface Water

The Texas Water Code currently allows the TCEQ to cancel any water right, in whole or in part, for ten consecutive years of non-use. This rule inhibits long-term water supply planning as water supplies are often developed for ultimate capacity to meet needs far into the future. Some entities enter into contracts for supply that will be needed long after the first ten years. Many times, only part of the supply is used in the first ten years of operation.

The regional water plans identify water supply projects to meet water needs over a 50-year use period. In some cases, there are water supplies that are not currently fully utilized or new management strategies that are projected to be used beyond the 50-year planning period. To support adequate supply for future needs and encourage reliable water supply planning, the ETRWPG:

- Opposes unilateral cancellation of uncommitted water contracts/rights;

- Supports long term contracts that are required for future projects and drought periods; and

- Supports “interruptible” water supply contracts as a way to meet seasonal and short-term needs before long-term water rights are fully utilized.

8.4.7 Standardized Processes for Regional Water Plan Development

The process of permitting a federal water project, such as a reservoir, is a long, detailed, and resource intensive project that must follow federal guidelines of the National Environmental Policy Act (NEPA) process. The ETRWPG recommends that the TWDB develop guidelines for regional water planning evaluations of federally permitted water projects that will produce documentation that can be integrated and used in the NEPA process. In addition, the TWDB is encouraged to continue to develop relationships with federal authorities to allow the use of the state and regional water planning population projections in the NEPA process.

The TWDB has coordinated with United States Army Corps of Engineers (USACE) and Environmental Protection Agency (EPA) on streamlining permitting processes for projects in the state water plan, including developing a better understanding of how population projections are developed for state planning efforts. TWDB should continue to work with these federal agencies to improve their understanding of the data developed during the water planning process.

8.4.8 Funding for Additional Groundwater Modeling

The ETRWPG recommends that funding for groundwater modeling for development of desired future conditions (DFCs) and modeled available groundwater (MAGs) be provided to the TWDB. This would improve the development of DFCs and MAGs by enabling a consistent, standardized approach across Groundwater Conservation District (GCD) boundaries to groundwater modeling. In addition to funding models, funds should be made available to assist the Groundwater Management Areas with the expenses related to developing the DFCs. The Environmental Defense Fund (EDF) issued a January 2023 report recommending more funding for DFCs, but there has been no legislative action as of December 2024; however, the upcoming legislative session is anticipated to include some assistance to this issue.

8.4.9 Clarification of Unique Stream Segment Criteria

Consideration of the designation of stream segments of unique ecological value (unique stream segments) is a component of regional water planning throughout the State. For some, however, there is a significant concern about the use of unique stream segments because of a lack of clarity about how the designation might be used in the future. In particular, there are concerns about the possibility of restriction of property rights for landowners adjacent to designated unique stream segments. The ETRWPA recommends clarifications be incorporated into the regional water planning process on a statewide basis. For example, the following was presented as House Bill 1016 of the 84th Texas Legislature (specific to the Region L Water Planning Area), providing clarification by stating that the designation of a river or stream segment as being of unique ecological value:

1. means only that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in the designated segment;

2. does not affect the ability of a state agency or political subdivision of the state to construct, operate, maintain, or replace a weir, a water diversion, flood control, drainage, or water supply system, a low water crossing, or a recreational facility in the designated segment;

3. does not prohibit the permitting, financing, construction, operation, maintenance, or replacement of any water management strategy to meet projected water supply needs recommended in, or designated as an alternative in, the 2011 or 2021 Regional Water Plan, and

4. does not alter any existing property rights of an affected landowner.

8.4.10 Interregional Planning Council

The TWDB received the Interregional Planning Council report on March 4, 2024. This report outlines a series of recommendations as they pertain to the three charges enlisted to the Interregional Planning Council. The three charges are:

1. improve coordination among the regional water planning groups, and between each regional water planning group and the Board, in meeting the goals of the state water planning process and the water needs of the state as a whole;
2. facilitate dialogue regarding water management strategies that could affect multiple regional water planning areas; and
3. share best practices regarding operation of the regional water planning process.

The ETRWPG supports the Interregional Planning Council and its recommendations. Some of these recommendations are addressed in earlier sections or are currently being implemented by Region I. The interregional coordination efforts of Region I are discussed in Chapter 10.

8.4.11 Voluntary Water Transfer

The ETRWPG considered making legislative recommendations to facilitate more voluntary water transfers in the region; however, no recommendations were made for this cycle.

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Chapter 9: Implementation and Comparison to the Previous Regional Water Plan

2026 Initially Prepared Plan

Prepared for:

East Texas Regional Water Planning Group

February 2025

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APPENDICES

Appendix 9-A: Water Management Strategy Implementation Survey

LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ANRA	Angelina and Neches River Authority
AN WCID #1	Angelina-Nacogdoches Water Control & Improvement District No. 1
DWSRF	Drinking Water State Revolving Fund
EDAP	Economically Distressed Areas Program
ETRWPA	East Texas Regional Water Planning Area
ETRWPG	East Texas Regional Water Planning Group
HC WCID #1	Houston County Water Control & Improvement District No. 1
MWA	Municipal Water Authority
SWIFT	State Water Implementation Fund
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TWDB	Texas Water Development Board
UNRMWA	Upper Neches River Municipal Water Authority
WIF	Water Infrastructure Fund'
WMS	Water Management Strategy
WMSP	Water Management Strategy Projects
WUG	Water User Group
WWP	Major Water Provider

9 IMPLEMENTATION AND COMPARISON TO THE PREVIOUS REGIONAL WATER PLAN

Chapter 9 includes a summary of the level of implementation of the 2021 East Texas Regional Water Plan (2021 Plan) recommended Water Management Strategies (WMS) to meet projected needs, as well as a brief comparison of the 2021 Plan and the 2026 East Texas Regional Water Plan (2026 Plan).

9.1 IMPLEMENTATION OF PREVIOUS REGIONAL WATER PLAN

Title 31 of the Texas Administrative Code (TAC) §357.45(a) requires the 2026 Plan to report the level of implementation and identified implementation impediments of recommended WMSs and Water Management Strategy Projects (WMSPs) meeting needs in the 2021 Plan.

9.1.1 Texas Water Development Board Implementation Survey

The East Texas Regional Water Planning Group and consultants were responsible for gathering information on the implementation, and reported impediments to implementation, of water management strategies included in the previous regional water plan. Methods used to gather information included:

- Contacting WMS project sponsors through electronic surveys sent out throughout the planning cycle by the ETRWPG;
- Tracking changes in Water User Group (WUG) and Major Water Provider (WWP) available water supplies and infrastructure since completion of the 2021 Plan;
- Identifying WMSs that are not recommended in the 2021 Plan that could be applicable to the 2026 Plan;
- Reviewing Texas Water Development Board (TWDB) funding records to identify projects in the region (SWIFT [State Water Implementation Fund for Texas], WIF [Water Infrastructure Fund], State Participation, DWSRF [Drinking Water State Revolving Fund], EDAP [Economically Distressed Areas Program], etc.); and,
- Local knowledge of ETRWPG members and consultants;
- Analyzing conservation implementation reports submitted to the TWDB.

An implementation survey reporting workbook was developed by TWDB to compile consistent and detailed information on the implementation status of WMSs and WMSPs in the 2021 regional water plans. This implementation survey was completed by the ETRWPG based on data from the sources listed above. The results of this survey are presented in Appendix 9-A.

The following sections discuss WMSs and WMSPs that were recommended in the 2021 ETRWP and have been partially or completely implemented since the adoption of that Plan. These WMSs or portions thereof which have been implemented are not included as WMSs in the current RWP, but are instead reflected as existing supplies. More detailed discussion regarding the implementation status of specific strategy types, including reservoirs, large-scale brackish groundwater development, and seawater desalination can be found in Chapter 5B.

9.1.2 Conservation

Municipal conservation was a recommended WMS for several municipal water user groups (WUGs) in the 2021 ETRWP. The recommended municipal conservation WMS in the 2021 ETRWP included conservation practices such as enhanced public and school education, water conservation pricing, and an enhanced water loss control program. It is assumed that some extent of municipal conservation and water loss reduction practices have been implemented across the ETRWPA since the development of the 2021 Plan, particularly in cases where a WUG has an active Water Conservation Plan (WCP). Chapter 5C provides an analysis of current conservation efforts in the ETRWPA, including an assessment of best management practices documented in WCPs. Municipal conservation continues to be a recommended WMS in the 2026 ETRWP.

9.1.3 Groundwater

A recommended WMS and WMSP in the 2021 ETRWP and Region C Plan involved Athens Municipal Water Authority (AMWA) developing additional groundwater supplies. In 2023, AMWA constructed a new groundwater well that has the capacity to produce 1 million gallons per day (MGD).

9.1.4 Voluntary Redistribution

In the 2021 ETRWP, several WMSs were recommended that involved purchase of water (i.e., voluntary redistribution) from a wholesale water provider to meet projected demands. Although no specific projects were identified, recent historical water use data indicates that additional water supply is being purchased from wholesale water providers in the ETRWPA to meet demands for both municipal and non-municipal uses. For example, manufacturing water use in Jefferson County from the Lower Neches Valley Authority (LNVA) has increased substantially since the 2021 Plan. Additionally, the City of Lufkin has been providing water supply to manufacturing water users in Angelina County and it is assumed that any additional manufacturing demands within the county could be met by Lufkin.

9.2 RWPA'S PROGRESS IN ACHIEVING ECONOMIES OF SCALE

The Region I Regional Water Planning Group (RWPG) has made significant efforts to encourage cooperation between WUGs and MWPs to achieve economies of scale and incentivize WMSs that benefit the entire region. In the 2021 RWP, a total of 23 WMSs and WMSPs were recommended to serve more than one WUG. In the 2026 RWP, a total of 24 WMSs were recommended to serve more than one WUG. Given the nature of MWPs, it is expected that WMSs sponsored by MWPs are likely serving more than one WUG as they are regional WMSs that will provide water supply benefits to the MWP and their customers. The Lake Naconiche Regional Water System project, although not sponsored by any MWP, is another WMS that will serve multiple WUGs in Nacogdoches County. Many of the regional-scale WMSs have been carried forward from the 2021 RWP to the 2026 RWP.

In the ETRWPA, certain recommended strategies are not currently utilized by any entities. This situation arises when a MWP or WUG develops supplies beyond the projected needs of its customers, resulting in a management supply factor greater than 1. This approach is designed to account for uncertainties such as future growth, new customers, and the possibility of a drought more severe than the drought of record.

Since these surplus supplies are retained by the wholesale provider as a margin of safety, they are not allocated to specific WUGs in TWDB Database 27. Instead, they are categorized as 'Unassigned Volumes'. This classification can result in discrepancies between the totals in the TWDB Report 125 ("DB27 RWP Data - Recommended WMS Economies of Scale Analysis Reference") and those presented in this section.

Since the adoption of the 2021 RWP, the project sponsors of several WMSs have taken affirmative actions, such as conducting feasibility studies and environmental assessments, to advance the projects. The sponsors of the two reservoir projects—the Angelina & Neches River Authority (ANRA) for Lake Columbia and the Lower Neches Valley Authority (LNVA) for the West Beaumont Reservoir—have been proactive in ensuring successful implementation through these studies. More detailed discussion regarding the implementation status of these reservoir strategies can be found in Chapter 5B.

The RWPG has made concerted efforts to encourage WMSs and WMSPs to serve more than one WUG and benefit the entire region. These efforts include facilitating stakeholder meetings, promoting inter-agency collaborations, coordinating between contracted customers, and securing funding for joint projects. The RWPG has also worked closely with the TWDB to ensure the smooth implementation of the projects. By fostering a collaborative environment, the RWPG aims to maximize the benefits of WMSs across the region, ensuring sustainable water management for the region.

9.3 COMPARISON TO PREVIOUS REGIONAL WATER PLAN

A comparison of the 2026 Plan to the 2021 plan follows for the following categories of water planning issues:

- Water Demand Projections
- Drought of Record and the hydrologic and modeling assumption(s) on which the 2026 plan is based
- Water Availability
- Existing Water Supplies
    - Water User Groups
    - Major Water Providers
- Identified Needs
    - Water User Groups
    - Major Water Providers
- Water Management Strategies and Water Management Strategy Projects
- Recommended Water Management Strategies and Projects
- Alternative Water Management Strategies and Projects

A WMS is a plan to meet a need for additional water by a discrete water user group, which can mean increasing the total water supply or maximizing an existing supply, including reducing demands. A WMS may or may not require an associated WMSP(s) to be implemented.

A WMSP is a water project that has a non-zero capital cost and that when implemented, would develop, deliver, and/or treat additional water supply volumes, or conserve water for water user groups or major water providers. One WMSP may be associated with multiple WMSs.

9.3.1 Water Demand Projections

The total demand projections for the East Texas Regional Water Planning Area (ETRWPA) increased for every decade from the 2021 Plan to the 2026 Plan, as shown in Figure 9.1and Table 9.1. This increase in demand is largely due to the increase in manufacturing demand.

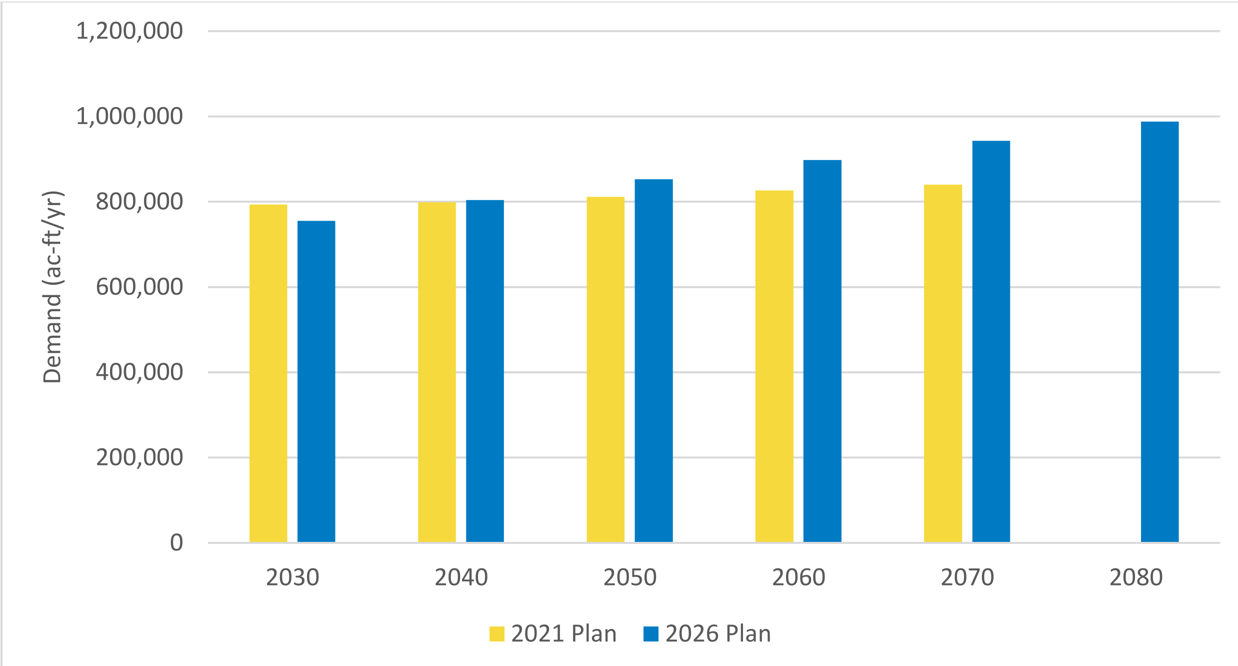

Figure 9.1 Total Projected Demand for the East Texas Regional Water Planning Area from the 2021 and 2026 Plans

Table 9.1 Summary of Projected Water Demands from the East Texas Regional Water Planning Area by Use Category and Decade

2021 Plan Projected Demands (ac-ft/yr)						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Municipal	199,870	207,822	218,266	230,468	243,611	N/A
Manufacturing	353,415	353,415	353,415	353,415	353,415	N/A
Mining	24,547	18,169	15,488	12,986	12,093	N/A
Steam Electric Power	67,011	67,011	67,011	67,011	67,011	N/A
Livestock	50,284	54,029	58,524	63,890	65,103	N/A
Irrigation	98,368	98,368	98,368	98,368	98,368	N/A
2021 Total for ETRWPA	**793,495**	**798,814**	**811,072**	**826,138**	**839,601**	**N/A**

2026 Plan Projected Demands (ac-ft/yr)						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Municipal	214,040	219,630	224,789	226,176	227,792	229,673
Manufacturing	360,181	402,032	444,136	486,507	529,147	572,071
Mining	9,673	9,759	9,847	9,952	10,062	10,179
Steam Electric Power	41,782	41,782	41,782	41,782	41,782	41,782
Livestock	30,001	31,116	32,434	33,979	34,460	34,460
Irrigation	99,429	99,429	99,429	99,429	99,429	99,429
2026 Total for ETRWPA	**755,106**	**803,748**	**852,417**	**897,825**	**942,672**	**987,594**

Percent Change in Projected Demands from 2021 to 2026 Plan						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Municipal	7%	6%	3%	-2%	-6%	N/A
Manufacturing	2%	14%	26%	38%	50%	N/A
Mining	-61%	-46%	-36%	-23%	-17%	N/A
Steam Electric Power	-38%	-38%	-38%	-38%	-38%	N/A
Livestock	-40%	-42%	-45%	-47%	-47%	N/A
Irrigation	1%	1%	1%	1%	1%	N/A
Total for ETRWPA	**-5%**	**1%**	**5%**	**9%**	**12%**	**N/A**

Notes:

Green cells indicate values that are greater in the 2021 Plan compared to the 2026 Plan.

The 2021 Plan developed projections only to 2070, so values for 2080 associated with the 2021 Plan are labeled N/A or not applicable.

9.3.2 Drought of Record

The drought of record varies across different geographic locations in the ETRPWA. As described in Chapter 7, there have been four primary droughts of record in the East Texas Region:

- The drought of the 1950s in the western and central portions of the region.
- The drought beginning in about 1962 and spanning the mid-1960s for eastern and north central portions of the region.

- The drought period in the late 1960s to early 1970s in the north central portion of the region.
- The drought of the early 2010s in the north central portion of the region.

In both plans, surface water supplies were determined using the Texas Commission on Environmental Quality (TCEQ) approved Water Availability Models (WAMs). For the 2021 Plan, WAMs used for all major river basins in the ETRWPA (Neches, Sabine, Trinity, Neches-Trinity river basins) incorporated historical hydrologic conditions that occurred between 1940 and 1996. For the 2026 Plan, the WAMs for the Sabine, Trinity, and Neches-Trinity used the same historical hydrologic conditions as the 2021 Plan. However, the 2026 Plan uses an updated version of the Neches River Basin WAM, adopted by TCEQ in 2021, that includes historical hydrologic conditions extended through 2018. This extended hydrology reflected a new drought of record for several reservoirs in the Neches River Basin. . Chapter 7 of the 2026 Plan includes a detailed examination of more recent droughts within the region, including the historical droughts of record for major water supply reservoirs. For a full evaluation of the impact of a potential new drought of record on surface water supply availability across the ETRPWA, the other Water Availability Models (e.g., the Sabine, Trinity, and Neches-Trinity) should be updated by TCEQ to incorporate the hydrologic conditions that have occurred since 1996.

9.3.3 Water Availability

Available water supplies refers to the maximum amount of raw water that could be produced by a source in a drought of record during a repeat of the drought of record, regardless of whether the supply is physically connected to or legally accessible by an entity. The total water availability decreased by 6% from the 2021 Plan to the 2026 Plan, as shown in Figure 9.2 and Table 9.2. This reduction in availability is primarily due to decreases in surface water availability in the Neches River Basin, driven by using an updated WAM with hydrology that captures a new drought (early 2010s), groundwater availability in the Carrizo-Wilcox and Queen City aquifers, and the removal of reuse quantity in Jefferson County due to lack of information.

The available water supplies presented do not include any saline or brackish surface water sources for either the 2021 Plan or 2026 Plan. In the 2021 Plan, saline or brackish surface water supply was included in the available supply total for the region. Saline or brackish surface water is based on water right permits granted by the TCEQ. Generally, brackish surface water supplies in the ETRWPA are run-of-river supplies associated with tidally influenced river segments. In the ETRWPA, several industries are permitted to use brackish water supplies for their manufacturing processes. The 2026 Plan only accounts for freshwater demands and available freshwater supply totals for water users, including manufacturing. .

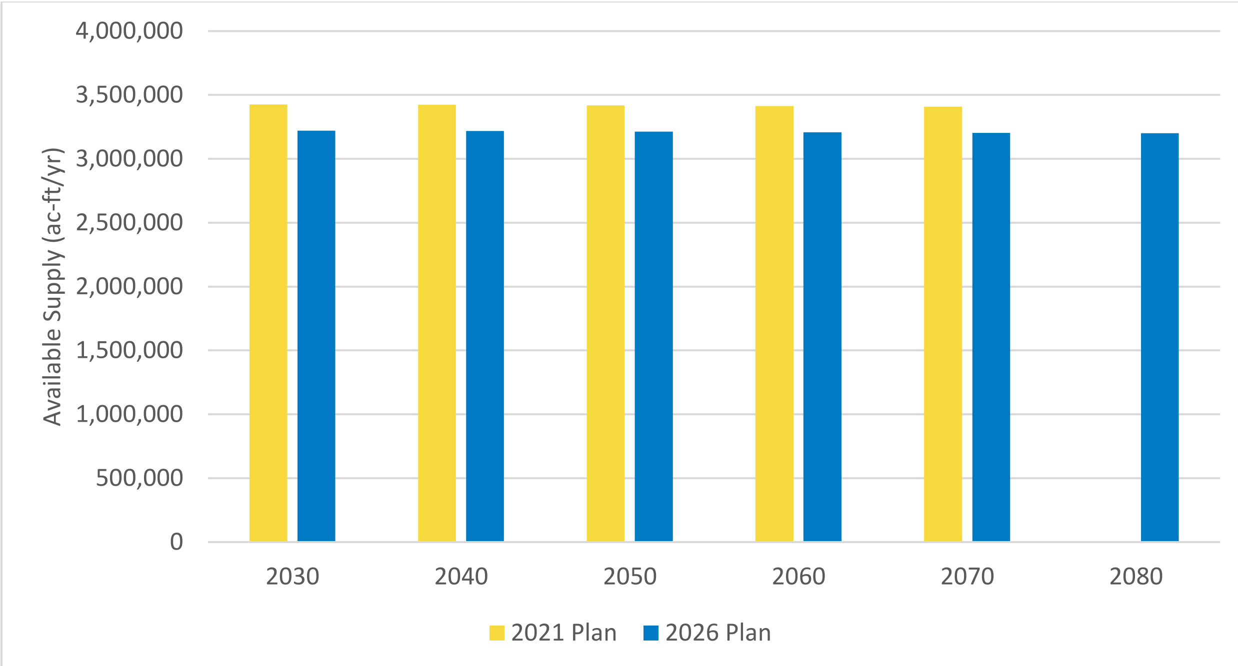

Figure 9.2 Total Available Supply for the East Texas Regional Water Planning Area from the 2021 and 2026 Plans

Table 9.2 Summary of Available Supply in the East Texas Regional Water Planning Area

2021 Plan Available Supply (ac-ft/yr)						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Reservoirs	2,251,402	2,247,600	2,243,702	2,239,008	2,233,125	N/A
Run-of-the-River	589,402	590,340	591,547	592,977	594,258	N/A
Groundwater	1,036,462	1,036,462	1,036,462	1,036,462	1,036,462	N/A
Local Supplies	548,258	548,121	547,520	546,379	545,543	N/A
Reuse	21,783	21,783	21,783	21,783	21,783	N/A
2026 Total for ETRWPA	13,999	14,012	14,023	14,037	14,052	**N/A**
2026 Plan Available Supply (ac-ft/yr)						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Reservoirs	2,112,306	2,107,723	2,103,345	2,098,614	2,094,089	2,089,564
Run-of-the-River	582,231	582,689	583,106	582,924	582,933	583,098
Groundwater	488,746	488,746	488,745	488,745	488,362	488,362
Local Supplies	36,496	36,496	36,496	36,496	36,496	36,496
Reuse	1,601	1,614	1,627	1,638	1,652	1,667
2026 Total for ETRWPA	**-11%**	**-11%**	**-11%**	**-11%**	**-11%**	**-11%**
Percent Change in Available Supply from 2021 to 2026 Plan						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Reservoirs	-6%	-6%	-6%	-6%	-6%	N/A
Run-of-the-River	-1%	-1%	-1%	-2%	-2%	N/A
Groundwater	-11%	-11%	-11%	-11%	-10%	N/A
Local Supplies	68%	68%	68%	68%	68%	N/A
Reuse	-89%	-88%	-88%	-88%	-88%	N/A
Total for ETRWPA	-6%	-6%	-6%	-6%	-6%	**N/A**

Notes:

Green cells indicate values that are greater in the 2021 Plan compared to the 2026 Plan.

The 2021 Plan developed projections only to 2070, so values for 2080 associated with the 2021 Plan are labeled N/A or not applicable.

Values are draft and subjected to change.

9.3.4 Existing Supplies of Water User Groups and Major Water Providers

Existing water supply is the maximum amount of water that is physically and legally accessible from existing sources for immediate use by a water user group under a repeat of a drought of record conditions. When evaluating existing water supplies available to Water User Groups and Major Water Providers in both plans, the ETRWPG considered available information, such as existing infrastructure constraints, historical water usage, water supply contracts, etc. Relevant information available since the adoption of the 2021 Plan was considered to evaluate existing water supplies for the 2026 Plan, which resulted in some changes. The existing water supplies of WUGs increased by 13% in every decade from the 2021 Plan to the 2026 Plan, as shown in Figure 9.3 and Table 9.3. The largest increase in existing supplies occurred for manufacturing water user groups in Jefferson and Orange County who collectively had an average increase in existing supplies between 123,000 and 132,000 acre-feet per year (ac-ft per year) in every decade of the planning period. In recent years, several existing manufacturing facilities have expanded, and new manufacturing facilities have been constructed in Jefferson and Orange counties, which has resulted in substantial increases in use of existing water supplies.

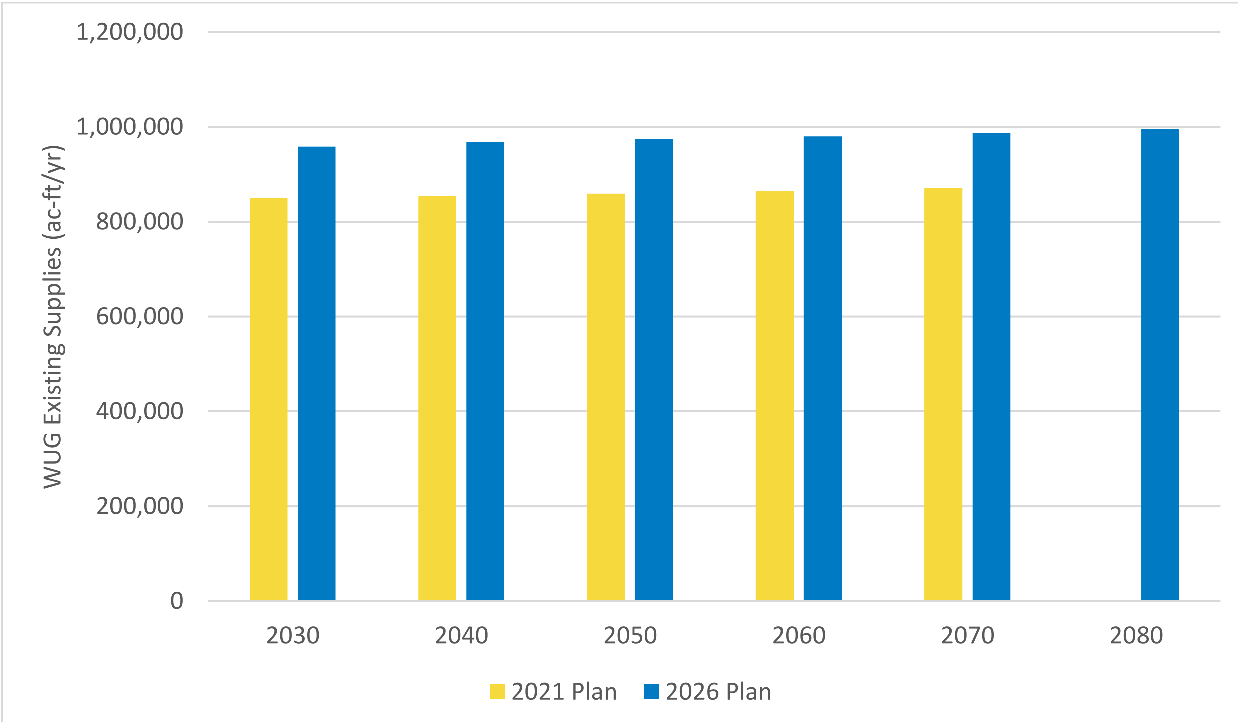

Figure 9.3 Total Existing Supplies of Water User Groups in the East Texas Regional Water Planning Area in the 2021 and 2026 Plans

Table 9.3 Summary of Existing Supplies of Water User Groups in the East Texas Regional Water Planning Area

2021 WUG Existing Supplies (ac-ft/yr)						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Anderson	19,326	19,290	19,183	19,140	19,120	N/A
Angelina	39,004	39,301	39,640	40,009	40,349	N/A
Cherokee	17,965	18,381	18,966	19,641	20,297	N/A
Hardin	8,223	8,356	8,479	8,606	8,710	N/A
Henderson*	8,199	8,139	8,191	7,558	7,148	N/A
Houston	11,670	11,589	11,518	11,445	11,412	N/A
Jasper	96,446	96,282	96,177	96,129	96,117	N/A
Jefferson	359,445	360,495	360,859	361,389	362,053	N/A
Nacogdoches	32,716	33,499	34,400	35,427	36,601	N/A
Newton	16,876	16,915	16,973	17,037	17,109	N/A
Orange	74,688	74,713	74,770	74,840	74,900	N/A
Panola	17,252	17,105	16,680	17,375	17,612	N/A
Polk*	2,747	2,822	2,902	2,975	3,041	N/A
Rusk	65,287	65,656	66,106	66,633	67,180	N/A
Sabine	5,501	5,495	5,493	5,493	5,493	N/A
San Augustine	4,303	4,314	4,326	4,340	4,340	N/A
Shelby	16,044	15,924	16,132	15,355	15,570	N/A
Smith*	41,677	43,722	46,266	49,139	51,977	N/A
Trinity*	1,581	1,575	1,567	1,576	1,584	N/A
Tyler	10,928	10,831	10,757	10,703	10,676	N/A
2021 Total for ETRWPA	**849,878**	**854,404**	**859,385**	**864,810**	**871,289**	**N/A**
2026 WUG Existing Supplies (ac-ft/yr)						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Anderson	23,150	23,276	23,409	23,526	23,647	23,772
Angelina	19,897	20,073	20,202	20,350	20,498	20,651
Cherokee	10,514	10,438	10,334	10,216	10,096	9,974
Hardin	9,669	10,450	11,186	11,130	11,080	11,038
Henderson*	8,636	8,866	8,512	8,183	7,876	7,687
Houston	9,883	9,780	9,692	9,702	9,597	9,503
Jasper	72,591	72,360	72,100	71,865	71,637	71,415
Jefferson	414,908	419,412	419,819	419,581	419,534	419,647
Nacogdoches	39,369	39,953	40,562	41,390	42,235	43,093
Newton	21,915	21,994	22,079	22,180	22,291	22,418
Orange	143,764	143,849	143,920	146,414	150,792	155,335
Panola	15,762	15,811	15,833	15,850	15,850	15,870
Polk*	2,374	2,471	2,557	2,642	2,725	2,805
Rusk	64,595	64,466	64,297	64,123	63,939	63,773
Sabine	3,159	3,212	3,188	3,171	3,158	3,142
San Augustine	4,938	4,949	4,953	4,953	4,953	4,953
Shelby	23,634	23,592	23,555	23,519	23,487	23,457
Smith*	59,274	63,639	68,491	71,190	74,103	77,277
Trinity*	647	647	618	600	580	561

Tyler	9,725	9,569	9,441	9,351	9,266	9,187
2026 Total for ETRWPA	**958,404**	**968,807**	**974,748**	**979,936**	**987,344**	**995,558**
Percent Change in WUG Existing Supplies from 2021 to 2026 Plan						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Anderson	20%	21%	22%	23%	24%	N/A
Angelina	-49%	-49%	-49%	-49%	-49%	N/A
Cherokee	-41%	-43%	-46%	-48%	-50%	N/A
Hardin	18%	25%	32%	29%	27%	N/A
Henderson*	5%	9%	4%	8%	10%	N/A
Houston	-15%	-16%	-16%	-15%	-16%	N/A
Jasper	-25%	-25%	-25%	-25%	-25%	N/A
Jefferson	15%	16%	16%	16%	16%	N/A
Nacogdoches	20%	19%	18%	17%	15%	N/A
Newton	30%	30%	30%	30%	30%	N/A
Orange	92%	93%	92%	96%	101%	N/A
Panola	-9%	-8%	-5%	-9%	-10%	N/A
Polk*	-14%	-12%	-12%	-11%	-10%	N/A
Rusk	-1%	-2%	-3%	-4%	-5%	N/A
Sabine	-43%	-42%	-42%	-42%	-43%	N/A
San Augustine	15%	15%	14%	14%	14%	N/A
Shelby	47%	48%	46%	53%	51%	N/A
Smith*	42%	46%	48%	45%	43%	N/A
Trinity*	-59%	-59%	-61%	-62%	-63%	N/A
Tyler	-11%	-12%	-12%	-13%	-13%	N/A
Total for ETRWPA	**13%**	**13%**	**13%**	**13%**	**13%**	**N/A**

Notes:

*The counties marked with an asterisk are split between two water planning regions. The available supply presented in this table represents only the portion of those counties that are within the boundaries of Region I.

Green cells indicate values that are greater in the 2026 Plan compared to the 2021 Plan.

The 2021 Plan developed projections only to 2070, so values for 2080 associated with the 2021 Plan are labeled N/A or not applicable. Values are draft and subjected to change.

The existing water supplies of MWPs are about the same in every decade in the planning period from the 2021 Plan to the 2026 Plan, as shown in Figure 9.4 and Table 9.4. The largest increases in supply percentages were incurred by city of Tyler. Tyler has been developing its surface water supply infrastructure since the 2021 RWP.

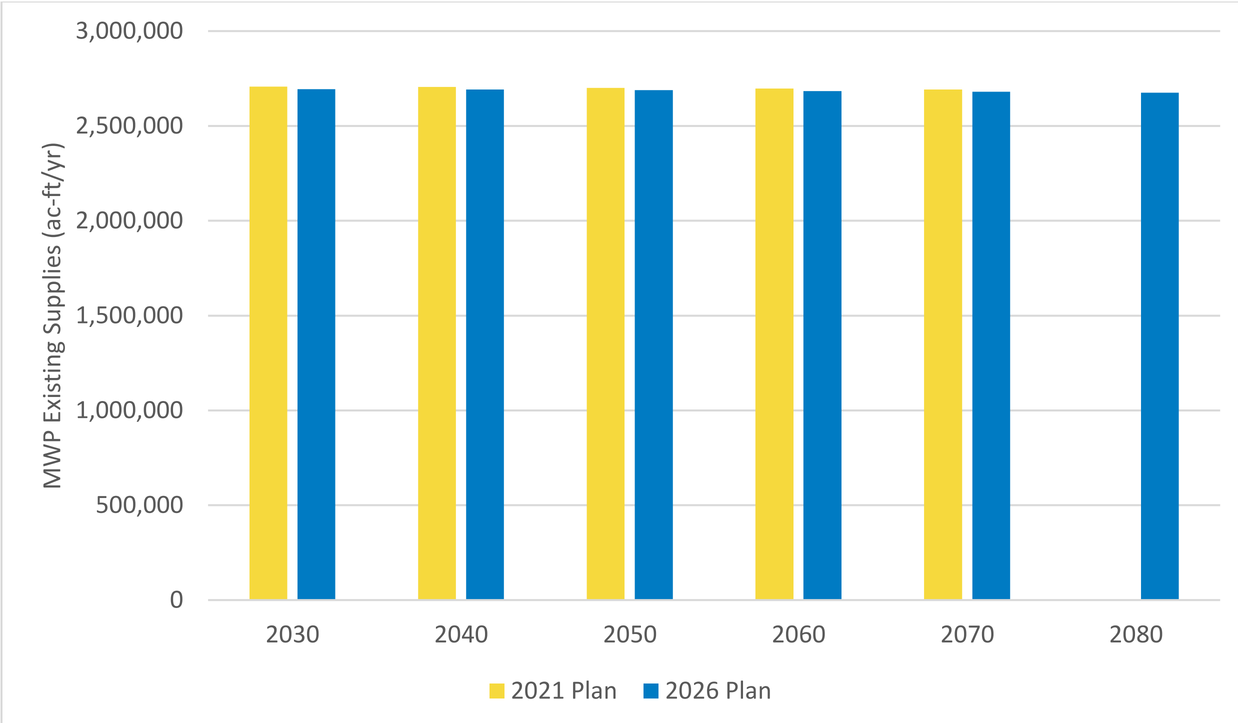

Figure 9.4 Total Existing Supplies of Major Water Providers in the East Texas Regional Water Planning Area from the 2021 and 2026 Plans

Table 9.4 Summary of Existing Supplies of Major Water Providers in the East Texas Regional Water Planning Area by Decade

2021 WWP Existing Supplies (ac-ft/yr)						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Angelina and Neches River Authority	70	70	70	70	70	N/A
Angelina-Nacogdoches Water Control & Improvement District (WCID) No. 1	19,635	18,890	18,150	16,715	14,690	N/A
Athens Municipal Water Authority	8,117	8,031	7,945	7,859	7,773	N/A
Beaumont	36,451	37,525	37,525	37,525	37,525	N/A
Carthage	5,564	5,564	5,564	5,565	5,565	N/A
Center	5,260	5,260	5,260	5,260	5,260	N/A
Houston Co. WCID 1	3,500	3,500	3,500	3,500	3,501	N/A
Jacksonville	7,391	7,391	7,391	7,391	7,391	N/A
Lower Neches Valley Authority	1,201,876	1,173,876	1,173,876	1,173,876	1,173,876	N/A
Lufkin	38,727	38,727	38,727	38,727	38,727	N/A
Nacogdoches	22,292	21,892	21,492	21,092	20,692	N/A
Panola Co. Freshwater Supply District No. 1	20,686	20,006	19,325	18,644	17,963	N/A
Port Arthur	25,655	25,434	25,389	25,370	25,369	N/A
Sabine River Authority of Texas	1,103,010	1,103,010	1,103,010	1,103,010	1,103,010	N/A
Tyler	41,056	41,056	41,056	41,056	41,056	N/A
Upper Neches River Municipal Water Authority	196,110	194,610	193,010	191,310	189,010	N/A
Major Water Provider Totals	**2,707,401**	**2,704,843**	**2,701,291**	**2,696,970**	**2,691,479**	**N/A**
2026 WWP Existing Supplies (ac-ft/yr)						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Angelina and Neches River Authority	3,607	3,519	3,418	3,321	3,218	3,106
Angelina-Nacogdoches Water Control & Improvement District (WCID) No. 1	10,500	9,990	9,480	8,970	8,460	7,950
Athens Municipal Water Authority	6,027	5,967	5,907	5,847	5,787	5,727
Beaumont	23,748	24,206	24,623	24,441	24,450	24,615
Carthage	4,891	4,891	4,891	4,891	4,891	4,891
Center	4,112	4,100	4,087	4,075	4,062	4,050

2021 WWP Existing Supplies (ac-ft/yr)						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Houston Co. WCID 1	3,500	3,500	3,500	3,500	3,500	3,500
Jacksonville	7,391	7,391	7,391	7,391	7,391	7,391
Lower Neches Valley Authority	1,204,049	1,201,876	1,201,876	1,201,876	1,201,876	1,201,876
Lufkin	35,313	35,336	35,359	35,382	35,405	35,428
Nacogdoches	20,827	20,465	20,103	19,741	19,379	19,017
Panola Co. Freshwater Supply District No. 1	20,800	20,016	19,482	18,448	17,664	16,880
Port Arthur	33,955	37,990	37,990	37,990	37,990	37,990
Sabine River Authority of Texas	1,071,861	1,071,544	1,071,191	1,070,910	1,070,593	1,070,276
Tyler	66,930	66,695	66,460	66,233	66,007	65,780
Upper Neches River Municipal Water Authority	177,110	175,040	172,970	170,950	168,930	166,910
Major Water Provider Totals	**2,694,621**	**2,692,526**	**2,688,728**	**2,683,966**	**2,679,603**	**2,675,387**

Percent Change in WUG Existing Supplies from 2021 to 2026 Plan						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Angelina and Neches River Authority	5053%	4927%	4783%	4644%	4497%	N/A
Angelina-Nacogdoches Water Control & Improvement District (WCID) No. 1	-47%	-47%	-48%	-46%	-42%	N/A
Athens Municipal Water Authority	-26%	-26%	-26%	-26%	-26%	N/A
Beaumont	-35%	-35%	-34%	-35%	-35%	N/A
Carthage	-12%	-12%	-12%	-12%	-12%	N/A
Center	-22%	-22%	-22%	-23%	-23%	N/A
Houston Co. WCID 1	0%	0%	0%	0%	0%	N/A
Jacksonville	0%	0%	0%	0%	0%	N/A
Lower Neches Valley Authority	3%	2%	2%	2%	2%	N/A
Lufkin	-9%	-9%	-9%	-9%	-9%	N/A
Nacogdoches	-7%	-7%	-6%	-6%	-6%	N/A
Panola Co. Freshwater Supply District No. 1	1%	0%	1%	-1%	-2%	N/A
Port Arthur	32%	49%	50%	50%	50%	N/A
Sabine River Authority of Texas	-3%	-3%	-3%	-3%	-3%	N/A
Tyler	63%	62%	62%	61%	61%	N/A

2021 WWP Existing Supplies (ac-ft/yr)						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Upper Neches River Municipal Water Authority	-10%	-10%	-10%	-11%	-11%	N/A
Major Water Provider Totals	**0%**	**0%**	**0%**	**0%**	**0%**	**N/A**

Notes:

Green cells indicate values that are greater in the 2026 Plan compared to the 2021 Plan.

The 2021 Plan developed projections only to 2070, so values for 2080 associated with the 2021 Plan are labeled N/A or not applicable.

Values are a draft and subjected to change.

9.3.5 Identified Needs

A comparison of WUG and MWP identified needs between the 2021 Plan and the 2026 Plan follows.

Water User Groups

In the last round of planning, there were 44 WUGs with identified needs; approximately 75% of these needs were from the manufacturing category of water uses. In the 2026 Plan, there are 27 WUGs with identified needs; most of these needs are associated with manufacturing. There are greater municipal needs identified from 2030 to 2070 largely due to the City of Beaumont. Both the number of WUGs with needs and the amount of needs decreased from the 2021 Plan to the 2026 Plan. The decrease in needs is largely due to a higher level of use of existing supplies by manufacturing water users. The summary of total identified water user group needs is presented in Figure 9.5 and Table 9.5.

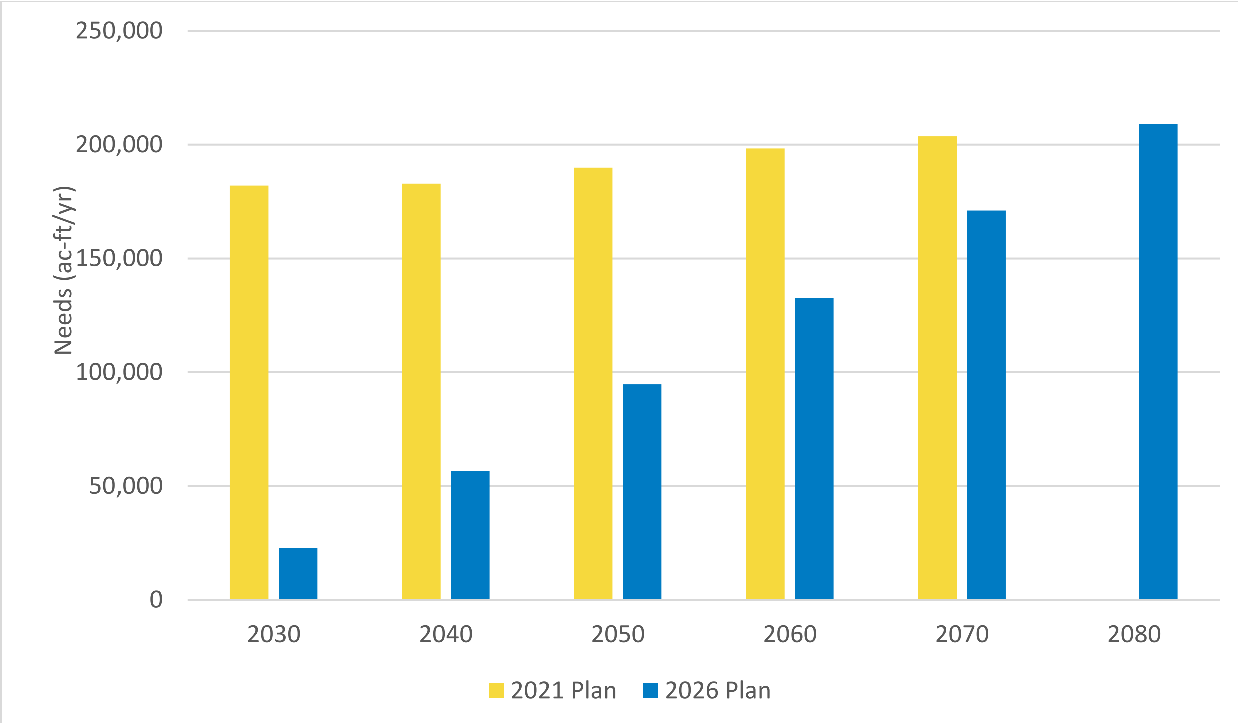

Figure 9.5 Total Identified Water User Group Needs for the East Texas Regional Water Planning Area in the 2021 and 2026 Plans

Table 9.5 Summary of Identified Water User Group Needs from the East Texas Regional Water Planning Area by Use Category and Decade

2021 Plan Identified WUG Needs (ac-ft/yr)						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Municipal	877	2,551	5,832	9,265	13,590	N/A
Manufacturing	145,222	145,206	145,188	145,171	145,155	N/A
Mining	5,281	903	468	308	207	N/A
Steam Electric Power	3,494	3,494	3,494	3,494	3,494	N/A
Livestock	26,613	30,128	34,381	39,483	40,666	N/A
Irrigation	526	526	526	556	576	N/A
2021 Total for ETRWPA	**182,013**	**182,808**	**189,889**	**198,277**	**203,688**	**N/A**
2026 Plan Identified WUG Needs (ac-ft/yr)						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Municipal	9,144	9,635	10,350	10,747	11,110	11,608
Manufacturing	8,403	41,662	78,926	116,133	153,673	190,995
Mining	702	761	818	873	952	1,097
Steam Electric Power	4,357	4,357	4,357	4,357	4,357	4,357
Livestock	215	215	215	215	215	215
Irrigation	0	0	0	156	702	871
2026 Total for ETRWPA	**22,821**	**56,630**	**94,666**	**132,481**	**171,009**	**209,143**
Percent Change in Identified WUG Needs from 2021 to 2026 Plan						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Municipal	943%	278%	77%	16%	-18%	N/A
Manufacturing	-94%	-71%	-46%	-20%	6%	N/A
Mining	-87%	-16%	75%	183%	360%	N/A
Steam Electric Power	25%	25%	25%	25%	25%	N/A
Livestock	-99%	-99%	-99%	-99%	-99%	N/A
Irrigation	-100%	-100%	-100%	-72%	22%	N/A
Total for ETRWPA	**-87%**	**-69%**	**-50%**	**-33%**	**-16%**	**N/A**

Notes:

Green cells indicate values that are greater in the 2026 Plan compared to the 2021 Plan.

The 2021 Plan developed projections only to 2070, so values for 2080 associated with the 2021 Plan are labeled N/A or not applicable.

Values are a draft and subjected to change.

Major Water Providers

In the last round of planning, there were 4 MWPs out of 16 total MWPs with identified needs. Over 50 percent of these needs were from the Angelina Neches River Authority (ANRA). In the 2026 Plan, there are 5 MWPs with identified needs. Starting in 2040, approximately 45% to 57 percent of these needs are from the ANRA. The total needs for the region have increased from the 2021 Plan to the 2026 Plan, which is largely due to reductions in existing water supplies from MWP sources, e.g., surface water, groundwater, as shown in Figure 9.6 and Table 9.6. In both rounds of planning, the MWPs have identified multiple WMSs to obtain available water in the region to meet their identified needs. The change in needs from the last round of planning to this round of planning is largely due to changes related to existing supplies for MWPs rather than changes in demand.

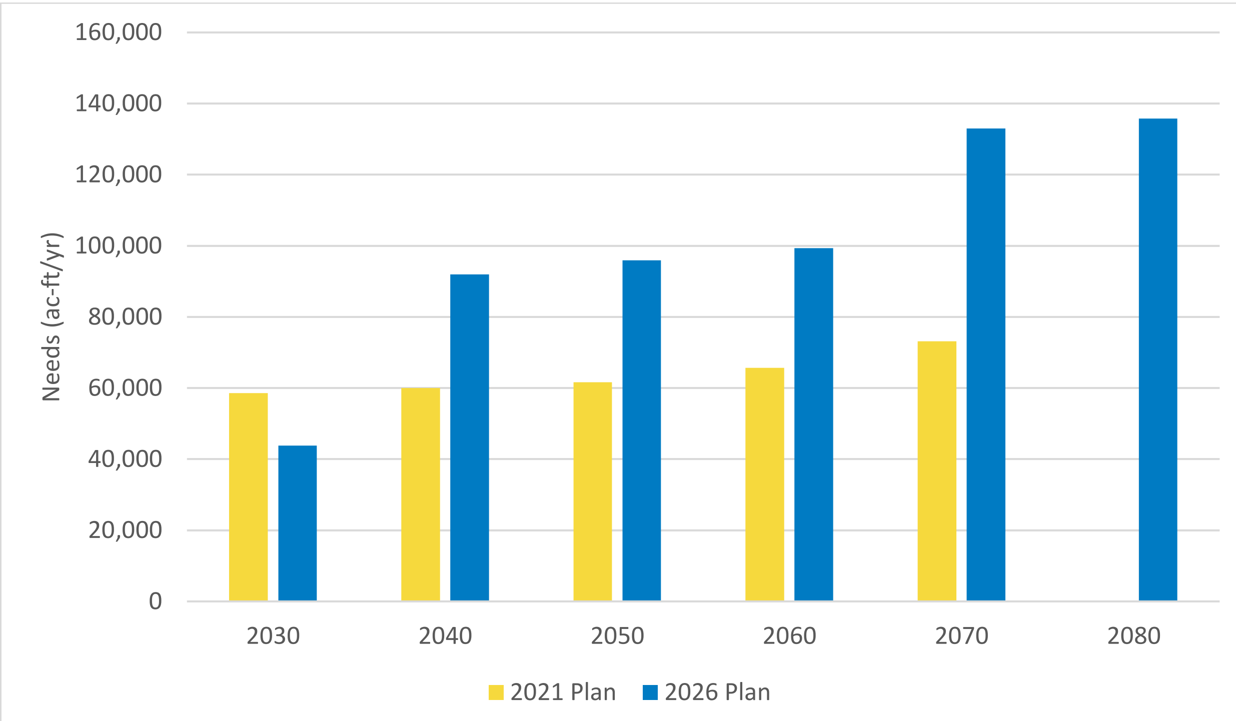

Figure 9.6 Total Identified Major Water Provider Needs for the East Texas Regional Water Planning Area in the 2021 and 2026 Plans

Table 9.6 Summary of Identified Major Water Provider Needs from the East Texas Regional Water Planning Area by Use Category and Decade

2021 Plan Identified WWP Needs (ac-ft/yr)						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
ANRA	44,464	44,464	44,464	44,464	44,464	N/A
Athens MWA	0	0	0	2,386	5,566	N/A
Beaumont	0	0	0	0	1,938	N/A
Center	0	0	0	0	0	N/A
UNRMWA	14,114	15,592	17,174	18,859	21,159	N/A
2021 Total for ETRWPA	**58,578**	**60,056**	**61,638**	**65,709**	**73,127**	**N/A**
2026 Plan Identified WWP Needs (ac-ft/yr)						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
ANRA	0	45,318	45,318	45,318	75,479	75,399
Athens MWA	0	0	890	1,972	3,342	4,145
Beaumont	9,508	10,221	11,096	11,336	11,388	11,289
Center	1,139	1,261	1,380	1,475	1,566	1,652
UNRMWA	33,137	35,184	37,232	39,234	41,239	43,259
2026 Total for ETRWPA	**43,784**	**91,984**	**95,916**	**99,335**	**133,014**	**135,744**
Percent Change in Identified WWP Needs from 2021 to 2026 Plan [e]						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
ANRA	N/A	2%	2%	2%	70%	N/A
Athens MWA	N/A	N/A	N/A	-17%	-40%	N/A
Beaumont	N/A	N/A	N/A	N/A	488%	N/A
Center	N/A	N/A	N/A	N/A	N/A	N/A
UNRMWA	135%	126%	117%	108%	95%	N/A
Total for ETRWPA	**-25%**	**53%**	**56%**	**51%**	**82%**	**N/A**

Abbreviations:

Angelina-Nacogdoches Water Control & Improvement District No. 1 (AN WCID #1)

Angelina and Neches River Authority (ANRA)

Municipal Water Authority (MWA)

Houston County Water Control & Improvement District No. 1 (HC WCID #1)

Upper Neches River Municipal Water Authority (UNRMWA)

Notes:

(a) Green cells indicate values that are greater in the 2026 Plan compared to the 2021 Plan.

(b) The 2021 Plan developed projections only to 2070, so values for 2080 associated with the 2021 Plan are labeled N/A or not applicable.

(c) The City of Center noted that their demand projection is likely overestimated and they have sufficient supply to meet the anticipated demand.

(d) The needs associated with ANRA and UNRMWA are contractual rather than demand-driven.

(e) A positive percent change indicates an increase in needs from the 2021 Plan to the 2026 Plan.

9.3.6 Water Management Strategies and Water Management Strategy Projects

The following is a summary of recommended and alternative WMSs included in the 2021 and 2026 Plans.

Recommended Water Management Strategies

The 2021 Plan included 65 recommended WMSs (excluding conservation WMSs) sponsored by entities in the ETRWPA, with a total supply of approximately 412,000 acre-feet per year in 2030 and increasing to approximately 659,000 acre-feet per year by 2070. In the 2026 Plan, there are 47 recommended WMSs (excluding conservation WMSs) sponsored by entities in the ETRWPA, with a total supply of approximately 38,000 acre-feet per year in 2030 and increasing to approximately 608,000 acre-feet per year by 2070, as shown in Figure 9.7. The variations in the number and overall supply of recommended WMSs are mainly influenced by changes in water needs identified across the region and shifts in projected online dates of WMSs. Additionally, feedback from sponsors about their potential future WMSs also plays a significant role.

In the 2021 Plan, recommended conservation WMSs in the ETRWPA were estimated to reduce demands for WUGs by a total of approximately 11,700 acre-feet per year in 2030 and approximately 22,100 acre-feet per year by 2070. In the 2026 Plan, recommended conservation WMSs in the ETRPWA were estimated to reduce demands for WUGs by a total of approximately 7,300 acre-feet per year in 2030 and by nearly 22,700 acre-feet per year by 2080. Differences in estimated conservation savings are largely attributed to changes in the recommended conservation WMS methodology between the 2026 and 2021 Plans.

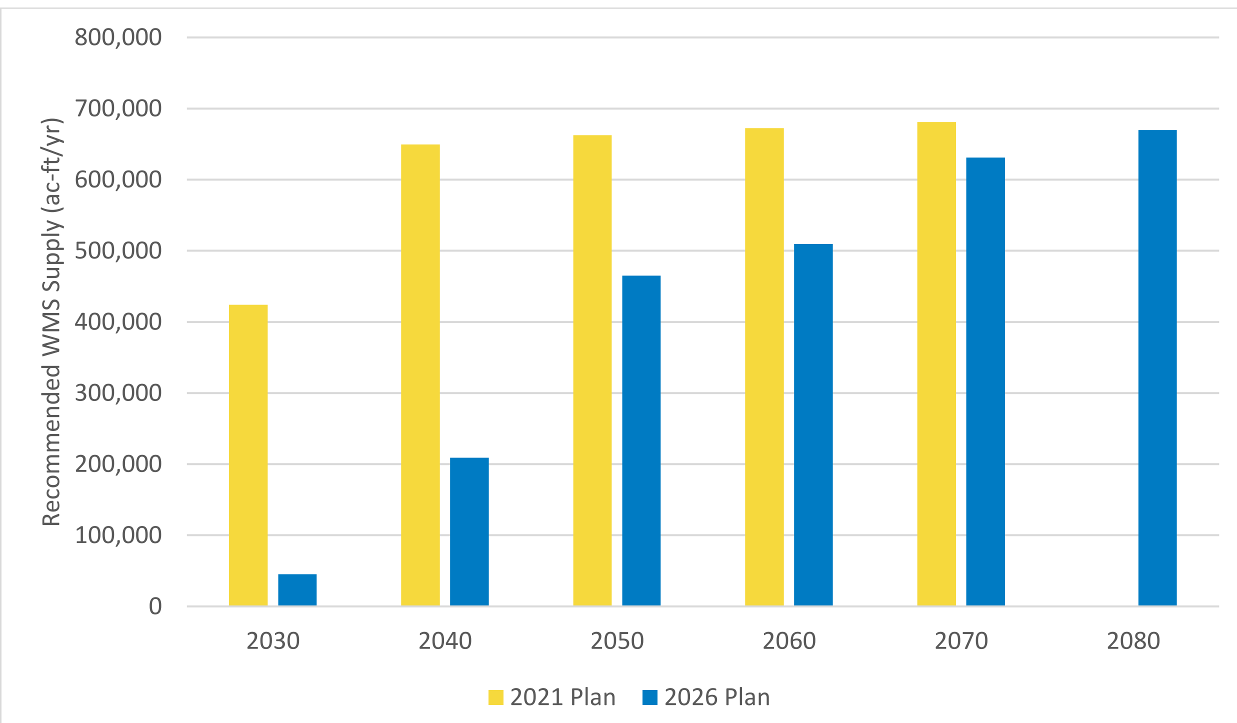

Figure 9.7 Total Supply of Recommended Water Management Strategies for the East Texas Regional Water Planning Area in the 2021 and 2026 Plans

Alternative Water Management Strategies

The 2021 Plan included five alternative WMSs sponsored by entities in the ETRWPA, with a total estimated supply volume of approximately 163,800 acre-feet per year in 2030 and nearly 165,100 acre-feet per year by 2070. The 2026 Plan includes three alternative WMSs sponsored by entities in the ETRWA, with a total estimated supply of nearly 3,200 acre-feet per year that starts in the 2050 decade and increases to approximately 3,900 acre-feet per year by 2070, as shown in Table 9.7. The substantial reduction in alternative WMS supply from the 2021 Plan to the 2026 Plan is due to the removal of two alternatives to UNRMWA and Dallas' Neches Run-of-River water management strategy. Only one version of this WMS concept, the Neches Run-of-River with Lake Palestine, was retained and recommended for the 2026 Plan.

Table 9.7 Summary of Identified Major Water Provider Needs from the East Texas Regional Water Planning Area by Use Category and Decade

2021 Plan Water Management Strategies Supply (ac-ft/yr)						
	2030	2040	2050	2060	2070	2080
Recommended WMSs	424,103	649,736	662,469	672,268	681,012	N/A
Alternative WMSs	163,825	163,825	163,825	163,825	165,087	N/A
2026 Plan Water Management Strategies Supply (ac-ft/yr)						
	2030	2040	2050	2060	2070	2080
Recommended WMSs	45,295	209,223	464,992	509,609	631,128	669,846
Alternative WMSs	0	0	3,182	3,182	3,902	3,902
Percent Change in Water Management Strategy Supply from 2021 to 2026 Plan						
	2030	2040	2050	2060	2070	2080
Recommended WMSs	-89%	-68%	-30%	-24%	-7%	N/A
Alternative WMSs	-100%	-100%	-98%	-98%	-98%	N/A

Notes:

Green cells indicate values that are greater in the 2026 Plan compared to the 2021 Plan.

The 2021 Plan developed projections only to 2070, so values for 2080 associated with the 2021 Plan are labeled N/A or not applicable.

Values are a draft and subjected to change.

Recommended Water Management Strategy Projects

There were 63 recommended water management strategy projects (WMSPs) in the 2021 RWP (excluding conservation WMSPs), some of which have been carried over to the 2026 RWP. For the 2026 RWP, there were several WMSPs added, removed, or modified on feedback from sponsors and shifts in identified needs, bringing the total to 52 WMSPs (excluding conservation WMSPs).

Additionally, the 2021 RWP included 11 WMSPs associated with water loss mitigation strategies. In this cycle, the ETRWPG recommends water loss mitigation strategies as a best management practice for all municipal WUGs—approximately 187 WUGs— resulting in 187 WMSPs that are related to water loss mitigation.

Alternative Water Management Strategy Projects

There were two alternative WMSPs in the 2021 RWP that have been carried over to the 2026 RWP and became recommended WMSPs. These two WMSPs are the booster pump station expansion for AMWA and additional groundwater wells for Houston County WCID 1. Two WMSPs that were previously recommended in the 2021 RWP, the Center pipeline from Toledo Reservoir and development of new groundwater wells by Chandler, were changed to alternative WMSPs in the 2026 RWP. Consistent with the discussion in the alternative WMS section, two alternative WMSPs related to the UNRMWA and Dallas Neches Run-of-River project were removed between the 2021 and 2026 Plans.

Chapter 10: Public Participation and Adoption of Plan

2026 Initially Prepared Plan

Prepared for:

East Texas Regional Water Planning Group

February 2025

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LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ETRWPA	East Texas Regional Water Planning Area
ETRWPG	East Texas Regional Water Planning Group
GMA	Groundwater Management Areas
IPP	Initial Prepared Plan
RWPG	Regional Water Planning Group
TAC	Texas Administrative Code
TWDB	Texas Water Development Board
WMS	Water Management Strategy
WUG	Water User Group

10 PUBLIC PARTICIPATION AND ADOPTION OF PLAN

Regional water planning in Texas is a public process, requiring strategy for ensuring that each region's citizens are able to participate in the process. Title 31 of the Texas Administrative Code (TAC) defines the Notice and Public Participation requirements of the process in §357.21. Holding a public meeting or hearing with an opportunity for public comment is required:

- Prior to preparation of the next regional water plan;
- During declaration to pursue simplified planning (if applicable);
- When proposing major amendments to the previous regional water plan (if applicable); and
- Following adoption of an initially prepared plan (IPP).

In addition, opportunities for public participation and input have specific requirements regarding public notice and open meetings in the State of Texas. The rules call for the following:

- Public meetings and hearings noticed and held in accordance with the Texas Open Meetings Act.
- Agendas, meeting notices, materials presented or discussed at meetings, IPP, and final regional water plan published on the internet.
- Copies of the IPP made available for public viewing.

This chapter addresses the East Texas Regional Water Planning Group's (ETRWPG) strategy for public involvement and participation in the development and adoption of the 2026 East Texas Regional Water Plan (2026 Plan)[1]. The strategy included regular meetings of the ETRWPG, consultation with representatives of the major water user groups (WUG), distribution of press releases when required, and maintenance of a website for the East Texas Regional Water Planning Area (ETRWPA). Copies of public notices and corresponding press releases are included in Appendix 10-A. A description of the ETRWPG and the regional water planning process follows.

10.1 EAST TEXAS REGIONAL WATER PLANNING GROUP MEMBERS

Original legislation for the 1997 Texas Legislature Senate Bill 1 and the Texas Water Development Board (TWDB) planning guidelines establish regional water planning groups (RWPG) to manage the planning process in their respective regions. The RWPGs include representatives of twelve specific community interests. Table 10.1lists members of the ETRWPG and the interests they represent.

[1] Chapter 10 may be revised, as necessary, during and subsequent to the Initially Prepared Plan public comment period.

Table 10.1 Voting Members of the East Texas Regional Water Planning Group and Group Representation

Member	Interest
David Alders	Agricultural
Matthew Mettauer	Agriculture
Judge Chris Davis	Counties
Fred Jackson	Counties
Mike Snyder	Electric Power
Dr. Matthew McBroom	Environmental
John Martin	Groundwater Management Areas
John McFarland	Groundwater Management Areas
David Gorsich	Industries
(Vacant)	Industries
Kate Dietz	Municipalities
(Vacant)	Municipalities
Terry Stelly	Public
(Vacant)	Public
Scott Hall	River Authorities
Kelley Holcomb	River Authorities
David Montagne	River Authorities
Monty Shank	River Authorities
Chris Wiesinger	Small Business
(Vacant)	Small Business
Chris Wiesinger	Water Utilities
Robb Starr	Water Utilities

The ETRWPG appointed an Executive Committee and a Technical Committee, each comprised of individuals within the planning group. Members of the Executive Committee include:

- Chair: John Martin, Southeast Texas Groundwater Conservation District
- Vice Chair: David Alders, Carrizo Creek Corporation
- Secretary: Terry Stelly
- At Large: Dr. Matthew McBroom, Stephen F. Austin University
- At Large: Kelley Holcomb, Angelina & Neches River Authority

The charge to the Technical Committee was to work with the ETRWPG consulting team to develop recommended population and water demand projections, review work produced by the consulting team, and provide technical advice to the planning group. Members of the Technical Committee include:

- Scott Hall
- John Martin
- Dr. Matthew McBroom

The ETRWPG also worked closely with water planning staff at the TWDB during the planning process. TWDB water planning staff provided valuable technical and regulatory guidance to the ETRWPG regarding the 2026 Plan.

10.2 PREPLANNING FOR THE 2026 PLAN

Rules in Title 31 of the TAC §357.12 define tasks that must be performed prior to development of the regional water plan. These rules include the following requirements:

- A public meeting to discuss recommendations and suggestions of issues that should be addressed in the regional or state water plan.
- Prepare a scope of work including a detailed description of tasks to be performed.
- Approve any amendments to scope of work in an open meeting.
- Designate a political subdivision as a representative of the RWPG.
- Determine a process for identifying potentially feasible water management strategies (WMS).

The ETRWPG held a public meeting, in conjunction with the regular RWPG meeting, on August 18, 2021, to discuss issues and provisions important to the ETRWPA that should be included in the 2026 Plan. As a result of this public meeting, a scope of work was prepared by the consulting team. The scope detailed tasks and activities to be performed during the planning cycle, including expense budgets, schedule, and description of reports to be developed as part of the planning process. The City of Nacogdoches was designated as the political subdivision representative of the ETRWPG, responsible for applying for financial assistance for the scope of work and regional water plan development.

On October 4, 2023, the ETRWPG held a regular public meeting to determine a process for identifying potentially feasible WMSs. The consultant team presented a proposed methodology for identifying strategies. Recommendations from the ETRWPG were incorporated into the methodology; no public comments were received. The ETRWPG then approved the draft process to identify and select WMSs.

10.3 INTERREGIONAL COORDINATION

The ETRWPG and its Technical Consultants actively collaborated with the Texas Water Development Board (TWDB), chairs of all Regional Water Planning Groups (RWPGs), neighboring regions (including Regions C, D, and H), and Groundwater Management Areas (GMAs) overlapping with Region I. The coordinated efforts encompass:

- Participation in various interregional activities, such as liaisons, Interregional Planning Council meetings, and RWPG Chair Conference Calls organized by the TWDB.
- Participated in key meetings, addressing issues like projections, modeling, water supply overallocation, and specific challenges.
- Collaborated on data exchange, draft projections, and coordinated calls for data consistency.
- Actively engaged in GMAs.

The subsequent sections provide details on the interregional coordination efforts.

10.3.1 General Regional Coordination

The Region I RWPG actively facilitated regional coordination throughout the development of the 2026 RWP. Notably, every Region I Water Planning Meeting featured an agenda item dedicated to reporting adjoining regions' activities. Additionally, Kelly Holcomb, serving as the Interregional Liaison, provided updates on the Interregional Planning Council in each meeting. The updates from other interregional liaisons, including Region C's David Montagne, Region D's John McFarland, Region H's Scott Hall, and Interregional Liaison Kelley Holcomb, were also regularly shared.

Furthermore, Region I RWPG Chair John Martin actively engages in the Chairs Conference Calls organized by the TWDB, fostering collaboration among the chairs of all 16 regional planning groups and TWDB representatives.

10.3.1.1 Region C

Technical Consultant team members from Region I attended the following Region C Regional Water Planning Group (RWPG) Meetings:

- 11/1/2021 – 6th Cycle Pre-planning Meeting
- 5/23/2022
- 11/7/2022
- 5/23/2023 - Major Water Provider Projections
- 5/24/2023 - Major Water Provider Projections
- 6/12/2023
- 7/17/2023
- 11/6/2023
- 4/29/2024
- 9/30/2024
- 1/6/2025
- 2/24/2025

The Technical Consultant teams from Region I and Region C also participated in the following coordination activities:

- February 2023: Coordinated with consultant team regarding coordination efforts with WUGs split between Regions C and I.
- March 2023: Coordinated with consultant team regarding 2027 WUG projections for 0.5 and 1.0 migration scenarios.
- May-June 2023: Region C and I consultant teams met with the City of Athens (WUG in both Regions C/I) and Athens Municipal Water Authority (supplies serve Regions C/I) to discuss draft population and demand projections and other relevant questions to the 2026 RWP. The consultant teams coordinated with these entities to develop revised draft population projections for Athens.
- June-July 2023: Exchanged revised draft population and demand projections for 2027 WUGs recommended by the Region C and East Texas RWPGs to ensure consistency.
- October 2023: Coordinated with consultant team regarding surface water availability modeling in the Trinity River Basin (shared between Region I/C).
- November 2023: 11/8/2023 Subconsultant Coordination Call.
- November 2024: 11/4/2024 Coordination Call among City of Athens, Athens Municipal Water Authority, consultant teams from Region I and Region C to ensure consistency of the Region I and Region C RWPs, specifically related to City of Athens, Athens Municipal Water Authority.
- January 2025: The consultant teams from Region I and Region C met multiple times to discuss the consistency of Chapter 8, specifically related to the unique reservoir site for the construction section.
- <To be updated in final plan with any additional coordination efforts with Region C>

10.3.1.2 Region D

The Technical Consultant team members from Region I attended the following Region D Regional Water Planning Group (RWPG) Meetings:

- Region I/D Interregional Coordination Meeting on 10/27/2023.

The Technical Consultant teams from Region I and Region D also participated in the following coordination activities:

- February 2023: Coordinated with consultant team regarding coordination efforts with WUGs split between Regions D and I.
- March 2023: Coordinated with consultant team regarding 2027 WUG projections for 0.5 and 1.0 migration scenarios.
- May 2023: Provided relevant survey response data received from Region I WUGs to Region D consultant team.
- June-July 2023: Exchanged revised draft population and demand projections for 2027 WUGs recommended by the Region D and East Texas RWPGs to ensure consistency.
- August 2023: Regional Water Database Data Entry Coordination Call with Texas Water Development Board on 8/28/2023.
- October 2023: Met with consultant team to discuss surface water availability modeling in the Sabine River Basin (shared between Region I/D) and Technical Memorandum content schedule.
- December 2023: Met with consultant team to discuss updates on surface water availability modeling in the Sabine River Basin. Shared relevant modeling files, as necessary, to ensure consistency.
- January 2024: Coordinated with consultant team regarding surface water availability modeling results in the Sabine River Basin.
- January 2024: The Region I technical consultant sent an email to the Region D technical consultant to resolve the Region I water supply source overallocation issue on 1/25/2024.
- February 2024: Participated in Interregional Coordination Meeting and discuss the status of the technical memorandum.
- January and February 2025: Coordinated on the Water Management Strategies for WUGs with identified needs.
- <To be updated in final plan with any additional coordination efforts with Region D>

10.3.1.3 Region H

The Technical Consultant teams from Region I and Region H also participated in the following coordination activities:

- February 2023: Coordinated with consultant team regarding coordination efforts with WUGs split between Regions H and I.
- March 2023: Coordinated with consultant team regarding 2027 WUG projections for 0.5 and 1.0 migration scenarios.
- May 2023: Provided relevant survey response data received from Region I WUGs to Region H consultant team.
- June-July 2023: Exchanged revised draft population and demand projections for 2027 WUGs recommended by the Region H and East Texas RWPGs to ensure consistency.
- October 2023: Region I/H Interregional Coordination Call on 10/27/23.
- November 2023: Coordinated with consultant team regarding surface water availability modeling in the Neches-Trinity Coastal River Basin (shared between Region I/H).
- January 2024: The Region I technical consultant worked with Region D technical consultant to resolve Region I water supply source overallocation issue via emails on 1/25/2024.
- February 2024: Participated in Interregional Coordination Meeting and discuss the status of the technical memorandum.
- January and February 2025: Coordinated on the Water Management Strategies for WUGs with identified needs.

- <To be updated in final plan with any additional coordination efforts with Region H>

10.3.2 Groundwater Management Areas

Region I overlaps with GMA 11 and GMA 14. Notably, two RWPG members actively participate in GMAs: John Martin, i.e., the RWPG chair, is the Chairman of the GMA 14, and John McFarland, a voting member of the RWPG, is the Board Member of GMA 11 and the General Manager of Pineywoods Groundwater Conservation District. RWPG members from Region I also attended the following GMA 14 meetings on the dates mentioned below:

- 1/20/2021
- 2/24/2021
- 4/9/2021
- 1/5/2022
- 3/7/2023
- 11/15/2023
- 8/29/2024
- 11/19/2024
- 2/3/2025
- <To be updated in final plan with any additional meetings>

10.4 OPPORTUNITIES FOR PUBLIC INPUT

The ETRWPG utilized various types of media and outreach to keep the public informed and to receive input throughout the development of the 2026 Plan, including the following:

- Water user group involvement
- Rural outreach
- ETRWPA website – www.etexwaterplan.org
- Public meetings
- Public hearings

These means of media and outreach are described below.

10.4.1 Contact with Water User Groups

The ETRWPG made special efforts to contact WUGs in the region and obtain their input in the planning process. In addition to continuous availability and outreach to WUGs throughout the planning process, specific efforts to involve and solicit input from WUGs and other major water providers (MWPs) include:

- Spring 2023 – Projections Survey Initial Emails
- Spring 2023 – Projections Survey Hard-copy Letters
- Spring 2023 – Projections Survey Phone Calls
- Summer 2023 – Projections Survey Emails #2
- Summer 2023 – Projections Survey Phone Calls #2
- May 2023– Major Water Provider Projections Coordination Virtual Meetings
- October 2023– Water Management Strategy Emails to all WUGs
- August to November 2024 – Major Water Provider Strategies Coordination Virtual Meetings
- <To be updated in final plan with any additional efforts>

10.4.2 Rural Outreach Efforts

In addition to the WUG outreach efforts listed in the previous section, the ETRWPG conducted additional outreach specifically to rural entities (Public water systems that meet the definition of a rural political subdivision as defined in TAC 15.001(14)) in the planning area to collect and evaluate information to support plan development, including keeping track of which rural entities were contacted by the RWPG/Consultant, which entities were not responsive to RWPG contact efforts, and a summary of the region's rural outreach efforts. Rural outreach efforts include:

- September 20, 2024 - Email/Phone Survey Outreach #1
- October 3, 2024 - Email/Phone Survey Outreach #2
- <To be updated in final plan with any additional efforts>

10.4.3 East Texas Regional Water Planning Website

The ETRWPA website, www.etexwaterplan.org was regularly updated to inform the public of scheduled meetings and to provide meeting notices, agenda, minutes, presentations, memoranda, press releases, documents submitted to the TWDB on behalf of the ETRWPG, and copies of correspondence sent to WUGs.

10.4.4 Regular Meetings of the East Texas Regional Water Planning Group

In execution of its duties as the water planning organization for the region, the ETRWPG held regular meetings during the development of the 2026 Plan, received information from the region's consultants, accepted public comments on issues relevant to water planning, reviewed proposed planning elements, and made decisions on planning efforts. ETRWPG meetings were open to the public, all requirements met in accordance with the ETRWPG By-Laws, the Texas Open Meetings Act, and Public Information Act in accordance with 31 TAC §§357.12 and 357.21. A copy of all materials presented or discussed at open meetings were made accessible on the Region I website: https://www.etexwaterplan.org/documents/.

Regular meetings were held on the following dates:

- March 17, 2021
- August 18, 2021
- April 7, 2022
- October 19,2022
- February 23, 2023
- April 19, 2023
- June 21, 2023
- October 4, 2023
- January 10, 2024
- February 15, 2024
- September 18, 2024
- January 7, 2025
- February 6, 2025
- <To be updated in final plan with any additional meetings>

10.4.5 Public Hearings for the Initially Prepared Plan

This section shall be updated after submission of the 2026 IPP for incorporation of data into the final 2026 Plan including an Appendix 10-B Transcripts, Presentations, and Minutes from the Public Hearings for the Initially Prepared Plan.

10.5 PUBLIC COMMENT

This section shall be updated after submission of the 2026 IPP for incorporation of data into the final 2026 Plan including an Appendix 10-C Summary of IPP Public Comments received.

10.6 FINAL ADOPTION OF THE 2026 PLAN

This section shall be updated after submission of the 2026 IPP for incorporation of data into the final 2026 Plan including an Appendix 10-D with the submittal letters from the ETRWPA chair to the TWDB for both the 2026 IPP and 2026 Plan.

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Region I
East Texas Regional
Water Planning Group

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