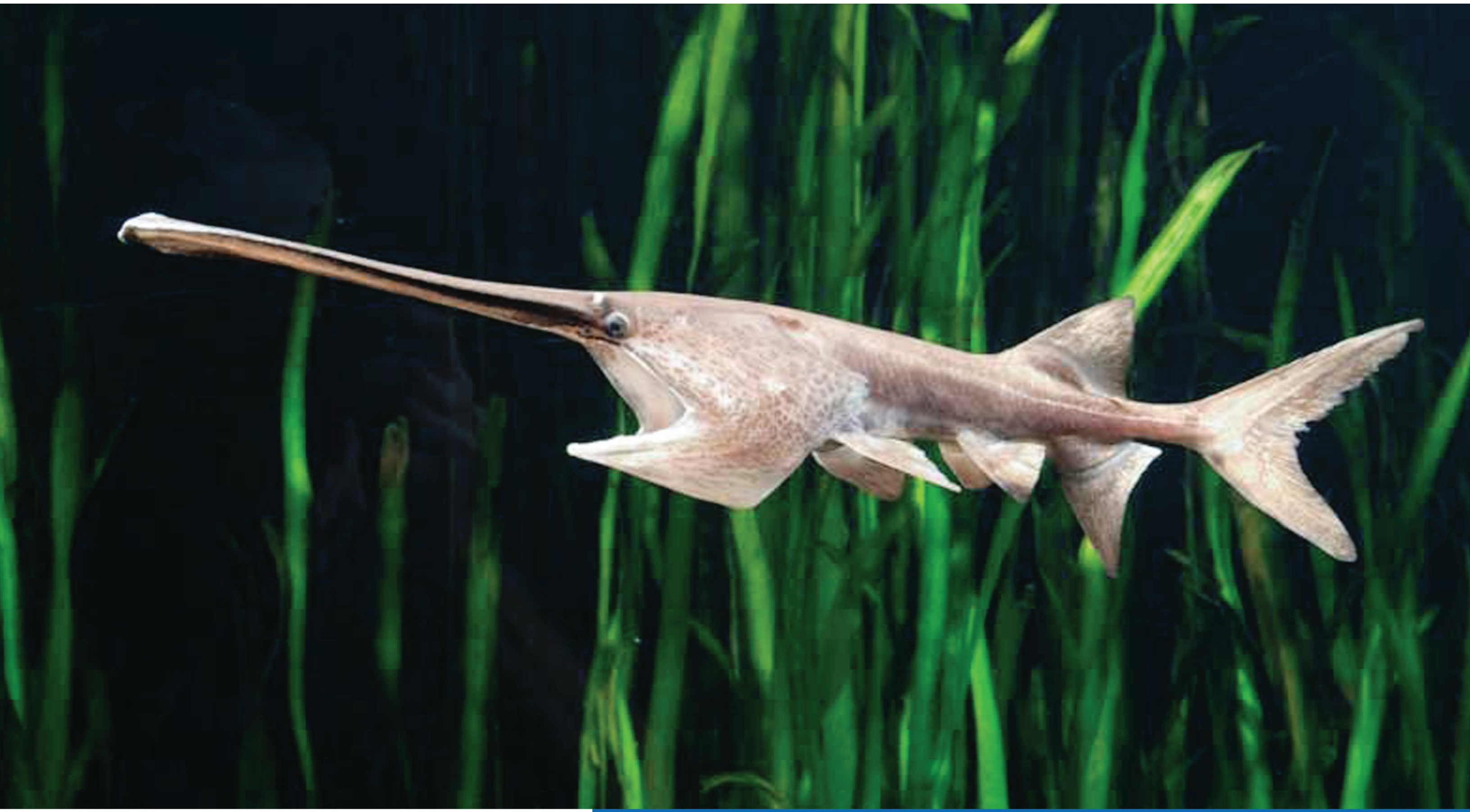

2026 REGION D INITIALLY PREPARED PLAN VOLUME I

Prepared for

The North East Texas Regional Water Planning Group

March 3, 2025

TBPELS NO. F-558

In association with:

HAYES ENGINEERING, INC

TEXAS REGISTERED ENGINEERING FIRM F-1465

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2026 REGION D WATER PLAN
Prepared for
The North East Texas Regional Water Planning Group – VOLUME I

March 3, 2025

Carollo Engineers, Inc.

Hayes Engineering, Inc.

WSP, USA, Inc.

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Riverbend Water Resources District – Mr. Kyle Dooley, Executive Director

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PREPARED BY:

DRAFT DOCUMENTS

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Appendices

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List of Acronyms

Ac-ft	Acre Feet
ac-ft/yr	acre-feet per year
afy	acre-feet per year
BBEST	Basin and Bay Expert Science Team
BBASC	Basin and Bay Area Stakeholders Committee
BEG	Bureau of Economic Geology
BMP	Best Management Practice
CFS	cubic feet per second
CO	County-Other
COG	Council of Governments
CWP	Consensus Water Planning
DCPs	Drought Contingency Plans
DFC	Desired Future Condition
DO	Dissolved Oxygen
DOR	Drought of Record
DPC	Drought Preparedness Council
ES	Executive Summary
FCWD	Franklin County Water District
FWSD	Fresh Water Supply District
gpm	gallons per minute
gpcd	gallons per capita per day
GAM	Groundwater Availability Model
GCDs	Groundwater Conservation Districts
GMA	Groundwater Management Area
HB	House Bill
IFR	Infrastructure Financing Report
IPP	Initially Prepared Plan
LCWSD	Lamar County Water Supply District

MAG	Modeled Available Groundwater
MCL	Maximum Contaminant Level
MGD	Million gallons per day
Mg/l	milligrams per liter
MTBE	Methyl Tertiary Butyl Ether
MUD	Municipal Utility District
MWP	Major Water Provider
NAICS	North American Industry Classification System
NETMWD	Northeast Texas Municipal Water District
NETRWP	North East Texas Regional Water Plan
NETRWPA	North East Texas Regional Water Planning Area
NETRWPG	North East Texas Regional Water Planning Group
NRCS	Natural Resources Conservation Service
NTMWD	North Texas Municipal Water District
PDSI	Palmer Drought Severity Index
PET	PET Potential Evapotranspiration
PMF	Probable Maximum Flood
PWS	public water supply
RRAD	Red River Army Depot
RRCP	Red River Commerce Park
RRRA	Red River Redevelopment Authority
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
RWRD	Riverbend Water Resources District
SB	Senate Bill
SRA	Sabine River Authority
SRBA	Sulphur River Basin Authority
SaRMWD	Sabine River Municipal Water District
SuRMWD	Sulphur River Municipal Water District
SUD	Special Utility District
SRMWD	Sulphur River Municipal Water District Authority
SWQM	Surface Water Quality Monitoring
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality

TCFWSD	Titus County Fresh Water Supply District
TDA	Texas Department of Agriculture
TDC	Texas Demographic Center
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
TSDC	Texas State Data Center
TSSWCB	Texas State Soil and Water Conservation Board
TWC	Texas Water Code
TWDB	Texas Water Development Board
UCM	Unified Costing Model
USACE	United States Army Corps of Engineers
USDM	U.S. Drought Monitor
USFWS	United States Fish and Wildlife Service
WAM	Water Availability Model
WCD	Water Conservation District
WIF	Water Infrastructure Fund
WMS	Water Management Strategy
WMSP	Water Management Strategy Project
WRD	Water Resources District
WSC	Water Supply Corporation
WTP	Water treatment plant
WUG	Water User Group
WWP	Wholesale Water Provider

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EXECUTIVE SUMMARY

The North East Texas Regional Water Planning Group (NETRWPG) represents the North East Texas Regional Water Planning Area (hereafter referred to as the North East Texas Region, Region D, or RWPA). This region is made up of all or part of 19 counties in North East Texas (See Figure 1.1), including Bowie, Camp, Cass, Delta, Franklin, Gregg, Harrison, Hopkins, Hunt, Lamar, Marion, Morris, Rains, Red River, Smith, Titus, Upshur, Van Zandt and Wood Counties. The NETRWPG includes representatives of eleven (11) key public interest groups; in addition, there is at least one representative from each of the 19 counties. The administrative agent for the group is the Riverbend Water Resources District (RWRD), located in New Boston, Texas.

The ultimate goal of the State Water Plan is to identify those policies and actions that may be needed to meet Texas' near- and long-term water needs based on a reasonable projected use of water, affordable water supply availability, and conservation of the state's natural resources. The Regional Water Planning Groups (RWPGs) have been charged with addressing the needs of all water users and suppliers within their respective regions. Groups are to consider socioeconomic, hydrological, environmental, legal, and institutional aspects of the region when developing the Regional Water Plan (RWP). Specifically, the groups are to address three major goals. These goals include:

- Determine ways to conserve water supplies.
- Determine how to meet future water supply needs.
- Determine strategies to respond to future droughts in the planning area.

This executive summary provides an overview of the ten (10) chapters of the 2026 Initially Prepared Plan (IPP) for the North East Texas Region (Region D). All required DB27 reports are tabulated in Appendix ES and are formally incorporated into this RWP.

ES.1 Chapter 1: Description of the Regional Water Planning Area

ES.1.1 Organization of the Regional Water Plan

The Regional Water Plan is organized into ten tasks, which are sequentially addressed by chapter.

Chapter 1 presents a description of the planning region including the region's physical characteristics, demographics and economics. Other information included in this description are the sources of surface and groundwater, major water suppliers and demand centers, current water uses, and water quality conditions. Finally, an initial assessment of the region's preparations for drought is discussed, as well as the region's agricultural and natural resources and potential threats to those resources.

Chapter 2 addresses population and water demand projections. Population and water demand projections have been completely revised from previous planning rounds, utilizing 2020 U.S. Census data. The TWDB, in conjunction with the Texas Demographic Center (TDC), prepared population and water demand projections for all water demands and all Water User Groups (WUGs). Draft population and water demand projections were provided to the RWPGs for review, with requested changes to the projections made where adequate supporting documentation was provided by the RWPG. The population and water demand projections were formally adopted for use in development of the 2026 RWPs.

Chapter 3 is an evaluation of current water supplies in the North East Texas Region, including surface and groundwater. It also presents the available supplies for each user group.

Chapter 4 of the report presents identified water needs (i.e., shortages) and surpluses in the region and lists shortages by county and river basin. It also includes a comparison of supply and demand for each Wholesale Water Provider (WWP). For the purposes of this RWP, the NETRWPG elected to identify all WWPs as Major Water Providers (MWPs), reports for which are also included in the RWP.

Chapter 5 of the plan presents the identification of potentially feasible water management strategies for solving each shortage, evaluations of these potentially feasible strategies, and recommended and alternative water management strategies, along with implementation evaluations, cost estimates, and environmental analyses. This chapter establishes criteria to be applied in the evaluation of water management strategies, and includes sub-sections regarding conservation recommendations and the implementation status of selected strategies.

Chapter 6 of the plan presents a discussion on the impacts of the plan, and provides a description as to how this plan is consistent with the long-term protection of the State's water resources, agricultural resources, and natural resources. Additionally, for the 2026 Plan, this chapter also addresses the potential impact of the Marvin Nichols Reservoir on the long-term protection of the State's water resources, agricultural resources, and natural resources.

Chapter 7 consolidates existing information on droughts of record and drought preparations in the region and presents a variety of recommendations developed by the RWPG in this regard. Additionally, this chapter includes region-specific model drought contingency plans.

Chapter 8 identifies policy recommendations regarding designation of unique reservoir sites and unique streams. Other policy recommendations include interbasin transfers, conversion of water supplies from groundwater to surface water, TCEQ regulations, and improvements to the regional water supply planning process.

Chapter 9 constitutes a reporting of strategy and project implementation and a summary comparison of the present 2026 Region D Plan to the previous 2021 Region D Plan.

Chapter 10 consists of a summary of public involvement and rural engagement throughout the planning process.

ES.1.2 Physical Description of the Region

The North East Texas Region is located in the northeast corner of Texas. It is bordered on the east by the Texas/Louisiana/Arkansas border and on the north by the Texas/Oklahoma/Arkansas border. The western boundary of the region is approximately 110 miles west of the eastern edge of Texas, and the southern boundary is located approximately 100 miles south of the northern boundary. The region encompasses approximately 11,500 square miles (refer to Figure 1.1).

ES.1.3 Regional Entities

The North East Texas RWPA includes all or a part of the following counties (refer to Figure 1.2 for the Water Planning Area Map):

- Bowie County
- Camp County
- Cass County
- Delta County
- Franklin County
- Gregg County
- Harrison County
- Hopkins County
- Hunt County
- Lamar County
- Marion County
- Morris County
- Rains County
- Red River County
- Smith County (partial)
- Titus County
- Upshur County
- Wood County
- Van Zandt County

ES.1.4 Natural Resources

Soils within the North East Texas Region are good for crop production and cattle grazing. In early Texas history, the soils in the Blackland Prairies Belt were considered well suited for row-crop farming, and farmers, realizing the potential of the area, brought their families there to work the land. Soils in the Piney Woods support fruit crops, especially peaches, blueberries and strawberries. The Piney Woods is also abundant in timber and supports a large timber industry. Livestock is another important economic resource in the region. Cattle in Northeast Texas are raised for stocker operations, cow-calf operations, beef production and dairies. Northeast Texas is home to major poultry processing plants, and many farmers raise poultry for eggs and broilers. Hogs and horses are significant in some counties, but are raised less extensively region wide.

ES.1.4.1 Socioeconomic Characteristics of the Region

Historical and Current Population. Population in the North East Texas Region has both increased and declined in the past 100 years due to economic (primarily agricultural) change. Much of the economy in northeast Texas has historically been based on agriculture, and many large on-farm families lived in the area until the 1930’s. The region as a whole grew 54 percent compared from 1970 to 2000, compared to an 86 percent growth in Texas and a 38 percent growth in the United States.

Demographics. The North East Texas Region is largely rural. Most towns within the region have populations of less than 10,000, and there are many small, unincorporated areas within counties. The 2010 U.S. Census identifies totals of ethnic categories, including black, white, and other (Asian, American Indian, Hispanic, etc.). The graph in Figure 1.14 illustrates ethnic percentages in the North East Texas Region compared to the state. Populations are projected to increase from approximately 831,000 in 2010 to over 1.3 million in 2070.

Economic Activity. The North East Texas Region's main economic base is agribusiness. Crops are varied, and include vegetables, fruits, and grains. Cattle and poultry production are important – cattle for dairies and cow-calf operations, and poultry for eggs and fryers. In the eastern half of the region, the timber, oil and gas industries are important, as is mining. Many residents on the western border of the region are employed in the Dallas-Ft. Worth Metroplex.

ES.1.4.2 Descriptions of Water Supplies and Water Providers in the Region

The Carrizo-Wilcox and Trinity aquifers are two major aquifers in the North East Texas Region. Minor aquifers in the region are Blossom, Nacatoch, Queen City and Woodbine aquifers. The region contains portions of the Red, Sulphur, Cypress and the Sabine River Basins. Groundwater is limited in quality and quantity in large portions of the North East Texas Region, and, consequently a majority of the region relies on surface water supplies. For example, of the estimated 2020 supplies in the Sulphur Basin, 95 percent of the water is surface water; 86 percent of water supplied in the Cypress Creek Basin is surface water, and in the Sabine River Basin, some 81 percent of the need is met by surface water. In the portion of the Red River Basin in the region, 95 percent of the water supply used is surface water.

ES.1.4.3 Wholesale Water Providers (WWP) and Major Water Providers (MWP)

TWDB guidelines define a 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. Based upon this explanation, the NETRWPG identified 18 WWPs/MWPs, as follows:

Wholesale Water Provider	Municipal Water Suppliers
Cash SUD	City of Commerce
Cherokee Water Company	City of Emory
Franklin County Water District	City of Greenville
Lamar County Water Supply District	City of Longview
Northeast Texas Municipal Water District	City of Marshall
Riverbend Water Resources District	City of Mt. Pleasant
Sabine River Authority	City of Paris
Sulphur River MWD	City of Sulphur Springs
Titus County FWD #1	City of Texarkana

The NETRWPG adopted these WWPs as Major Water Providers (MWPs) for the purposes of the 2026 Region D Plan, and all reporting for WWPs represents reporting for MWPs. Where required, MWP reports are included within this RWP.

ES.1.4.4 Description of Water Demand in the Region

Historical and current uses in the North East Texas Region include municipal, manufacturing, recreation, irrigation, mining, power generation and livestock. Municipal and manufacturing are the predominant use categories in the region. In 2021, total estimated usage in the North East Texas Region – both ground and surface – was 302,753 ac-ft/yr. By 2070, projections developed in this plan indicate usage will reach 479,321 ac-ft/yr, a 30 percent increase from 2021. Water in the region is also used for recreational demands and environmental demands. The lack of perennial streams limits the viability of navigation projects in Northeast Texas.

ES.1.4.5 Existing Water Planning in the Region

A number of major suppliers in the North East Texas Region maintain regional plans. Among these are the Sabine River Authority, the City of Longview, the City of Paris, Northeast Texas Municipal Water District, Lamar County Water Supply District, Riverbend Water Resources District, and the City of Greenville. The TWDB completed the development of Groundwater Availability Models (GAMs) of the northern part of the Carrizo-Wilcox, the Queen City, the Woodbine, the Nacatoch, and the Blossom aquifers. The Sulphur River Basin Authority has developed the "Sulphur River Feasibility Study", in cooperation with the United States Corps of Engineers.

ES.2 Chapter 2: Population and Water Demand Projections

In each planning cycle, the RWPGs are required to revisit past planning efforts and revise population and water demand projections to reflect changes that have occurred since the previous round of planning and to incorporate any newly available information. Per the TWDB's "Second Amended General Guidelines for Development of the 2026 Regional Water Plans (Exhibit C)", new decennial census data from the 2020 Census were used to form the basis of population projections for municipal WUGs. Further, non-population related water demand projections consisting of manufacturing, irrigation, and steam-electric power generation have been developed by TWDB using newly adopted methodologies.

The TWDB, in conjunction with the Texas Commission on Environmental Quality (TCEQ), Texas Parks and Wildlife Department (TPWD), and TDA, prepared population and water demand projections for all water demands and all WUGs. Draft population and water demand projections were provided to the NETRWPG for review, with requested changes to the projections made where provided by the RWPG. For the first time, downward trends in population have been made allowable for the purposes of regional water planning, rather than being held constant as was done in previous cycles.

The population and water demand projections have been formally adopted for use in development of the 2026 RWPs. The new population projections used in the 2026 RWPs increase population projections in some locations while decreasing population projections in other locations, relative to the population projections in the 2021 RWPs. As can be observed in the Appendix ES reports, population is projected to grow by approximately 13% from the years 2030 to 2080. Total annual water demand is expected to increase approximately 11%, or 41,128 ac-ft/yr, from 2030 to 2080. The increase in regional water demand will be due to increases in municipal and manufacturing water demands. The largest percentage of water is currently used for municipal and manufacturing uses.

Approximately 40% of the total regional water demand is for municipal purposes. Municipal water demand for the North East Texas Region is projected to increase by approximately 19,500 ac-ft/yr over the fifty year planning period (2030 to 2080). Municipal water demand is currently concentrated in Gregg, Bowie, Harrison, and Hunt Counties. Driven by the large population growth, Hunt County municipal water demand is projected to grow by approximately 37% through the year 2080. Due to population growth (municipal demand), and to a lesser extent manufacturing growth, the Sabine River Basin is projected to have the highest overall water demand of the six river basins within the region. Approximately 552,200 acre-feet of water will be needed by 2080 for the portion of the Sabine River Basin that is in Region D.

Over the fifty year period from 2030 to 2080, 27% to 30% of the total water demand in the North East Texas Region is projected to be manufacturing demand. Overall manufacturing water demand for the region is projected to slightly grow by approximately 20% over the 2030 to 2080 planning period. Harrison, Cass, and Morris counties currently have the greatest demand for water used for manufacturing purposes. The three largest water using industries in the region, in order of size, are: Graphics Packaging International (GPI, formerly International Paper), U.S. Steel, and Eastman Chemical Company.

Annual steam electric water demand is projected to remain constant from the year 2030 to 2080. By 2030, steam-electric power generation projections represent approximately 16% of water demand for this region. By 2080, steam-electric is anticipated to require 15% of the region's water demand. The majority of this demand is expected to remain Titus, Harrison, Lamar, and Marion Counties as steam electric power generation facilities are maintained and additional facilities are anticipated to come online or go offline to supply the power generation needs of Region D and surrounding regions. Irrigation, Livestock, and Mining water demand represent relatively small portions of water demand within the region. They represent 8%, 6% and 1% of water demanded in the North East Texas Region by the year 2030, respectively. Irrigation, Livestock, and Mining water demands are expected to remain relatively constant over the 50 year planning period, with similar percentages of total water demanded of approximately 8%, 6%, and 1% of regional water demand, respectively.

ES.3 Chapter 3: Water Supply Analysis

A key task in the preparation of the water plan for the North East Texas Region is the determination of the amount of water that is currently available to the region. As part of the evaluation of current water supplies in the region, the NETRWPG was charged with updating the water availability numbers from the 2021 RWP through the use of the available official Water Availability Models (WAM) for surface water and Groundwater Availability Models (GAM) for groundwater sources.

The North East Texas Region includes all or a portion of 19 counties that encompass major portions of four river basins: the Cypress Creek Basin, the Red River Basin, the Sulphur River Basin and the Sabine River Basin. Relatively small portions of the Neches River Basin and the Trinity River Basin also extend into the RWPA. Surface water sources within the region include rivers, streams, lakes, ponds, and tanks. As required by Texas Administrative Code (TAC) §357.32, for the 2026 Plan the most current TCEQ WAMs for reservoirs and river systems were utilized. The WAM was developed to account for water availability during drought of record conditions and considers factors such as reservoir firm yield, run-of-river diversions, direct reuse from currently installed wastewater reclamation practices and indirect use (return flow) and assumed full exercise of senior water rights within a system. Appendix ES presents data on the amount of the water supply determined to be available by WUG category.

Six aquifers were identified within the North East Texas Region. Major aquifers, as classified by the Texas Water Development Board, include the Carrizo-Wilcox and Trinity aquifers. The Blossom, Nacatoch, Queen City and Woodbine aquifers are four minor aquifers present in the North East Texas Region. Groundwater availability was established for the purposes of the 2026 Region D Plan generally based on the Modeled Available Groundwater (MAG) volumes that may be produced on an average annual basis to achieve Desired Future Conditions (DFC) as adopted by Groundwater Management Areas (GMAs) (per Texas Water Code §36.001). Groundwater availability is not limited by permits currently issued. MAG volumes for each aquifer were provided by TWDB, and split into discrete geographic-aquifer units by: Aquifer/Region/County/Basin.

With the passage of Senate Bill 1101 by the 84th Texas Legislature in 2015, an RWPG is allowed to define all groundwater availability as long as there are no GCDs within the RWPA. In the State of Texas, this applies only to the Region D RWPA. Because there are no GCDs within Region D, the NETRWPG exercised the right to refine the groundwater availability estimates to determine if the MAG volumes estimated by the TWDB were appropriate for those instances where it was determined that existing supplies (or possible Water Management Strategies) would exceed the MAG amount for a given county-aquifer-basin. These amounts were submitted to TWDB and approved for the purposes of the 2026 Region D Plan.

ES.4 Chapter 4: Identification of Water Needs

The objective of this chapter is to compare the water demands within the North East Texas Region, as presented in Chapter 2, with currently available water supplies, as presented in Chapter 3. This chapter compares the demands and supplies of each WUG within the region to determine which entities are projected to encounter demands greater than their projected supplies, or water supply shortages. Total shortages in all sectors are expected to reach 75,146 acre-ft/yr by the year 2080.

Water shortages for all six user group categories (municipal, manufacturing, mining, steam electric, irrigation, and livestock) are presented in three ways. First, shortages are presented at the county level. WUG's that span two or more counties are listed in each of the counties in which they are located. Second, shortages are shown by river basin. WUG's are listed in the river basin where the demands occur, rather than the basin where the supplies are located. If a WUG demand spans two or more river basins, it is divided proportionately between the appropriate basins. Finally, water shortages are presented for WWPs (which also represent MWPs). If an entity obtains water from more than one water provider, it is listed under each of its water sources. The reports incorporated in Appendix ES displays the water needs and second tier water needs by WUG category, respectively, and includes a source water balance indicating no over-allocation of source availability in the region.

Within the North East Texas Region, five general strategies have been identified to meet water shortages. The first strategy is advanced water conservation, when identified as appropriate considering TCEQ regulatory minimums. The second strategy is the voluntary reallocation of existing supply sources to more efficiently meet an identified need. The third strategy is to increase the amount of an existing surface water contract. This strategy is used when a WUG has an existing contract and the surface water source has an adequate supply of surface water, both physically and legally. Alternatively, several such strategies necessitate contingency upon strategies developed by a water provider. The fourth strategy is for the WUG to enter into a new contract with a WWP or WUG Seller to provide an adequate supply for the system. The fifth strategy is to construct new infrastructure, which commonly includes drilling a new well or multiple wells, or construction of a pipeline to an existing surface water supply to meet the demand of the WUG. Such infrastructure may also include WTP expansions, new WTPs, or pump stations to increase physical supply capacity.

ES.5 Chapter 5: Identification and Evaluation of Potentially Feasible, Recommended, and Alternative Water Management Strategies

The NETRWPG's approach to the evaluation of water management strategies focused on the modeled water supply yield, cost, the anticipated environmental impact of each water management strategy, and local information developed from the individual WUGs. In accordance with TWDB guidelines, yield is the quantity of water that is available from a particular strategy under drought-of-record hydrologic conditions.

The cost of implementing a strategy includes the estimated capital cost (including construction, engineering, legal, and other costs), the total annualized cost, and the unit cost expressed as dollars per acre-foot of yield. As indicated, cost estimates include the cost of water delivered and treated for end user requirements. Cost estimates were prepared utilizing the latest TWDB Unified Costing Model (UCM), in accordance with TWDB guidelines regarding interest rates, debt service, and other project costs (e.g., environmental studies, permitting, and mitigation). Treated and raw water rates at the time of publication were acquired, when possible, from regional water providers, and are to be used solely for comparative purposes of the various strategies considered herein. These costs represent a snapshot indicative of the order of magnitude of potential present contract costs, and are not intended to be indicative of future rates for raw or treated water; as such rates are individually negotiated and will likely vary in the future. In addition to environmental considerations included in estimates of cost for each strategy, environmental impacts were considered and assessed at a reconnaissance level.

The NETRWPG (Region D) has considered the variety of actions and permit applications that may come before the Texas Commission on Environmental Quality (TCEQ) and the Texas Water Development Board (TWDB) and does not want to unduly constrain projects or applications for small amounts of water that may not be specifically included in the adopted regional water plan. "Small amounts of water" is defined as involving no more than 1,000 acre feet per year, regardless of whether the action is for a temporary or long term action. The NETRWPG provides direction to TCEQ and TWDB regarding appropriations, permit amendments, and projects involving small amounts of water that will not have a significant impact on the region's water supply, such projects are consistent with the regional water plan, even though not specifically recommended in the plan.

The NETRWPG has identified a total of 66 Water User Groups with shortages projected to occur at some point over the 2030 – 2080 planning period which will require strategies in this plan. A total of 158 Water Management Strategies (WMSs) are recommended herein to meet these projected shortages. There are many instances wherein multiple strategies are recommended to meet the projected demands for a given WUG. 10 shortages will be resolved by simply renewing, extending, or increasing existing water purchase contracts, and will not require capital expenditure or new sources of supply. As noted previously, 8 shortages and will be partially resolved with the implementation of Advanced Water Conservation measures. 54 water loss reduction strategies have been identified. 78 shortages will be resolved with additional groundwater supplies, by far the most common recommended water management strategy. There is one (1) instance of recommended voluntary reallocations of existing supplies, recommended to WWP and WUG sellers in the region to meet projected customer needs. These comprise a portion of a total of 9 "seller" strategies have been recommended for three (3) of the WWPs and WUG sellers that provide water to customers in the North East Texas Region. There is one (1) instance of recommended indirect reuse. There are 5 water management strategies that have been recommended that entail more significant development of infrastructure to develop additional supplies utilizing existing surface water resources in the region.

In general, most of the projected water supply needs within the North East Texas Region are associated with municipal water user groups. Overall, the recommended strategies for meeting these needs involve the development of additional groundwater supplies in areas where MAG availability is not a constraint, the acquisition of surface water supplies from existing sources, and advanced water conservation. Strategies necessitating significant infrastructure for water supply development (non-groundwater) are as follows (in no priority order):

1. Riverbend Water Resources District, Bowie, Cass, and Red River Counties - Riverbend Strategy - Comprised of the following WMSPs: Water Right Amendment, Contract Amendment for Interim to Ultimate Storage, and new RWRD Intake, Pump Station, Raw Water Pipeline, and Water Treatment Plant (2030).
2. Riverbend Water Resources District, Bowie, Cass, and Red River Counties - New 2.5 MGD Water Treatment Plant (2030).
3. City of Celeste, Hunt County – Treated Water Pipeline and New Contract with City of Greenville (2070).
4. City of Greenville, Hunt County – New WTP (24 MGD; 2030).
5. Irrigation, Lamar County – Pat Mayse Raw Water Pipeline (2020).
6. Livestock, Lamar County – Livestock Water Pipeline (2020).

With the exception of the above listed strategies, no other major water supply development projects are recommended to meet needs within the North East Texas Region. Please refer to Appendix C5 for detailed analyses of all proposed strategies. The regional solutions proposed for localized water supply problems will not adversely impact other water resources of the state, will not aggravate or increase threats to agricultural and natural resources (see Chapter 1), and will not result in adverse socioeconomic impacts to third parties from voluntary redistribution of water (e.g., contractual water sales).

Multiple needs have been identified as remaining unmet in the North East Texas Region for the purposes of the 2026 Plan, including municipal and non-municipal. A summary of these unmet needs, by category, is presented in Section 5.5.5, Section 6.3.1, and tabulated in Appendix ES.

Summary tabulations of the recommended and alternative Water Management Strategies are also presented in Appendix ES.

ES.5.1 Advanced Water Conservation

The 77th Texas Legislature amended the Water Code to require water conservation and drought management strategies in RWPs. The RWP is to include water conservation strategies for each WUG to which Texas Water Code (TWC) 11.1271 applies and must consider conservation strategies for each WUG with a need. The RWPG must also consider drought management for each identified need.

TAC §357.34(g) requires that planning groups "shall include a subchapter consolidating the RWPG's recommendations regarding water conservation." Also required is the inclusion of model water conservation plans pursuant to Texas Water Code §11.1271. The Texas Water Code §11.002(8) (1) defines conservation 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."

ES.5.2 Existing Water Conservation & Drought Planning

Current TCEQ regulations require that all water users having an existing permit, certified filing, or certificate of adjudication for surface water in the amount of 1,000 acre feet or more, create and submit a water conservation plan. All water user groups are required to have a drought contingency plan. For entities serving over 3300 connections, or for wholesale water suppliers, these drought contingency plans are to be on file with TCEQ. For a number of years, the TWDB has required such planning for entities applying for financial assistance through its various programs.

In a survey conducted to obtain data for development of this plan, each WUG was asked if it had a current water conservation plan and/or drought contingency plan. While a substantial number of entities responded positively, there continue to be a number of entities which either do not have a plan or are not actively pursuing any implementation of their plan.

ES.5.3 Water Conservation Strategies

The NETRWPG recommends that a minimum consumption of 115 gallons per capita per day (gpcpd) should be established for all municipal water user groups, and that a reasonable upper municipal level – a goal but not a requirement –be established at 140 gallons per capita daily (gpcd). The 140 gpcd target was selected to coincide with prior recommendations of the Texas Water Conservation Implementation Task Force. Using these concepts, a decision matrix was developed (refer to Figure 5.1) to guide consideration of water conservation strategies.

For all municipal use entities, water savings are anticipated in the RWP due to plumbing code requirements for low flow fixtures and water saving toilets. Homes built after 1992 should be equipped with low flow toilets and fixtures due to the implementation of the Texas Plumbing Efficiency Standards. Entities for which this RWP's demand projections are greater than 140 gpcd were considered candidates for additional conservation strategies beyond plumbing code requirements. The strategies for Region D included:

- Single family clothes washer rebates.
- Single family irrigation audits.
- Single family rainwater harvesting.
- Single family rain barrels.
- Multi-family clothes washer rebates.
- Multi-family irrigation audits.
- Multi-family rainwater harvesting.
- Commercial clothes washer rebates (coin-operated).
- Commercial irrigation audits.
- Commercial rainwater harvesting.

After evaluation, the advanced water conservation scenario was considered as an applicable strategy for seven municipal WUGs, 410 WSC, East Mountain Water System, East Texas MUD, Hickory Creek SUD, Liberty Utilities Silverleaf Water, Scottsville, and White Oak. While several other entities exceeded the established 140 gpcd threshold, water conservation was not recommended as a strategy for those entites as the supply was not projected to meet the TCEQ regulatory minimum of 0.6 gpm/connection. Several entities serving populations primarily in other regional water planning areas, but serving portions of WUGs with populations within Region D, have been identified by other RWPG's, namely Region C and Region I. Advanced conservation measures recommended by other those RWPGs (Region C and Region I) are included herein for consistency.

The criteria for evaluating water conservation measures for manufacturing uses was limited to counties showing a need in this sector during the planning period. The counties meeting this criterion include Bowie, Camp, Cass, Gregg, Upshur, Van Zandt, and Wood Counties. TWDB Report 362 lists fourteen best management practices for industrial users. Application of each of these practices to the manufacturing industries in these counties is not practical at present. However, the industrial water audit practice is a feasible alternative to consider for implementation. The TWDB Report 362 determined that an audit could result in savings of 10 to 35 percent if an audit has not been performed. The expected savings of implementation of this water conservation strategy is based on a savings of 10 percent, resulting in a total savings of up to approximately 700 ac-ft/yr.

Water conservation strategies for other users (irrigation, livestock and mining) were not developed. Irrigation demand is projected to remain relatively small as a percentage of the total regional water demand over the planning period. Livestock and mining comprise a total of 6% to 1% of the demand. The cost of water in these industries comprises a small percentage of the overall business cost and it is not expected these industries will see a significant economic benefit to water conservation.

TWDB's Water Conservation Best Management Practices (BMP) Guide provides information on measures that can be used to reduce the amount of water used in electric power generation plant's cooling towers. The measures include: once-through cooling, improved system monitoring and operation, optimal contaminant removal, use of alternative sources for make-up water, and reducing heat load to evaporative cooling. The demand for steam-electric use is projected to be relatively constant at 16% of the demand during the 50-year period. Most of the demand will be consumed by increasing existing contracts, which include conservation in the projected water use, and voluntary reallocations of existing supply. In this round of planning, estimates were not made for steam-electric power water conservation because data on operating strategies for each power plant were not available, and many plants have currently implemented conservation measures already, particularly once-through cooling, which consumes less water than cooling towers by forced evaporation. The plants do have water conservation plans, whereby annual reports on annual conservation and projected future conservation measures are considered. No conservation strategies are recommended for steam-electric power generation WUGs in the 2026 Plan.

ES.5.4 Model Water Conservation Plan

The planning group has developed and provided in a subchapter to Chapter 5 (and in Appendix C5-3) a model water conservation plan for use by holders of surface water rights of 1,000 acre feet or more for municipal, industrial, and other non-irrigation uses, and holders of surface water rights of 10,000 acre-feet or more for irrigation uses. Model drought contingency plans for use by wholesale and groundwater suppliers, as well as for municipal, manufacturing, and steam-electric users are presented as part of Chapter 7 of this Plan.

ES.5.5 Water Conservation and Drought Management Recommendations

The NETRWPG offers the following water conservation and drought management recommendations:

1. Systems which experience a per capita usage greater than 140 gpcd should perform a water audit to more clearly identify the source of the higher consumption. 140 gpcd should not be considered an enforceable limit, but rather a reasonable target, which may not be appropriate for all entities. Among other tasks, the audit should establish record management systems that allow the utility to readily segregate user classes. A water audit worksheet by TWDB (http://www.twdb.texas.gov/conservation/municipal/waterloss/), can be used along with the Task Force's Best Management Practices Guide in performing an audit. The BMP Guide can be downloaded from the TWDB's website on the conservation webpage at (http://www.twdb.texas.gov/conservation/BMPs/index.asp).
2. Higher per capita consumption figures are often related to "unaccounted-for" water – water which is produced or purchased, but not sold to the end user. Systems with a water "loss" greater than 15% should be encouraged to perform physical and records surveys to identify the sources of this unaccounted-for water. TWDB will provide assistance in the form of on-site review of the worksheet, water loss workshops, and the loaning of water loss detection equipment. More information can be obtained on the TWDB website, www.twdb.state.tx.us.
3. The NETRWPG encourages funding and implementation of educational water conservation programs and campaigns for the water-using public; and continued training and technical assistance to enable water utilities to reduce water losses and improve accountability.

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). The WCAC has submitted a Report and Recommendations to the 88th Texas Legislature[1] with the following updates:

- Recent trends indicate that regional water planning groups should eliminate the 140 gpcd target.
- A recommended methodology is to reduce the planning year per capita water use by one percent each year. However, the Council acknowledges that the cumulative reduction might not be feasible beyond 2040.[2]

The TWDB has continued the work of the Task Force by providing additional resources for municipal water users to assist water utilities with water conservation, including:

- Water Conservation Best Management Practice Guides:
  - » Municipal Water Providers, May 2019
  - » Wholesale Water Providers, October 2017

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[1] Water Conservation Advisory Council, Progress Made in Water Conservation in Texas: Report and Recommendations to the 88th Texas Legislature, December 1, 2022. https://savetexaswater.org/resources/doc/2022%20WCAC%20Report_Final.pdf

[2] In light of the limitations of the recommended methodology, the NETRWPG decided to keep the 140 GPCD as the planning target until new information becomes available in the next cycle.

- Water Conservation Plan Guidance for Utilities, developed in January 2013:
  - Water Conservation Plan Checklist
  - How to Develop a Water Conservation Plan
  - Identifying Water Conservation Targets and Goals

The TWDB provided tools for Regional Water Planning Groups to consider during development of municipal water conservation recommendations for the 2026 Regional Water Plans. These resources were considered during development of the 2026 Region D Regional Water Plan, with Region D-specific results summarized below in sub-bullets.

- Annual Water Conservation Report Data (Years 2016 and 2022)
- Municipal Water Conservation Planning Tool

ES.5.6 Water Implementation for Selected Projects

The plan includes information on how the NETRWPG conducted outreach specifically to rural entities in the planning area to collect and evaluate information to support plan development, including keeping track of which rural entities were contacted by the NETRWPG's technical consultant, which entities were not responsive to RWPG contact efforts, and including a summary of the rural outreach efforts. Focus was given to identifying the implementation of recommended strategies. A subsection to Chapter 5 on this topic is provided within the Plan, which will be expounded upon for the Final Plan.

ES.6 Chapter 6: Impacts of the Regional Water Plan, and Description of How the Regional Water Plan is Consistent with Long-Term Protection of the State's Water, Natural, and Agricultural Resources

The strategies recommended herein to address actual shortages are primarily to address shortages in municipal suppliers. Municipal water suppliers are governed by regulations of the TCEQ, primarily Chapter 290 of Title 30 of the Texas Administrative Code. Key parameters of water quality are therefore those regulated by the TCEQ.

ES.6.1 Impacts on Water Quality

The strategies utilizing groundwater involve the drilling of additional wells by smaller systems, generally in the 50 to 200 gpm production range. Each of the region's aquifers have been assessed in Chapter 3, using the capacities of the aquifer determined to be adequate by the TWDB and the NETRWPG (via identified Modeled Available Groundwater, i.e. MAG, amounts, and local hydrogeologic assessments) to accommodate the additional pumping. Should overdrafting occur, or should wells not be properly completed, degradation of water quality in the aquifer could occur. Possible sources would include brine intrusion from lower levels of the aquifer, or breakthrough from upper, poorly separated strata.

The surface water strategies for entities with projected actual shortages, involving increasing contractual supplies from existing, adequate surface impoundments should result in no measurable change in the long-term water quality in the existing impoundments. There are a number of strategies related to the expansion and/or replacement of a WUG's Water Treatment Plants and raw water intakes and/or reuse. These strategies include recommendations for the Riverbend Water Resources District and its Member Entities' development of a new raw water intake, pump station, pipeline, and WTP (with subsequent expansions) along with a new 2.5 MGD package WTP and transmission line. Such strategies are not anticipated to result in measurable changes in the water quality of existing impoundments.

While it is anticipated that detailed environmental and water quality studies will be performed by project sponsors during the development of a project, for planning purposes the recommended withdrawals of the reservoir contents in terms of overall capacity can be considered minimal to moderate. The comparative evaluations of water quality parameters for sources identified for utilization in the recommended water management strategies suggest minimal impacts to the water quality of the source supplies. The sources under consideration herein presently exist, and when considered in the context of WUGs' existing supplies, are generally comparable in terms of water quality.

ES.6.2 Impacts of Moving Water from Rural and Agricultural Areas

TAC §357.34 rules require that the plan include an analysis of the impacts of strategies which move water from rural and agricultural areas. As previously noted, a total of 158 strategies were identified for 76 entities in the NETRWPA. There are 78 strategies involving the drilling of wells for use in the immediate vicinity of the well. There are 10 strategies involving contractual movements of surface water which taken from a reservoir (or run-of-river supply source) within the same proximity as the WUG. There are 8 Advanced Water Conservation Strategies, 54 water loss reduction strategies, 1 strategy entailing the voluntary reallocation of existing supplies, and 5 strategies involving the expansion of an existing water treatment plant, development of new water treatment plant, pipeline, and/or the development of new raw water intakes to utilize existing surface water supplies.

There are two (2) strategies recommending the movement of surface water supplies within the North East Texas Region. These recommended strategies move water either between rural areas, or from urban to rural areas.

ES.6.3 Socioeconomic Impacts of Unmet Needs

The Texas Administrative Code (31 TAC §357.40(a)) requires that regional water plans 'include a quantitative description of the socioeconomic impacts of not meeting the identified water needs' in the planning area for water users. This assessment will be included in its entirety in Appendix C6-5 of the Final 2026 RWP once it has been provided to the NETRWPG by the TWDB.

ES.6.4 Protection of Water Resources

The water resources in the North East Texas Region include six river basins providing surface water and six aquifers providing groundwater. The four major river basins within the region's boundaries include the Cypress Creek Basin, the Red River Basin, the Sabine River Basin, and the Sulphur River Basin (minor portions of the region are within the Trinity and Neches watersheds as well). The respective boundaries of these basins are depicted in Figure 1.2. The region's groundwater resources include, primarily, the Carrizo-Wilcox Aquifer, the Trinity Aquifer, the Queen City Aquifer, the Nacatoch Aquifer, the Blossom Aquifer, and the Woodbine Aquifer. Lesser amounts of water are also available from localized shallow aquifers and springs.

Surface water accounts for the majority of the total water use in the Region. Of the estimated 2030 supplies in the Sulphur River Basin, 86 percent of the water used is surface water; in the Cypress Creek Basin, 89 percent of the water used is surface water; and in the Sabine River Basin, 82 percent of the need is met by surface water. In the portion of the Red River Basin in the region, 98 percent of the water supply used is surface water. Surface water sources include 10 reservoirs in the Cypress Creek Basin, 2 in the Red River Basin, 11 in the Sabine River Basin, and 11 in the Sulphur River Basin. There are no planned additional reservoirs by the NETRWPG other than Prairie Creek Reservoir. Currently, the majority of the available surface water supply in Region D comes from the Sabine River Basin. The available official TCEQ WAMs for each river basin have been utilized to assess the firm availability of surface water under drought conditions.

The Carrizo-Wilcox Aquifer is the most important groundwater resource in the NETRWPA, accounting for a total of 84% of the available groundwater. Recent groundwater level observations indicate there are significant water level declines in the Carrizo-Wilcox Aquifer in Smith and Cass Counties. The City of Tyler has made significant investments to reduce their dependency on groundwater in Smith County. MAG amounts developed by TWDB via GAMs have been used by the NETRWPG to establish available groundwater supplies in the region, except in those instances where the NETRWPG employed approved additional groundwater availability amounts as no GCDs presently exist within the region.

ES.6.5 Protection of Natural Resources

Region D contains many natural resources that must be considered in water planning. Natural resources include threatened or endangered species; local, state, and federal parks and public land; and energy/mineral reserves. The 2026 North East Texas RWP is consistent with the long-term protection of these resources. The recommended water management strategies will have little or no impact on the State's natural resources.

ES.6.6 Protection of Agricultural Resources

Agriculture is a significant contributor to local economies in the Planning Area. Irrigation is a critical component of successful agriculture operations in the region. Irrigation plays a significant role in numerous nurseries in the Sabine Basin and numerous row crop operations in the Red River Basin. Many dairy and beef cattle operations utilize groundwater from the Carrizo-Wilcox and Queen City Aquifers. The WAMs indicate adequate availability of surface water to meet the projected irrigation demands for the planning period in most cases. Where insufficient reliabilities have been identified, water management strategies have been developed in accordance with TWDB guidelines to provide adequate supplies to meet identified agricultural needs where possible.

As indicated previously, unmet needs have been identified for municipal and non-municipal water providers. All potentially feasible WMSs have been considered by the NETRWPG using its adopted process, and in these instances either no feasible, cost-effective solutions were identified, or the unmet needs are artifacts of constraints in regional water planning whereby a WUG would likely develop supply beyond what is allowed under regional water planning rules and guidelines (e.g., pumping beyond the MAG due to a lack of GCD regulations within the region). In such instances, the NETRWPG preferred to avoid recommending an infeasible WMS rather than falsely addressing an unmet need with an infeasible project.

ES.6.7 Consistency with State Water Planning Guidelines

The information, data evaluations, and recommendations included in Chapters 1 through 10 of the 2026 North East Texas Regional Water Plan collectively comply with Texas Administrative Code (TAC) 31, Chapters 357.40, 357.41, 358.3(4) and (9).

ES.6.8 Impacts of Marvin Nichols Reservoir proposed by Region C in Protecting Region D Resources

Although not a recommended water planning strategy for the NETRWPG for this round of planning, Marvin Nichols Reservoir was a recommended water management strategy for Region C in 2011, 2016, 2021. Since all proposals for Marvin Nichols reservoirs would be located exclusively in the North East Texas Region, and the impacts to agricultural and natural resources would be greatest in this Region, the NETRWPG feels it is important and necessary to review the impacts that any such Marvin Nichols reservoir would have to this area. This is particularly true since the spirit of Texas' regional water planning process includes a ground up, localized approach to the planning process. The discussion below will apply to the Marvin Nichols Reservoir, since it was included in the 2022 State Water Plan, but the approach applies to any proposed reservoir in the Sulphur River Basin.

It has been, and continues to be the position of the NETRWPG that due to the significant negative impacts upon environmental factors, agricultural resources/rural areas, other natural resources, and third parties, Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan. In referencing Marvin Nichols Reservoir, the 2026 North East Texas RWP incorporates Marvin Nichols I, Marvin Nichols IA, and any major dam sites on the main stem of the Sulphur River.

It is further the position of the NETRWPG that the reallocation of Wright Patman Reservoir provides a viable potential water management strategy to assist in meeting the needs for Region C. Although the approach may be potentially more expensive to Region C (in terms of the unit costs of water) to meet that region's growing needs, the reallocation of Wright Patman may produce less of a potential impact to the agricultural and natural resources of Region D, while providing greater socioeconomic benefits to North East Texas.

At the time of publication of this Regional Water Plan, no agreement has been made between Regions C and D for the purposes of the 2026 Region D Plan.

ES.7 Chapter 7: Drought Response Information, Activities, and Recommendations

For the purpose of this planning cycle, the drought of the 1950s is declared the Drought of Record (DOR), although this varies by basin. Drought is a frequent and inevitable factor in the climate of Texas. Therefore, it is vital to plan for the effect that droughts will have on the use, allocation and conservation of water in the State. Through the regional water planning process, requirements for drought management planning are found in Title 31 of the Texas Administrative Code (TAC), Part 10, Chapter 357, Subchapter D. Drought Contingency Plans (DCPs) are intended to establish criteria to identify when water supplies may be threatened and the actions that should be taken to ensure these potential threats are minimized. The general structure of DCPs allows increasingly stringent drought response measures to be implemented in successive stages as water supply decreases and water demand increases. This measured, or gradual, approach allows for timely and appropriate action as a water shortage develops. Demand management focuses on temporary reductions in use in response to temporary shortages in water supply or other emergencies.

The onset and termination of each implementation stage should be defined by specific 'triggering' criteria. Drought response triggers should be specific to each water supplier and should be based on an assessment of the water user's vulnerability. Surface water triggers are widely used in the NETRWPG, typically in conjunction with other triggers based on system demands. Triggering criteria are intended to ensure that timely action is taken in response to a developing situation and that the response is appropriate to the level of severity of the situation. The NETRWPG does not support the provision of drought management measures as an explicit WMS in the 2026 Region D Plan. Drought management measures vary within the Region, and are temporary strategies intended to conserve supply and reduce impacts during drought and emergency times and are not implemented in the region to address long-term demands. Such measures may be used to mitigate the occurrence of unmet needs should a repeat of the drought of record occur prior to development of a recommended strategy.

ES.8 Chapter 8: Unique Stream Segments and Reservoir Sites and Legislative Recommendations

The RWPGs are to include legislative recommendations in the RWP with regard to legislative designation of ecologically unique river and streams segments, unique sites for reservoir construction, and legislative recommendations. RWPGs may include in the adopted regional water plans recommendations for all or parts of river and stream segments of unique ecological value located within the regional water planning area. The RWPGs are also authorized to make recommendations of unique sites for reservoir construction and prepare specific legislative recommendations in these two areas. The NETRWPG has elected to make comments in these two areas and in specific cases has elected to consider recommendations to the legislature, which are presented in Chapter 8.

ES.8.1 Legislative Designation of Ecologically Unique Stream Segments

The NETRWPG considered nominating stream segments for the designation as an Ecologically Unique Stream Segment. After deliberation, the NETRWPG elected to forgo unconditionally recommending the designation of any of the considered stream segments as ecologically unique. However, the NETRWPG did recommend the designation of three streams as ecologically unique conditioned upon the Legislature providing for such designation to contain six specific clarifying provisions as follows:

1. A provision affirming that the only constraint that may result from the ecologically unique stream segment designation is that constraint described in Subsection 16.051(f) Texas Water Code which prohibits a state agency or political subdivision of the state from financing the construction of a reservoir in a designated stream segment.
2. A provision stating that the constraint described in Subsection 16.051(f) Texas Water Code does not apply to a weir, diversion, flood control, drainage, water supply, or recreation facility currently owned by a political subdivision.
3. A provision stating that this designation will not constrain the permitting, financing, construction, operation, maintenance, or replacement of any water management strategy recommended, or designated as an alternative, to meet projected needs for additional water supply in the 2010 Regional Water Plan for the North East Texas Water Planning Region.
4. A provision affirming that this designation is not related to the "wild and scenic" federal program or to any similar initiative that could result in "buffer zones," inadvertent takings, or overreaching regulation.
5. A provision stating that all affected landowners shall retain all existing private property rights.
6. A provision recognizing that the unique ecological value of the designated segment is due, in part, to the conscientious, voluntary stewardship of many landowners on the adjoining properties.

The NETRWPG has recommended that the following three (3) stream segments be designated as Ecologically Unique Stream Segments provided that the above reference stipulations are followed:

- **Black Cypress Creek** - From the confluence with Black Cypress Bayou East of Avinger in southern Cass County upstream to its headwaters located four miles northeast of Daingerfield in the eastern part of Morris County.
- **Black Cypress Bayou** - From the confluence with Big Cypress Bayou in south central Marion County upstream to the confluence of Black Cypress Creek east of Avinger in south Cass County.
- **Pecan Bayou** – This Red River Basin Stream extends from two miles south of Woodland in northwestern Red River County east to the Red River approximately one mile west of the eastern Bowie County line.

ES.8.2 Voluntary Instream Flow Goals and Proposals

Texas law and TWDB's Guiding Principle 23 (TAC §358.3) provide authority for RWPGs to focus some of their work on "environmental water needs." Meeting environmental flow goals can be compatible while meeting other water needs. Most of the needs presently addressed in the regional plans and state water plan are for "consumptive uses," that is, water diverted from a river, stream or lake and used for drinking water, agricultural and industrial uses. A percentage of that water is returned to the river. In contrast, most environmental water needs are non-consumptive, such as flows in the river to provide for fish and wildlife. Moving water downstream in a way that mimics natural flows can meet environmental flow goals while providing water for consumptive use downstream.

In the 2011, 2016, and 2021 Region D RWPs, the NETRWPG stated that it was taking steps to protect environmental flow goals, such as instream flows. Senate Bill 3 provided for development of environmental flow "standards" for a number of river basins, but did not include an established schedule for the Cypress or Sulphur River basins. Nor has TWDB obtained the funds from the Legislature, as it has for the basins specifically identified in Senate Bill 3, for development of such standards. Senate Bill 3 does, however, provide that in those basins not listed, voluntary development of environmental flow goals and proposals can proceed.[3] That voluntary approach is taking place in the Cypress Creek Basin.

Over the past 20 years, a number of stakeholders have worked with the U.S. Army Corps of Engineers (USACE) and the Northeast Texas Municipal Water District (NETMWD) to develop a set of environmental flow regimes in the Cypress Basin. Those voluntary efforts, which have involved participation by a wide variety of interests (including permit holders, 3 federal and 7 state conservation agencies, 9 universities, 6 local and regional governmental entities, along with conservation organizations, landowners, and industry representatives), have been, and continue to be, undertaken in accordance with Section 11.02362(e) of the Texas Water Code. Over the past 14 years, USACE and NETMWD have worked to meet those flow regimes through voluntary changes in the water release patterns from Lake O' the Pines. Because of the success of this project to date, NETRWPG considers those regimes as voluntary goals for instream flows for the purposes of this 2026 Region D Plan. The NETRWPG recognizes that, as with other aspects of the planning process, new information in the future may change the position of the NETRWPG on these instream flow goals.

Consistency with the goals, as they continue to be refined, is identified as a factor to be weighed and addressed for interbasin transfers subject to Water Code Section 11.085(k)(2)(F), but the strategies to meet future water needs of RWPs and the State Water Plan are otherwise not to be limited by these voluntary goals for instream flows. Such goals also are presented herein as a point of reference for the consideration of whether strategies are consistent with the protection of the agricultural and natural resources of the Cypress Creek Basin and the state that rely upon such flows. The flow regimes for the Cypress Basin report, as they may be further refined through those ongoing efforts, are incorporated in this regional water plan as the voluntary goals for instream flows in that basin and the best flow-related information available for the evaluation and protection of instream uses, water quality, and aquatic and riparian habitats potentially affected by interbasin transfers from the basin that are subject to Water Code Section 11.085(k). While a process similar to that used in the Cypress Basin has not yet been developed for the Sulphur Basin, a potential first step has been taken that is important to the NETRWPG. This step is described in more detail in Trungale (2015).

[3] See Section 11.02362(e), Tex. Water Code , the Senate Bill 3 provision for the "voluntary consensus-building process" for basins not scheduled for the formal environmental flow process.

As noted in Trungale (2015), the identified flow regime therein "reflects the historic instream flow conditions that continue to exist today." The regime has not, however, been subject to review and revision by scientists or stakeholders to determine the extent of this flow regime that is needed to maintain the ecological health of the fish and wildlife habitat and the economic and other values currently provided. Thus, this flow regime serves as only a first attempt at identifying voluntary instream flow goals for the Sulphur River Basin. The NETRWPG proposes and supports the development of a stakeholder process, similar to that of the Cypress Creek Basin, to develop such goals in the future. Although the flows identified in Trungale (2015) are not presented herein as requirements to be implemented on regional water management strategies, the flow regime identified therein does provide additional information for consideration of potential impacts on the agricultural and natural resources of the region and the state. This initial work provides a point of reference for considering the pulse flows discussed in Chapter 6 as necessary for the floodplain forests below the Marvin Nichols reservoir site.

It is the position of the NETRWPG that there be no development of new reservoirs in the Sulphur River Basin within Region D nor transfer of water out of the basin for that part that is within Region D until the flow needs for a sound ecological environment are defined for the Sulphur River Basin through the process established in Senate Bill 3, 2007 Regular Session of the Texas Legislature. Those flow needs are defined as the low, pulse, and flood flows. The flow needs assessment for the Sulphur River has not yet begun. No development should take place until the State has identified the flow needs for the Sulphur River and established a demand for the environmental flows for the basin. The NETRWPG recognizes that other RWPGs may include recommendations for new reservoirs in the Sulphur River Basin or for the transfer of water out of the Sulphur River Basin to basins in other regions, as part of their recommended water management strategies or as alternate strategies. It is the position of the NETRWPG that such proposed reservoirs or transfers include explicit recognition that the needs for environmental flows in the North East Texas Region must be satisfied first consistent with Senate Bill 3.

Development of new reservoirs prior to determination of the water demands required for environmental flows in the Sulphur River Basin would be premature. It is the position of the NETRWPG that proposed reservoirs or transfers need to be consistent with the protection of significant agricultural and natural resources of Region D and the State.

ES.8.3 Reservoir Sites

The TWDB rules allow a RWPG to recommend sites of unique value for construction of reservoirs by including descriptions of the sites, reasons for the unique designation and expected beneficiaries of the water supply to be developed at the site. The NETRWPG has reviewed the 2012 State Water Plan, has reconsidered the 2001 North East Texas Regional Water Plan, specifically the information from the *Reservoir Site Assessment Study* (Appendix B) of that plan, the most recently available information from the ongoing Sulphur River Basin Feasibility Study currently being performed for the Sulphur River Basin Authority (SRBA) and the U.S. Army Corps of Engineers (USACE), and local studies developed by WUGs within Region D, and has commented on the reservoir sites identified in those documents. The approximately 17 reservoir sites identified are as follows:

Cypress Creek Basin	Red River Basin
Little Cypress (Harrison)	Barkman (Bowie)
	Big Pine (Lamar and Red River)
	Liberty Hills (Bowie)
	Pecan Bayou (Red River)

	Dimple (Red River)

Sabine River Basin	Sulphur River Basin
Big Sandy (Wood and Upshur)	George Parkhouse I (Delta and Hopkins)
Carl Estes (Van Zandt)	George Parkhouse II (Delta and Lamar)
Carthage (Harrison)	Marvin Nichols I/IA (Red River & Titus)
Grand Saline Creek	Marvin Nichols II (Titus)
Kilgore II (Gregg and Smith)	
Prairie Creek (Gregg and Smith)	
Waters Bluff (Wood)	

The NETRWPG recommends that any new reservoirs in NETRWPG area be pursued only after all other viable alternatives have been exhausted. The NETRWPG further recommends that no reservoir sites in this region be designated as unique in this Plan or in the 2027 State Water Plan. Also, the potential Marvin Nichols reservoir site as described in the Reservoir Site Protection Study, TWDB Report 370, published July 2008, is not recommended by the NETRWPG for designation as a unique Reservoir Site. As noted previously, at the time of publication of this document, no agreement has been made between Regions C and D for the purposes of the 2026 Region D RWP.

The NETRWPG recognizes that there are approximately[4] 16 locations, listed above, in NETRWPG area where the topography is such that the area could be classified as uniquely suitable as a reservoir site. The NETRWPG recognizes that the waters of the State of Texas belong to the citizens of Texas for their specific use, but it is also recognized that the properties rights belong to individuals. Local government should be recognized for the effect that major alterations to the local economy, such as the development of a unique reservoir site, will have on them. To address the issue of unique reservoirs and the accompanying property owners, industry, and local government concerns the NETRWPG recommended those issues of identification of a unique reservoir site; mitigation; compensation to property owners, local government, taxing agencies, and business; and future disposition of water resources be considered as early in the process as possible.

The development of reservoirs in the NETRWPG area as a future water source for other portions of the state would require interbasin transfer authorizations from the TCEQ. Among its many provisions, SB 1 included provisions (Texas Water Code, Section 11.085) requiring the TCEQ to weigh benefits of a proposed new interbasin transfer to the receiving basin against the detriments to the basin supplying the water. SB 1 also established criteria to be used by the TCEQ in its evaluation of proposed interbasin transfers.

[4] Several potential reservoir locations exist for the proposed Marvin Nichols Reservoir I/IA site, representing varying configurations.

The NETRWPG supports the full application of the criteria for authorization of interbasin transfers contained in current state law. With regard to compensation to the basin of origin, the NETRWPG recommends that a portion of the firm yield of projects developed in the NETRWPG basins for interbasin transfer be reserved for future use within the basin of origin. The specific terms of such compensation, along with other issues associated with development of the project (e.g., financing, operation of the reservoir, etc.), should be addressed by the appropriate representatives of the authority within the basin of origin, in coordination with the water districts and the entities in receiving regions and within the North East Texas Region that are seeking the additional supply.

The NETRWPG also endorses the recommendation contained in the adopted Comprehensive Sabine Watershed Management Plan that the Sabine River Authority (SRA) develop the Prairie Creek Reservoir. As previously noted, the Prairie Creek Reservoir and Pipeline Project is being pursued by the Sabine River Authority at this time due to the conservation easement limitation on the Waters Bluff reservoir site. If the conservation easement were removed, the Water Bluff Reservoir would become the Sabine River Authority's top priority project to meet projected water needs in the upper Sabine River Basin.

The NETRWPG also has definite concerns about local property owners who would be directly impacted by reservoir construction. A particular concern is that landowners be compensated fairly for the value of any land acquired for reservoir development. The NETRWPG recommends that the Wetlands Compensatory Mitigation Rule be closely followed to minimize any impact on the region through the consideration of reservoirs and the mitigation thereof. The group strongly supports the requirement of the mitigation sequence of "avoid, minimize and compensate" should any new reservoirs in Region D be pursued.

It is the position of the NETRWPG that there be no development of new reservoirs in the Sulphur River Basin within Region D nor transfer of water out of the basin for that part that is within Region D until the flows necessary to maintain a sound ecological environment are defined for the Sulphur River Basin through the process established in Senate Bill 3, 2007 Regular Session of the Texas Legislature, resulting in the adoption of environmental standards to be applied to future permits or amendments for surface water supplies in the region.

ES.8.4 Legislative Recommendations

TWDB rules for the 2026 regional water planning activities provide that RWPGs may include in their RWPs recommendations to the legislature. The approved scope of work for the development of the RWP for Region D includes development of legislative recommendations for ecologically unique stream segments, ecologically unique reservoir sites and general recommendations to the state legislature on water planning actives as well as issues in the North East Texas Region.

Throughout the 2026 planning process, the one major policy issue that dominated the meetings of the NETRWPG and received the most comment from the public during the public comment portion of the regular meetings was the designation of the various Marvin Nichols Reservoir Sites in the Sulphur River Basin as a water management strategy for providing water outside the region. Below are additional legislative recommendations.

ES.8.4.1 Recommendation: Marvin Nichols Reservoir Site

Based on the reasons set forth in Section 6.9 of this regional plan, it has been the position of the NETRWPG that Marvin Nichols Reservoir should not be included in the 2027 State Water Plan as a water management strategy. Region D continues to oppose Marvin Nichols Reservoir, but is willing to work with other regions to obtain water supplies from the Sulphur River Basin that do not involve new reservoir construction.

At the time of publication of this Regional Water Plan, no agreement has been made between Regions C and D for the purposes of the 2026 Region D Plan.

ES.8.4.2 Recommendation: The Growth of Giant Salvinia

The NETRWPG recommends that available State funds be dedicated to the control of Giant Salvinia and that governmental sources provide additional resources when available, such as enactment of complementary legislation to support control efforts and prevent distribution of Giant Salvinia. The Texas Legislature is also recommended to approve legislation that will assist local and state officials in controlling the spread and elimination of existing infestations of the plant. It is further recommended by the NETRWPG that the local and state governments adopt the following:

- Continue to research and develop efficient, effective and appropriate control techniques.
- Provide extension and education services to urban and industry stakeholders.
- Support enforcement of legislation and control measures.
- Ensure that Giant Salvinia is identified in local, regional, and State level pest management plans.
- Coordinate with landholder, community and industry interest groups to cooperatively manage and control Giant Salvinia infestations.
- Research and develop best management practices.
- Monitor water pollution.
- Periodically inspect all water bodies for Giant Salvinia.
- Promote reporting of new Giant Salvinia infestations.

The NETRWPG also recommends to the appropriate State and Federal governmental departments adopt the following actions:

- Develop awareness campaigns to discourage the transportation and/or possession of Giant Salvinia.
- Eradicate infestations where feasible, and ensure Giant Salvinia control is undertaken on all federally managed land.

ES.8.4.3 Recommendation: Concerning Mitigation

The NETRWPG recommends that any planning group or entity proposing a new reservoir or any other water management strategy should address the subject of mitigation in conjunction with any and all feasibility studies. As evidenced in Section 6.9 of this plan, a study on possible mitigation effects should be undertaken and completed in conjunction with any and all feasibility studies. Information should include estimates of mitigation, predication ratios, and other information useful to landowners potentially affected by mitigation requirements. Also, any new reservoir proposed by a RWPG must be accompanied by a map of the proposed reservoir and a map of the land proposed to be mitigated, including proposed acreage.

ES.8.4.4 Recommendation: Future Interbasin Transfers from the North East Texas Region

The North East Texas Region currently supplies surface water to other areas of the state through interbasin transfers and is identified in the current State Water Plan as a likely source of additional future water supply for various entities in Region C. The 1997 State Water Plan included recommendations that one or more new reservoirs be developed in the Sulphur River Basin as a source of future water supply for the Dallas-Ft. Worth Metroplex. In addition to potential future water transfers from the North East Texas Region to Region C, there may also be water management strategies for meeting needs within the North East Texas Region that will involve conveyance of supplies from one river basin to another within the region.

Current state law and policy regarding interbasin transfers of surface water provide a useful starting point for interregional discussions on the development of a new reservoir in the Sulphur River Basin. Several of the criteria that TCEQ is to consider in its review of interbasin transfers are of particular relevance, including:

- Future needs for water supply in the Sulphur River Basin.
- Economic impacts of future reservoir development and interbasin transfer on the Sulphur River Basin.
- Environmental impacts.
- Mitigation of impacts to Sulphur Basin and compensation for the interbasin transfer.

ES.8.4.5 Recommendation: Designation of Wholesale Water Providers

The NETRWPG supports the designation of a WWP as described in the Texas Administrative Code §357.10(44) as:

> *"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."*

The NETRWPG supports the granting of a designation of WWP for an entity within Region D depending upon a written request from that entity to the NETRWPG that demonstrates said entity has entered or the RWPG expects or recommends to enter into contracts to sell more than 1,000 acre-feet of water wholesale during the period covered by the plan, including the designation of expected demand and the expected supply. Without a request that includes sufficient identification of expected contractual demand and expected supply, the NETRWPG cannot plan for such an entity. With this noted, Region D expects that the water supply out of Lake Wright Patman will continue to be with Texarkana and Riverbend Water Resources District control as WWPs.

ES.8.4.6 Recommendation: Future Water Needs

A widely held view within the North East Texas Region is that future water needs within the region must be assured before additional interbasin transfers are permitted. Many residents of the region express support for future reservoir development and interbasin transfers provided the region's long term water demands are met. This sentiment is supported by TWDB rules for regional water planning, which require that the evaluation of interbasin transfer options include consideration of "…the need for water in the basin of origin and in the proposed receiving basin."

The issue of how much water is needed in the North East Texas Region for local use is not as simple as just comparing estimates of existing water supply to projections of future water demand. It should be remembered that the water demand projections adopted by the NETRWPG and the TWDB for development of the regional plan are based largely on an extrapolation of past growth trends. While this is a common and accepted method for forecasting future conditions, there are nonetheless significant uncertainties in the projections.

Shifting demographics and economic and technological change could result in substantially higher demand for water in the North East Texas Region than is currently projected. For example, there is an observed trend over the past decade in many areas of the U.S. of higher population growth in small and medium sized cities and rural areas. This has been attributed in part to advancements in telecommunications and the evolving information and service-based economy, which no longer requires a concentration of labor in large cities. Another factor is the aging of the population and the trend toward retirement in rural areas. Also, development of a new reservoir in the Sulphur Basin could, itself, act as a significant catalyst for economic development and growth in the area. In fact, some in the planning region have expressed interest in building reservoirs as part of an overall regional economic development strategy. Results from the SRBA (2014) Sulphur River Basin Feasibility Study suggest a wide variety of potential demands in the region, many significantly higher than those estimates developed for regional planning.

Such factors suggest that the NETRWPG may want to review a possible policy recommendation regarding the definition of "need" in the basin of origin. Some members have also suggested broadening the test of need for interbasin transfers to consideration of projected needs throughout the *region* of origin, not just the basin of origin.

ES.8.4.7 Recommendation: Economic and Environmental Impacts

The NETRWPG recommends considering potential economic and environmental impacts associated with reservoir development.

ES.8.4.8 Recommendation: Improvements to the Regional Water Planning Process

a) The NETRWPG believes that the regional water planning process should provide greater flexibility in development of water demand projections. TWDB rules and guidelines regarding population and water demand projections tend to confine rural and smaller urban areas to past rates of growth without allowing for consideration of alternative scenarios for future growth and economic development initiatives. Because the region has a relatively small population and water demands, the impact of a major new water user, such as a paper mill or a power plant, could dramatically alter the water supply and demand equation at a county or even basin level. There is no mechanism in the current process to provide for these potential increases, until the five-year review period.

TWDB rules also build into municipal water demand projections conservation assumptions which may be unrealistic. In rural areas that already have low rates of per capita use, there often is an increase in per capita use as development takes hold in the area. Assumptions about conservation in these areas that already use far less on a per capita basis than the very large and rapidly growing urban areas could have the effect of limiting future development. There are more than 30 water user groups in the North East Texas Region with per capita usage levels well below the 115 gallons per capita daily (gpcd) level set as the "floor" by the NETRWPG. Some usage rates are in the 70-80 gpcd range, a sharp contrast with large urban areas where 200 gpcd or more is not uncommon. Landscape watering, a prime target for urban water conservation programs, is much less prevalent in rural areas. Further, the housing stock is not undergoing rapid growth or replacement, thus reducing the potential impact of plumbing fixture efficiency standards.

The NETRWPG recommends that the TWDB should revise procedures for calculating water demand reduction projections contained in its conservation scenarios by recognizing a floor for the application of demand reduction for rural and small city areas where the per capita water consumption levels are already very low.

b) For the present round of planning, the TWDB established a floor for water demand at 60 gpcd. In earlier rounds, the RWPGs were allowed the capability to establish individual floors, whereby Region D used an amount of 115 gpcd. It appears inappropriate to assume that usage less than 115 gpcd can be sustained over the long-term planning horizon. For those communities using in excess of 250 gallons per day, it should be noted that TWDB planning rules for this current round of planning are enabling 50-year forecasts for systems using 4 times or more than another community. This rule, as applied, is inherently unfair, and eliminates small per capita usage systems from ever having a normal usage, as it basically confines that system to always serving an area that is constraining growth. The growth cannot be higher usage (water usage generally increases as disposable income per household increases) with the TWDB methodology as presently applied.

The NETRWPG recommends that the TWDB allow the RWPGs to establish individual thresholds for a given region, as this provides a more equitable solution for the establishment of future demands in the region.

a) The NETRWPG recommends additional funding be made available to allow for greater scrutiny of rural water supply entities at the Sub-Water User Group (Sub-WUG) level. For this round of regional planning, such entities are aggregated and represented within the plan as a "County-Other" WUG. Where necessary, extra effort has been given to identify and evaluate the needs for rural entities, particularly those within this "County-Other" category, but with limited funding in the present round as compared to early rounds the level of overall effort to distinguish these entities has been necessarily diminished. Additional funding affords the capability to more rigorously evaluate these smaller, rural entities, which comprise a significant portion of the Region D population, as was done in previous rounds of planning.

b) Analyses in the Sulphur River Basin (SRBA Watershed Study; 2014) suggested that although the historic Drought of Record for the basin is 1951 to 1956, a more significant drought occurs between 2002 and 2006. An updated official Sulphur River Basin WAM has been developed and used by the TCEQ that incorporates a longer hydrologic period of record reflecting the impacts of these more recent droughts. Although not available for this RWP, similar efforts are underway for the Cypress Basin WAM. Given the proximity of the Red and Sabine River Basins, it is not unreasonable to consider similar hydroclimatologies existing. If a worse drought exists than the current Drought of Record utilized in the official TCEQ WAMs, this poses additional uncertainty with regard to the modeled firm yields and reliabilities upon which water supplies in the North East Texas Region are based. Thus, the NETRWPG recommends that the legislature initiate a process through TCEQ to appropriately update the Sabine and Red Water Availability Models (WAMs) in a manner consistent with these WAMs' original development, to reflect more recent information on the hydroclimatology of the river basins in the region, and provide additional certainty to resultant calculations of firm supplies in the region.
c) It is recommended that the Joint Planning Process representing the coordination between GMA 8 and the NETRWPG incorporate the information regarding groundwater availabilities (as well as amounts identified by the NETRWPG) as appropriate to make adjustments to better address the identified limitations in the MAG amounts relating to actual and planned legal pumping activities.
d) It is recommended that the TWDB consider revising its analytic approach to identifying allowable groundwater availabilities to more adequately address the legal capabilities of WUGs currently using or planning to use groundwater as a WMS within Region D, to better align with the intent of the aforementioned SB 1101.

ES.8.4.9 Recommendation: Wright Patman Lake/Reservoir

The NETRWPG recommends that before any new reservoirs are planned in the North East Texas Water Planning Area, the alternative of raising the level of the Wright Patman Lake /Reservoir be considered.

ES.8.4.10 Recommendation: Standardize Statistics used for Conservation Assessments

The NETRWPG recommends that the Texas Legislature standardize the method used to derive the statistic known as "gpcd" (gallons per capita per day) and known as "municipal per capita usage". The TWDB previously funded the Statewide Water Conservation Quantification Project (Averitt & Associates, 2017). This research project observed the difficulty for utilities to identify the gpcd used for regional planning purposes, which is defined as the annual volume of water pumped, diverted, or purchased minus the volume exported (sold) to other water systems or large industrial facilities divided by the permanent resident population of the municipal water user group in the regional water planning process divided by 365. However, utilities are noted to use a different formula for deriving gpcd, as defined in the TWDB water conservation plan annual report as the Total Gallons in System divided by the Permanent Population divided by 365.

While the move to utility-based planning for regional water planning has been a positive move towards more consistency, the uncertainties regarding the methods used to define gpcd remain. The justification for this recommendation is demonstrated by the need to have a successful conservation program in areas that are projected to need water management strategies. The NETRWPG supports conservation as a water management strategy for any entity that has a gpcd greater than a goal of 140 gpcd. Assessing the progress of communities engaged in conservation will be more reliable with a standardized method for comparison.

ES.9 Chapter 9: Implementation and Comparison to 2021 Plan

Chapter 9 addresses the statutory requirements outlined in SB 660 (82nd Legislative Session) and the planning rules under 31 TAC §357.45(a), which mandate the evaluation of the implementation status of Water Management Strategies (WMSs) and projects recommended in the 2021 Region D Water Plan. This assessment is based on data provided by RWPGs through DB27, and supplementary information collected via TWDB-provided forms. Key metrics, including project initiation dates, implementation progress, and expenditure to date, are analyzed to identify challenges and impediments to development. Additionally, this chapter offers a comparative analysis of the 2021 and 2026 Plans, emphasizing improvements in the planning process and examining efforts to enhance regional collaboration among Water User Groups (WUGs) to achieve shared benefits and economies of scale.

ES.10 Chapter 10: Adoption of the Plan and Public Participation

Chapter 10 contains a summary of the communications and public participation conducted during the 2026 RWP's development. Records of the public participation for the plan's review will be presented in this chapter upon development of the final RWP. The regular meetings of the NETRWPG allowed time at each meeting for the public to express their concerns and to offer comments to the planning group without response. Every regular meeting of the NETRWPG was noticed as a public meeting under the Texas Open Meetings Act (TAC), meeting all requirements under TAC §357.21, and were typically attended by approximately 10-50 persons in addition to the planning group members. Also there have been many news releases and public notices.

The subject that dominated the meeting comment segments was opposition to the possible development of Marvin Nichols Reservoir, a Region C water management strategy. After submittal of the Initially Prepared Plan (IPP), the NETRWPG will hold a public hearing on the IPP to solicit public input on aspects of the Plan. Digital or physical copies of the plan will be made available in the Office of the County Clerk and in a public library in each of the 19 counties in the region. Comments will be received and incorporated in the comments section of the final 2026 Region D Plan.

This document is the certified 2026 North East Texas Initially Prepared Plan, being completed and adopted by the NETRWPG at its February 19, 2025, public meeting.

Detailed tabulations from various database reports are presented in the Executive Summary Appendix. This database is referred to as DB27, as it serves as the technical repository of regional water planning data that will ultimately be used for the purposes of the 2027 State Water Plan. These standard TWDB DB27 Database Reports are hereby incorporated as part of the regional water plan, and 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 filter to all DB27 reports associated with the 2026 Regional Water Plans.
3. Click on the report name hyperlink to load the desired report.
4. Enter planning region letter parameter, click view report.

APPENDIX ES

The database utilized for this round of planning is referred to as DB27, as it serves as the technical repository of regional water planning data that will ultimately be used for the purposes of the 2027 State Water Plan. These standard TWDB DB27 Database Reports are part of the regional water plan, and may be accessed at https://www3.twdb.texas.gov/apps/SARA/reports/list.

Report	Description
1	WUG Population
2	WUG Demand
3	Source Availability
4	WUG Existing Water Supply
5	WUG Needs/Surplus
6	WUG Second-Tier Identified Water Need
7	WUG Data Comparison to 2021 RWP
8	Source Data Comparison to 2021 RWP
9	WUG Unmet Needs
10a	Recommended WUG Water Management Strategies
11	Recommended Projects Associated with Water Management Strategies
12	Alternative WUG Water Management Strategies
13	Alternative Projects Associated with Water Management Strategies
14	WUG Management Supply Factor
15	Recommended Water Management Strategy Supply Associated with a new or amended IBT Permit
16	WUG Recommended WMS Supply Associated with a new or amended IBT Permit and Total Recommended Conservation WMS Supply
17	Sponsored Recommended WMS Supplies Unallocated to WUGs
18	MWP Existing Sales and Transfers
19	MWP WMS Summary

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CHAPTER 1 DESCRIPTION OF THE REGIONAL WATER PLANNING AREA

1.1 Introduction

"Boundaries don't protect rivers, people do."

– Aristotle

1.1.1 Overview of Texas Legislation

The population of Texas is growing rapidly and ips expected to double from 2000 to 2080. As a result, water demand is expected to increase by almost 14 percent by 2080. These ever-increasing water demands are placed on finite resources, which can be exhausted if not prudently managed.

Texans have been involved in water planning for generations. Water supply districts, river authorities, municipalities and others have developed local and regional water plans. While these plans are vital for local water planning, they may not always consider the effects on larger regions and the state as a whole. Therefore, water planning on a statewide basis is essential in order to grasp the totality of the needs of the people and environments and the resources available to meet those needs. The responsibility for water planning on a statewide basis is that of the Texas Water Development Board (TWDB), and this agency's task includes analyzing water supply and demand using a holistic approach over the entire state.

Increased awareness of Texas' vulnerability to drought, and an estimated fifty three percent increase in population over the next fifty years, caused the 75th Texas Legislature to consider several avenues in state water resource planning. In 1997, the Texas Legislature enacted Senate Bill 1 (SB 1), comprehensive legislation which addressed water planning. One result of this legislation was a "bottom up" approach to Texas water planning, rather than the top-down approach of the past. This new approach gives local and regional entities a greater opportunity to participate in the planning and to have a stake in the future of water availability in Texas. The TWDB divided the state into 16 planning regions, each of which is responsible for analyzing a geographic area and creating a water plan spanning 50 years, to be revisited and submitted every 5 years. Then, TWDB staff reviews the plans and molds them into a statewide water plan.

The 77th Legislature amended the planning process by adopting Senate Bill 2 (SB 2), which added a requirement for water conservation and drought management strategies, added a requirement for infrastructure funding strategies, and clarified the definition of unique stream segments, among other changes. The 80th Legislature added Senate Bill 3 (SB 3), providing guidance on adopting environmental flow standards for river basins, bays and estuaries, and designating unique stream segments and reservoir sites. In addition, it established a Study Commission on Region C (Dallas-Fort Worth) water supply.

More recently, each Regional Water Planning Group (RWPG) is required to amend their RWP if a recommended Water Management Strategy (WMS) or Water Management Strategy Project (WMSP) became infeasible prior to the next plan adoption to ensure realistic reservoir development timelines. It also mandates a thorough assessment of project feasibility, necessitating the removal of infeasible projects from RWPs by 2026.

The 86th Texas Legislature further enacted several bills relevant to regional water planning and state water plan development. These include assessing counterproductive drought response strategies, evaluating aquifer storage and recovery projects' potential, setting per capita water use goals, assessing progress in promoting cooperation among water user groups, and encouraging feedback for water planning process improvements. House Bill 721 mandated the TWDB to evaluate aquifer storage and recovery projects and conduct a statewide survey to identify suitable aquifers for such projects, informing future planning cycles.

RWPGs have been established by the TWDB in each region to prepare and adopt a regional water plan for a designated area. Each RWPG represents diverse realms of public interest including:

- Agriculture
- Counties
- Environment
- Industry
- Municipalities
- River authorities
- Small business
- Water districts
- Water utilities
- Electric generating utilities
- General public

The variety of backgrounds of the board members is intended to ensure that a broad range of public interests are represented.

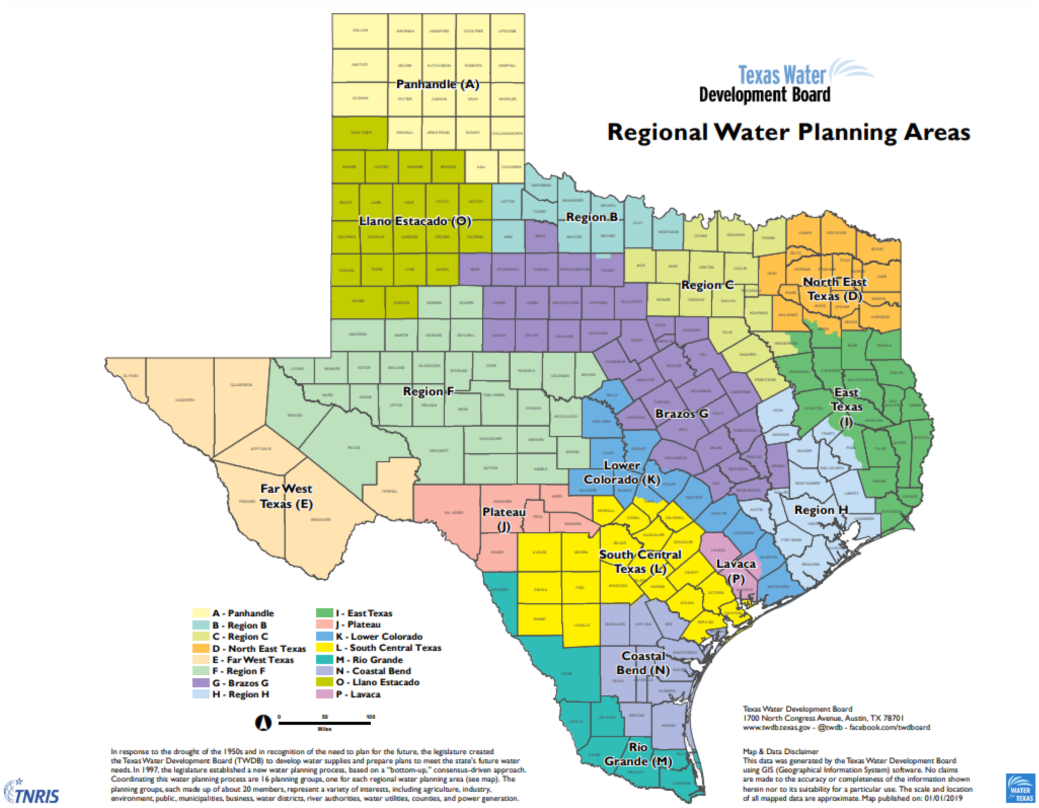


Figure 1.1 Texas Regional Water Planning Areas

(Source: TWDB)

The North East Texas Regional Water Planning Group (NETRWPG) represents the North East Texas Regional Water Planning Area (RWPA) and is also referred to as Region D. This region is made up of all or part of 19 counties in northeast Texas (See Figure 1.1 including Bowie, Camp, Cass, Delta, Franklin, Gregg, Harrison, Hopkins, Hunt, Lamar, Marion, Morris, Rains, Red River, Smith, Titus, Upshur, Van Zandt and Wood. This Regional Water Planning Group includes representatives of all of the above-mentioned public interest groups; in addition, each county has at least one representative. There are 24 voting members, and several non-voting members. The administrative agent for the group is the Riverbend Water Resources District, located in New Boston, Texas.

The goal of the State Water Plan (SWP) is to identify those policies and actions that may be needed to meet Texas' near- and long-term water needs based on a reasonable projection of water use, affordable water supply availability, and conservation of the State's natural resources.

The RWPGs are to address three major goals, which include:

- Determine ways to conserve water supplies.
- Determine how to meet future water supply needs.
- Determine strategies to respond to future droughts in the planning area.

1.1.2 The Planning Process

The TWDB has developed the "General Guidelines for Sixth Cycle of Regional Water Plan Development" which includes a set of 10 tasks that the regional groups are to accomplish in the regional water plan, as follows:

Chapter 1 presents a description of the planning region including the region's physical characteristics, demographics and economics. Other information included in this description are the sources of surface and groundwater, major water suppliers and demand centers, current water uses, and water quality conditions. Finally, an initial assessment of the region's preparations for drought is discussed, as well as the region's agricultural and natural resources and potential threats to those resources.

Chapter 2 addresses population and water demand projections. Population and water demand projections have been completely revised from previous planning rounds, utilizing 2020 U.S. Census data. TWDB, in conjunction with Texas Commission on Environmental Quality (TCEQ), Texas Parks and Wildlife Department (TPWD), and Texas Department of Agriculture (TDA), has prepared population and water demand projections for all water demands and all Water User Groups (WUGs). Draft population and water demand projections were provided to the RWPGs for review, with changes to the projections made when requested by the RWPG. The population and water demand projections were formally adopted for use in the development of the 2026 RWPs.

Chapter 3 is an evaluation of current water supplies in the North East Texas RWPA, including surface and groundwater. It also presents the available sources and supplies for each Water User Group (WUG), Wholesale Water Provider (WWP), and Major Water Provider (MWP).

Chapter 4 of the report presents identified water needs (i.e., shortages) and surpluses in the region and lists shortages by county and river basin. It also includes a comparison of supply and demand for each WWP and MWP.

Chapter 5 of the plan presents the identification of potentially feasible WMSs and WMSPs for solving each shortage, evaluations of these potentially feasible strategies, and recommended and alternative water management strategies for the 2026 Plan, along with implementation evaluations, cost estimates, and environmental analyses. This chapter establishes criteria to be applied in the evaluation of WMSs and WMSPs, and includes a sub-section regarding conservation recommendations.

Chapter 6 of the plan presents a discussion on the impacts of the plan and provides a description as to how this plan is consistent with the long-term protection of the State's water resources, agricultural resources, and natural resources. Additionally, for the 2026 Plan, this chapter also addresses the potential impact of the Marvin Nichols I Reservoir on the long-term protection of the State's water resources, agricultural resources, and natural resources.

Chapter 7 consolidates existing information on droughts of record and drought preparations in the region and presents a variety of recommendations developed by the RWPG in this regard. Additionally, this chapter includes a region-specific model drought contingency plan.

Chapter 8 identifies policy recommendations regarding designation of unique reservoir sites and unique streams. Other policy recommendations include interbasin transfers, conversion of water supplies from groundwater to surface water, TCEQ regulations, and improvements to the regional water supply planning process.

Chapter 9 provides a description of the level of implementation and identified, reported implementation impediments to the development of previously recommended WMSs and WMSPs that have affected progress in meeting water needs. Also included is an assessment of the region's efforts to encourage cooperation between WUGs for the purpose of achieving economies of scale and incentivizing WMSs that benefit the entire region, and a brief summary comparing how the 2026 Region D Plan differs from the previous 2021 Region D Plan.

Chapter 10 consists of a summary of public involvement embedded throughout the NETRWPG's process for developing the 2026 Region D Plan. This includes public participation, interregional coordination, and rural outreach efforts.

1.2 Physical Description of the Region

1.2.1 Regional Entities

The North East Texas RWPA includes all or a part of the following counties (see Figure 1.2):

- Bowie County
- Camp County
- Cass County
- Delta County
- Franklin County
- Gregg County
- Harrison County
- Hopkins County
- Hunt County
- Lamar County
- Marion County
- Morris County
- Rains County
- Red River County
- Smith County (partial)
- Titus County
- Upshur County
- Van Zandt County
- Wood County

The Region is home to various agencies interested in water planning, including:

- Ark-Tex Council of Governments.
- East Texas Council of Governments.
- North Central Texas Council of Governments.
- Red River Authority.
- Sabine River Authority.
- Sulphur River Basin Authority.
- Neches River Authority.
- Natural Resource Conservation Service.
- Riverbend Water Resources District.
- Rural Development, USDA.
- United States Army Corps of Engineers (USACE), Tulsa.
- USACE, Fort Worth.
- USACE, Vicksburg.

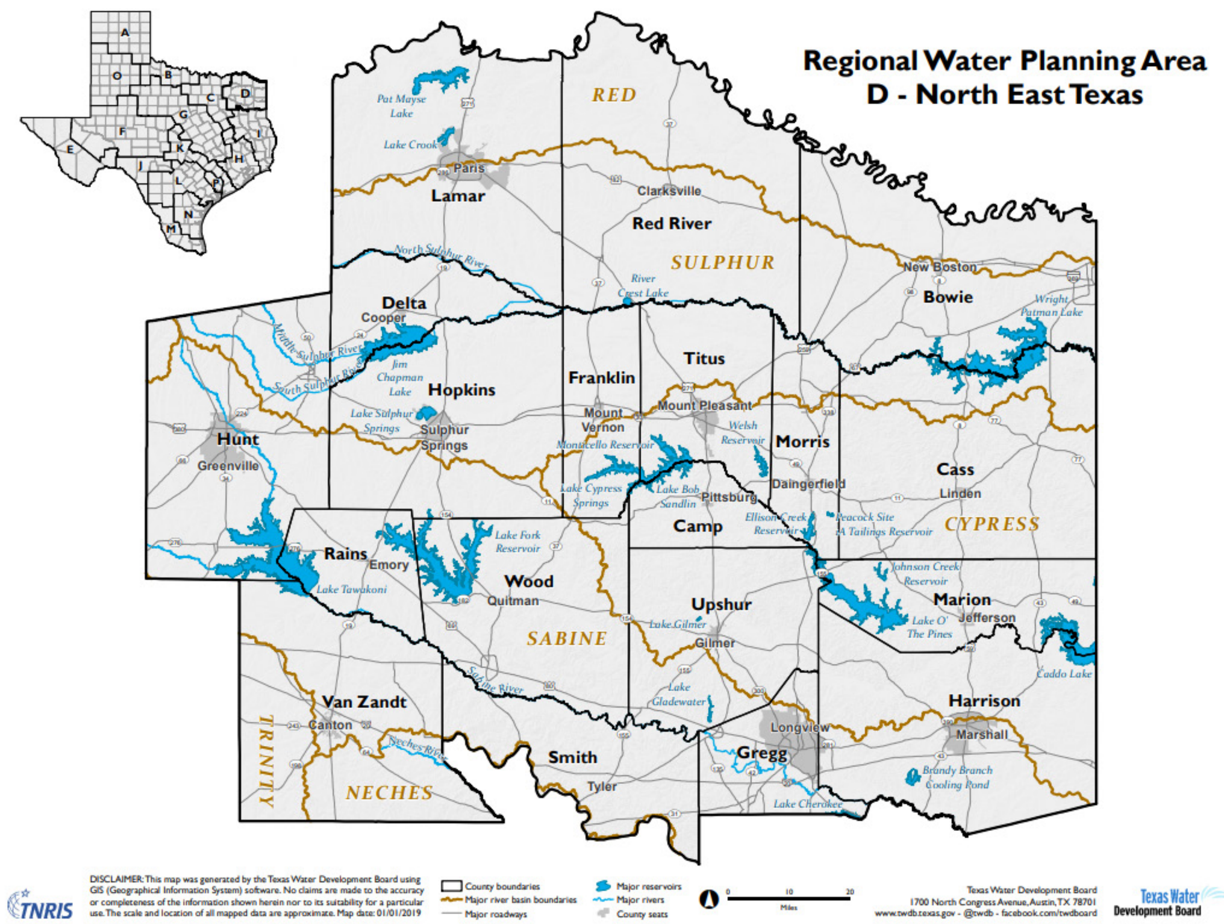


Figure 1.2 Regional Water Planning Area

(Source: TWDB)

Table 1.1 compares the size and population of the Region's counties and lists the largest city in each county.

Table 1.1 County Population Comparison

County	Area (Square Miles)	2020 Census	Largest City
BOWIE	885	92,893	Texarkana°
CAMP	196	12,464	Pittsburg
CASS	937	28,454	Atlanta
DELTA	257	5,230	Cooper
FRANKLIN	284	10,359	Mount Vernon
GREGG	273	124,239	Longview°
HARRISON	900	68,839	Marshall°
HOPKINS	767	36,787	Sulphur Springs
HUNT	840	99,956	Greenville°
LAMAR	907	50,088	Paris°
MARION	381	9,725	Jefferson
MORRIS	252	11,973	Daingerfield
RAINS	229	12,164	Emory
RED RIVER	1,044	11,587	Clarksville
SMITH	921	233,479	Tyler
TITUS	406	31,247	Mount Pleasant
UPSHUR	583	40,892	Gilmer
VAN ZANDT	843	59,541	Canton
WOOD	645	44,843	Mineola
REGION TOTAL	**11,552**	**984,760**	

**Portion within the North East Texas Region.*
°Population over 20,000.

1.2.2 Physiography

The NETRWPG is located in the physiographic region known as the Gulf Coastal Plains, which extends from the eastern border of Texas to the Balcones fault zone and spans from the Texas/Oklahoma border to the southern tip of the state (Figure 1.3). Topography in this region is primarily hilly in the east, with pine and hardwood vegetation. Moving westward, the region becomes more arid with a post oak dominated fauna, until the vegetation becomes prairie. The Gulf Coastal Plains are located in "lowland Texas" as opposed to upland Texas west of the Balcones fault.

The Gulf Coastal Plains has been divided into several sub-areas. Within the RWPA, the Blackland Prairies Belt and the Interior Coastal Plains are represented. These belts are distinguished by surface topography and vegetation.

Elevations within the Region range from 150 – 200 feet above sea level at Caddo Lake on the eastern edge of the region, to 650 – 700 feet above sea level in the northwestern portions of Hunt County.

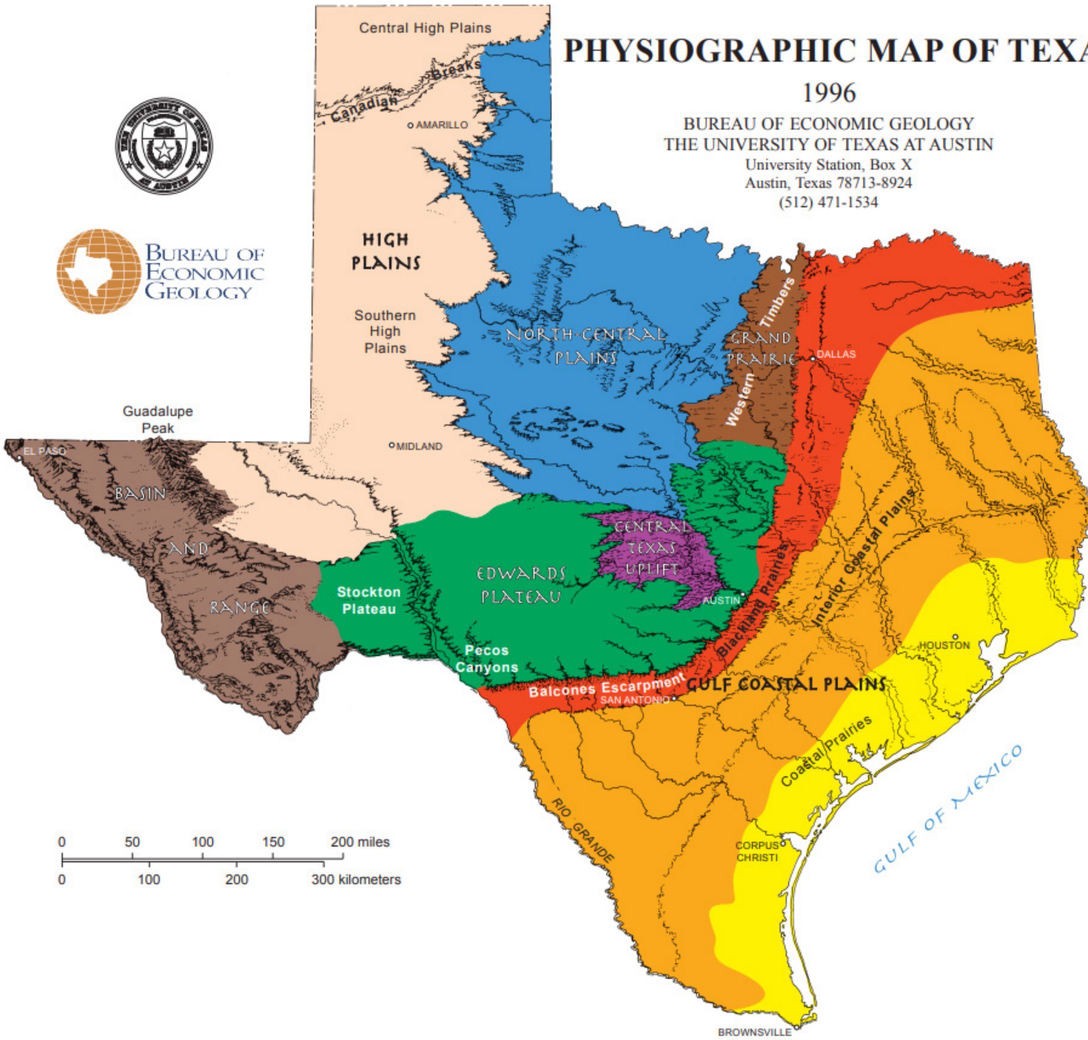


Figure 1.3 Physiographic Map of Texas

(Source: Bureau of Economic Geology)

The Region has 24 surface water bodies with capacity of 5,000 ac-ft or more. The terrain is crossed by a network of rivers, streams, and creeks. In addition, farm and pasture land is scattered with ponds and pools. Major waterways bordering or crossing through the Region include the Red River, Sulphur River, Sabine River, and Cypress Creek. There are six river basins in the RWPA including the Red, Sulphur, Cypress, Sabine, and small portions of the Neches in Van Zandt County and the Trinity in Hunt County.

1.2.3 Climate

The North East Texas Region experiences a "subtropical humid" climate, noted for its warm summers. Climate in the area is generally mild. Based on data from 1991-2020, the average annual temperature in northeast Texas is 65°F. The mean high temperature for July in the Region is 94°F, and the mean low January temperature is 34°F[1]. The 30-year average number of days per year with temperatures of 100°F and higher is 12[2]. Relative humidity is high in the Region, which makes temperatures seem more extreme. The growing season in northeast Texas lasts approximately 245 days[3].

Mean annual precipitation in the region is 47.8 inches (see Figure 1.4)[1]. Average annual lake surface evaporation over a five-year period, from 2018 to 2022, was 46.82 inches down from 49.76 inches from 2013 – 2017[4]. Over the same period, the January average evaporation rate was 1.96 inches, and in August the rate was 6.17 inches. The Region experienced 19 recorded droughts from 1892 – 2022[5]. Winter precipitation, such as snow, sleet and ice, occurs infrequently in northeast Texas and is generally short-lived. Figure 1.5 depicts average net evaporation in the region.

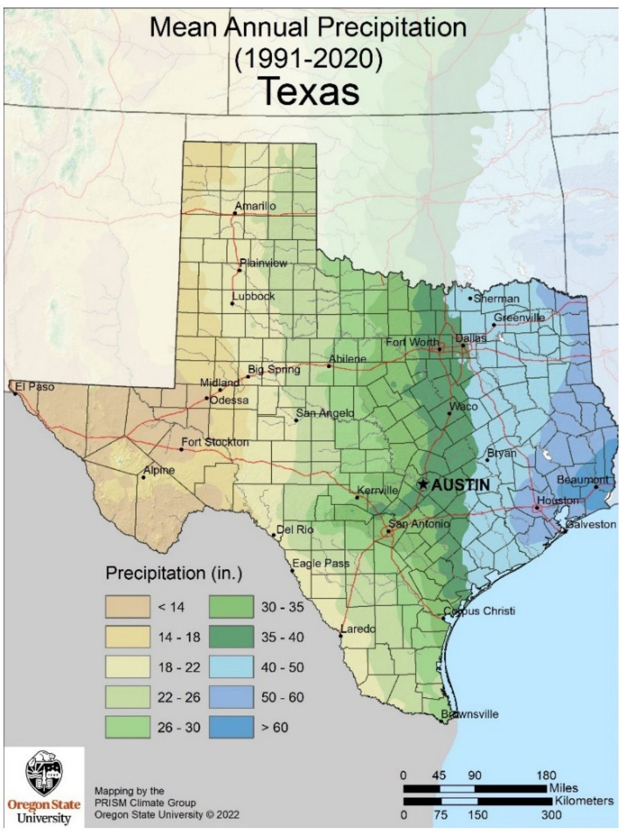


Figure 1.4 Average Annual Precipitation (1991 – 2020)

(Source: PRISM Climate Group)

[1]PRISM Climate Group, Oregon State University, 30-Year Climate Normals, https://prism.oregonstate.edu/
[2]National Centers of Environmental Information (NCEI), 1991-2020 Monthly Climate Normals website,
[3]Texas A&M Agrilife Extension website
[4]Water Data for Texas, Gross Lake Evaporation Data website,
[5]National Centers of Environmental Information (NCEI), U.S. Gridded Standardized Precipitation Index (SPI) from nClimGrid-Monthly, website

Winds in the Region are predominately from a southerly direction during summer months. In winter, winds from the north are typical. Velocities range from an annual average of 8.3 mph on the eastern edge of the region, to 10.7 mph on the west.

Destructive weather is a factor in the North East Texas Region. Hurricanes in the Gulf of Mexico can bring thunderstorms with high winds as was the case with hurricanes Ike and Dolly in 2008. Tornadoes are frequent and are often destructive according to the National Climatic Data Center. The Region has an average of 1-2 tornadoes per 2,500 square miles per year. According to the 2022 Texas Almanac, the Red River Valley, in the northern part of the Region, has the highest frequency of tornadoes in the state.

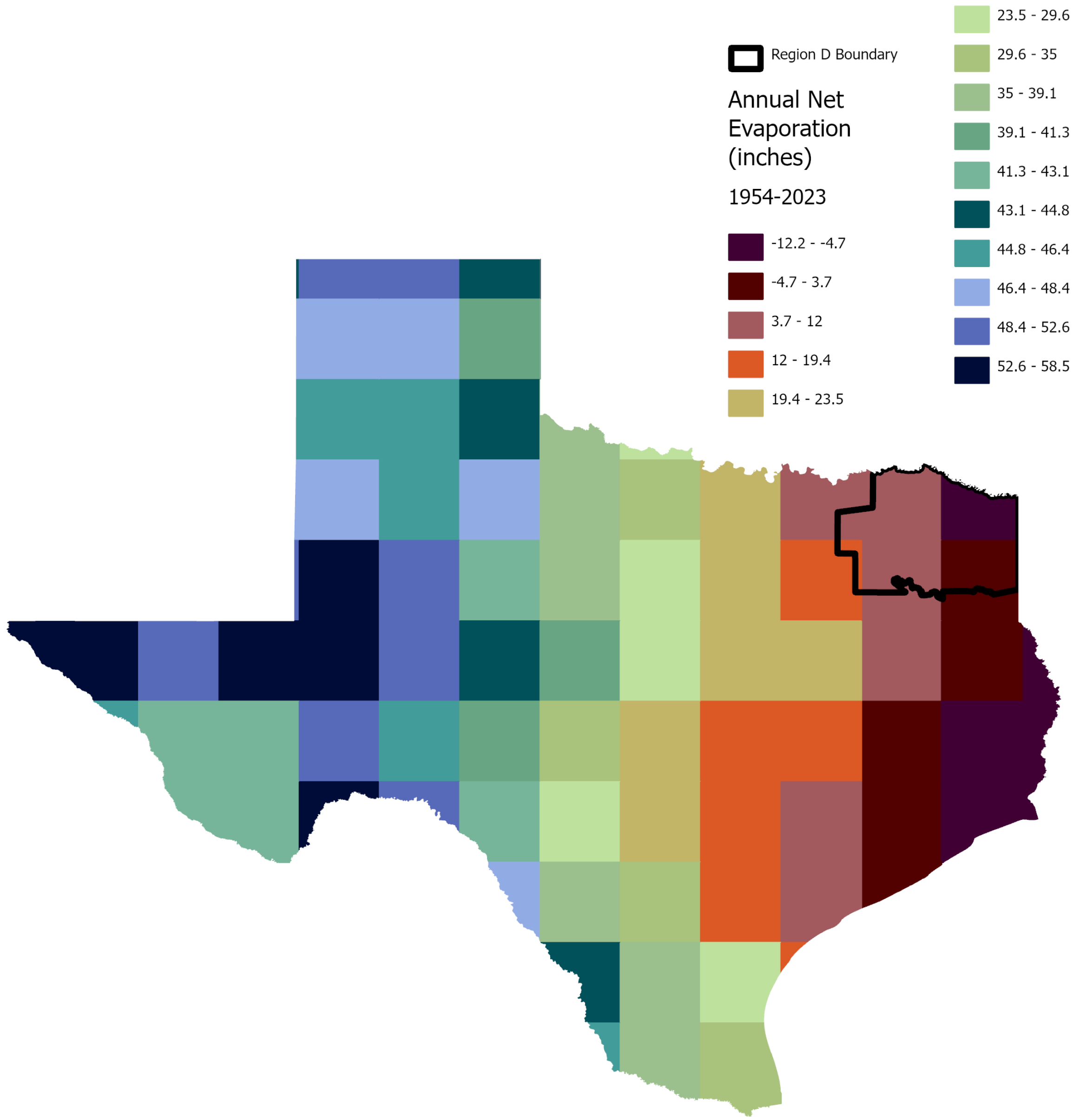


Figure 1.5 Average Net Evaporation in Texas

(Source: TWDB)

1.2.4 Geology

Surface outcroppings in the Region are from the Cretaceous, Paleocene and Eocene periods. From the northwest corner of the region moving southeast, the bands of rocks become younger. Soils in the Region range from light colored, acidic sandy loams, clay loams and sands in the east to dark colored calcareous clays in the western part of the region. Northeast Texas is located just east of the Ouachita Mountains, a buried mountain range that reaches from southwest Texas through the Austin and Dallas areas and eventually runs eastward to the Appalachian Mountains. Formation of this range 300 million years ago caused down warping on either side, and as a result, much sediment settled in northeast Texas. For the past 60 million years, the North East Texas Region has been "sinking", and rocks from earlier periods have been buried rather than exposed. The effects of sediment buildup from the mountain range run-off coupled with waters of the Gulf of Mexico flowing over the surface, led to the formation of rich organic sediments that over time turned into oil and gas deposits. Salt deposits compressed by dense organic-rich muds formed domes and spikes beneath the surface.

Mineral resources in the Region are varied and abundant. Lamar and Red River counties have chalk deposits buried beneath the surface. The southern part of the Region is dotted with salt domes. Salt was deposited about 200 million years ago when the Gulf of Mexico was beginning, before it was connected to other oceans. This is salt that pushed up through layers of thick, dense sediment, created domes which are mined today. This area also contains significant oil and gas deposits. Oil in northeast Texas is produced from the late Cretaceous Woodbine Formation. Normally found deep below the surface, some oil has been forced upward by the upheaval of the salt domes which trapped oil and natural gas. Oil is an important industry in Texas, and Gregg County has produced more total barrels of oil since discovery than any other county in Texas. Lignite, a low-grade form of coal, was formed in northeast Texas when organic rich muds, flowing from the Ouachita Mountains, were pressed beneath later layers. This fuel resource is used by the electric utility industry. Industrial clays, used for producing bricks, tile, pottery, and even fine china, are located beneath parts of Bowie, Franklin, Harrison, Hopkins, Morris, Titus, Rains and Van Zandt counties.

1.2.5 Natural Resources

Soils within the Region are good for crop production and cattle grazing. Soils in the Piney Woods support fruit crops, especially peaches, blueberries and strawberries. The Piney Woods is also abundant in timber and supports a large timber industry. Livestock is another important economic resource in northeast Texas and regional soils support sufficient vegetation for grazing. Cattle in northeast Texas are raised for stocker operations, cow-calf operations, beef production and dairies. Northeast Texas is home to major poultry processing plants, and many farmers raise poultry for eggs and broilers. Finally, hogs and horses are significant in some counties, but are raised less extensively Region wide.

Vegetation in the Region is varied due to local differences in rainfall, temperature, and terrain. Figure 1.6 delineates the vegetative or eco-regions within northeast Texas. The Piney Woods is appropriately named because the vast majority of its timber is pine. Native vegetation is defined as a pine-hardwood forest, and principal trees include shortleaf pine, loblolly pine, sweetgum and red oak. Moving westward, vegetation changes from pine to oak and from oak to prairie, with scattered trees. Vegetation in the Oak Woods and Prairies Belt is distinct between uplands and bottomlands. Uplands contain tall bunchgrasses and stands of post oak and blackjack oak. The bottomlands, wooded and brushy, contain chiefly hardwoods, with an occasional pecan. Native vegetation in the Blackland Prairies Belt is classified as true prairie with important native grasses being little bluestem, big bluestem, Indian grass, switch grass, and Texas wintergrass. Pastures seeded with Dallis grass and Bermuda grass are common. Principal trees are post oak, shumard oak, bur oak, magnificent chinquapin oak, pecan, American and cedar elms, soapberry, hackberry and eastern red cedar.

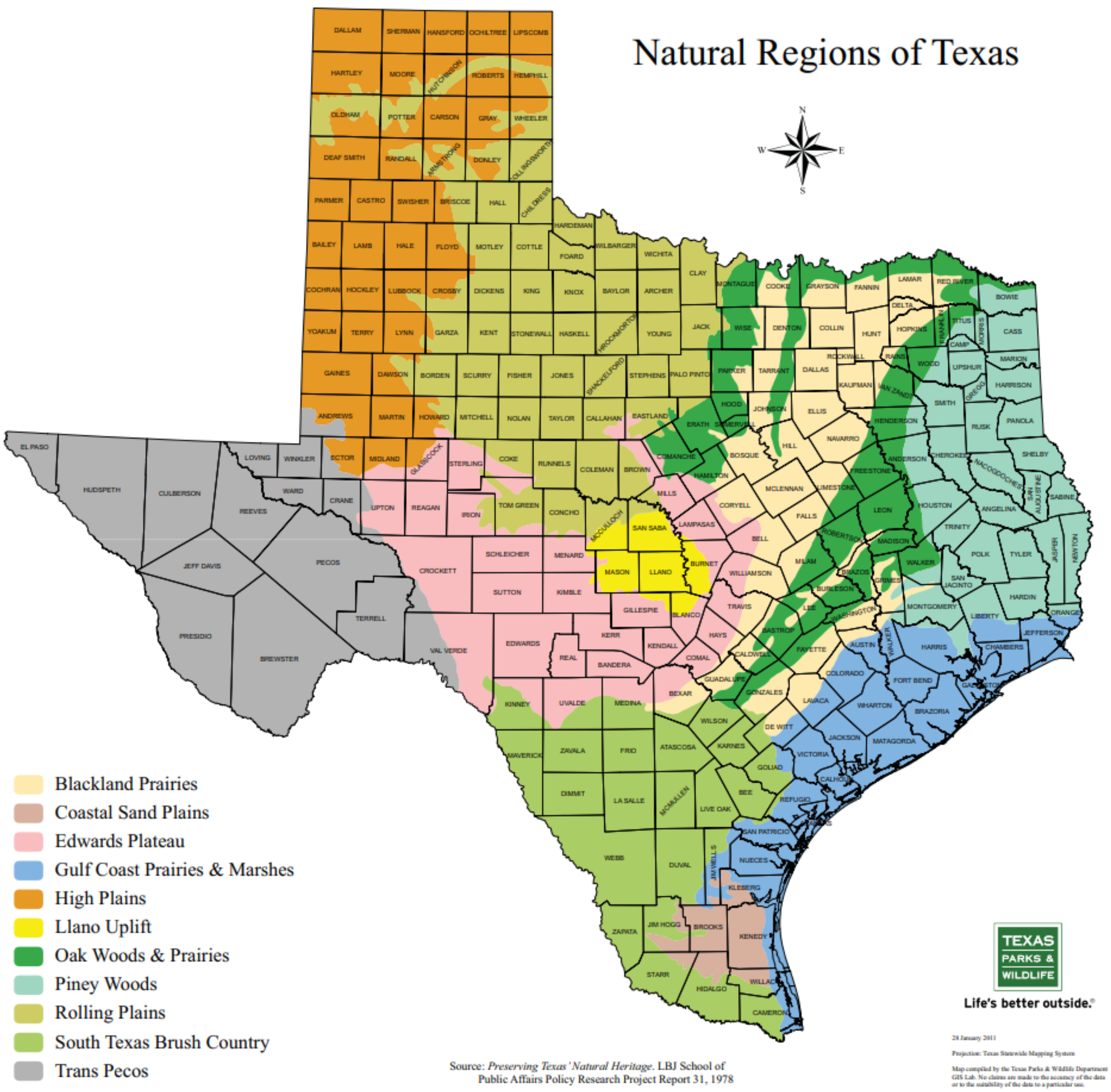


Figure 1.6 Natural Regions of Texas

(Source: Texas Parks and Wildlife Department)

The Region supports numerous species of wildlife, including, but certainly not limited to white-tailed deer, armadillo, quail, rabbit, opossum, raccoon, squirrel, dove, wild hog and wild duck. Since northeast Texas is predominantly rural, there is farm and ranch land as well as recreational, undeveloped and timbered land available for wildlife habitat. The numerous surface water impoundments, rivers and streams provide suitable habitat for many different species. Wetlands, bottomland hardwood forests, pine forests and state protected lands also provide habitat. At one time, larger deer and black bears were found in the area; however, population growth and accompanying development and hunting encroached upon the habitat of bears, and also caused a reduction in deer size. According to the Texas Parks and Wildlife Department, there are six TPWD wildlife management areas in the NETRWPG Region. These include Cooper (14,480 acres), Pat Mayse (8,925 acres), Tawakoni (2,335 acres), White Oak Creek (25,777 acres), Old Sabine Bottom (5,727 acres), and Caddo Lake (8,005 acres). These areas are used for hunting, research, fishing, wildlife viewing, hiking, camping, bicycling, and horseback riding.

Air quality in Texas is monitored by the TCEQ, which has monitoring stations in various locations around the state. The monitoring locations in or near the North East Texas Region include those in the Dallas-Ft. Worth area and the Tyler-Marshall-Longview area. Currently, the TCEQ monitors six air pollutants including ozone, sulfur dioxide, nitrogen dioxide, respirable particulate matter, carbon monoxide, and lead, regulated under National Ambient Air Quality Standards. Within Region D, Gregg, Harrison, Smith, and Upshur counties are presently in the non-attainment zone for ozone[6]. Other counties do not have permanent monitoring stations.

The Haynesville Shale formation has been under development in western Louisiana and eastern Texas. The area being developed overlaps with the Region D water planning area primarily in Harrison, Gregg and Marion Counties (Figure 1.7).

[6] TCEQ Air Quality website

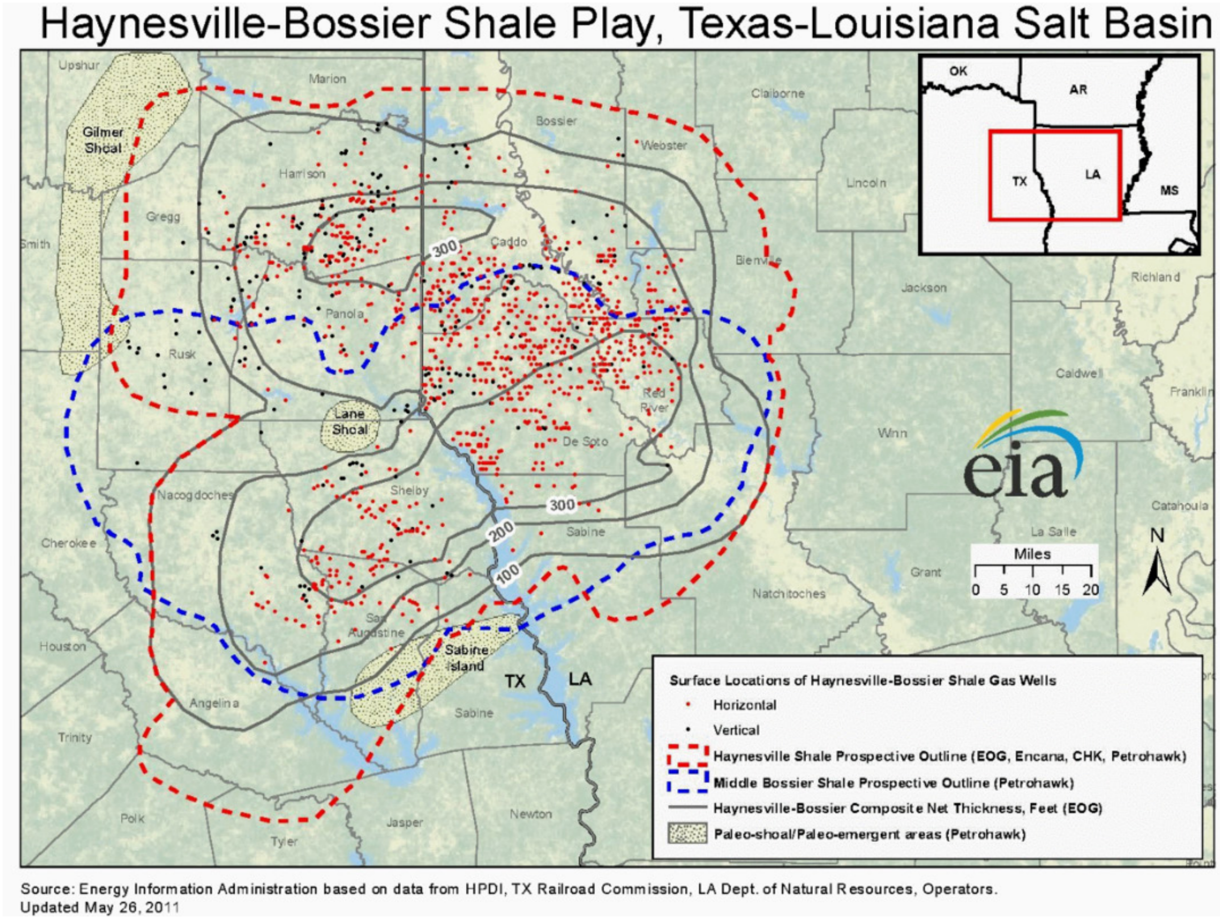


Figure 1.7 Haynesville Shale and Oil/Gas Well Location Map

(Source: Energy Information Administration, TCEQ)

The Haynesville Shale is considered a tight formation which requires that a technique called fracking be utilized to open up the shale and allow easier capture of the oil/gas. The water demand necessary to complete and frack a well is reported to be of the magnitude of seven million gallons of water per well. This equates to approximately 21 acre-feet per well. The fracking operation typically is completed in a matter of days. Historically the oil and gas industry has used groundwater for drilling operations because local water wells could be drilled on each site and provide the necessary water for drilling. The Haynesville Shale wells will require a significantly larger volume of water in a shorter time period leading to the necessity of additional supply. The development of Haynesville Shale in Louisiana is ahead of Texas, and it has been reported that the majority of water being supplied for Haynesville Shale wells in Louisiana is coming from surface water sources. Dry natural gas production from the Haynesville shale play in northeastern Texas and northwestern Louisiana reached new highs in March 2023, averaging 14.5 billion cubic feet per day (Bcf/d), 10% more than the 2022 annual average of 13.1 Bcf/d. It is estimated that as many as 1,000 Haynesville Shale wells could potentially be drilled in Region D over the next few decades. This number of wells would equate to 20,000 acre-feet of water demand. `

There have been concerns raised within the Region concerning the possibility of groundwater contamination associated with oil/gas drilling activities. The fracking process consists of injecting water and solid materials at an extremely high pressure to force open and hold open cracks in the shale to allow the desired product to flow more freely and be captured. The concern is that the frack fluid and product would flow up into the water bearing strata. While industry professionals indicate that this is not likely to occur, most agree that it is possible and additional study is necessary.

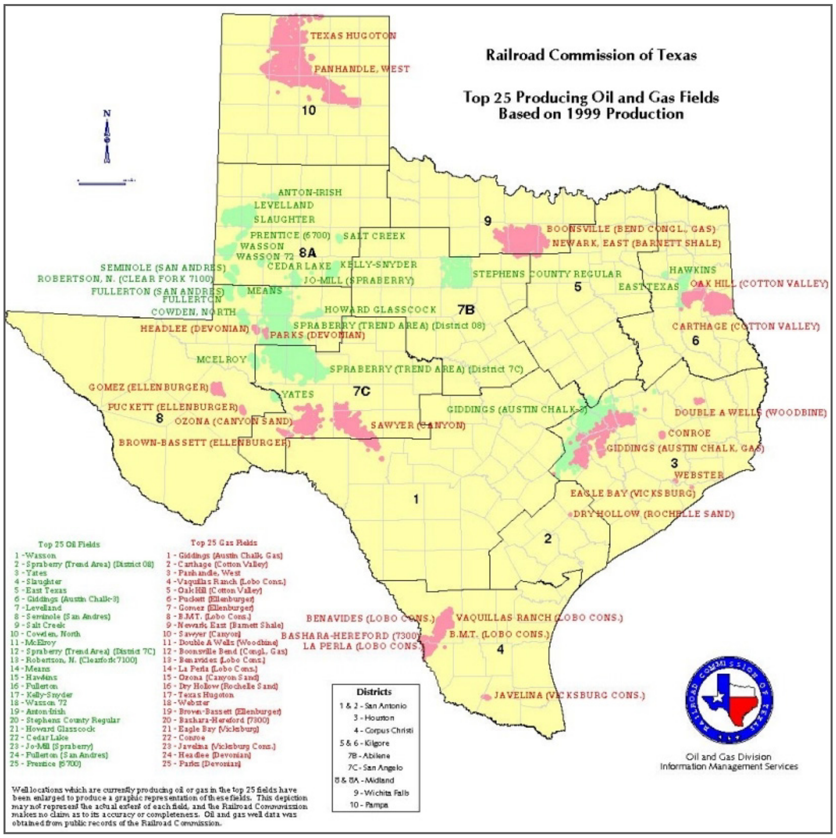


Figure 1.8 Top 25 Producing Oil and Gas Fields based on 1999 Production

(Source: Railroad Commission of Texas)

There are oil fields located throughout the Region, as noted on Figure 1.8. Counties in the Region with the largest oil production in 2023 include Wood, Cass and Gregg. Table 1.2, taken from the Texas Railroad Commission reported production data, lists the amount of crude oil produced in the North East Texas Region in 2021, 2022 and 2023. These amounts are depicted graphically in Figure 1.9.

Table 1.2 Regional Oil Production

County	Oil Production 2021 (BBL)	Oil Production 2022 (BBL)	Oil Production 2023 (BBL)	Total Production (January 1993 to December 2023 (BBL)
BOWIE	22,828	18,851	42,161	3,468,068
CAMP	73,816	73,202	71,878	8,120,244
CASS	570,957	1,015,230	1,741,657	14,794,303
DELTA	0	0	0	0
FRANKLIN	313,159	280,333	211,654	13,409,195
GREGG	1,060,412	1,032,532	1,177,262	182,968,251
HARRISON	369,924	514,776	484,023	14,583,398
HOPKINS	118952	111749	109738	9,361,394
HUNT	940	974	267	128,266

County	Oil Production 2021 (BBL)	Oil Production 2022 (BBL)	Oil Production 2023 (BBL)	Total Production (January 1993 to December 2023 (BBL)
LAMAR	0	0	0	0
MARION	410,702	360,850	268,530	7,056,459
MORRIS	60,876	131,035	130,548	452,319
RAINS	0	0	0	0
RED RIVER	54,879	53,222	52,583	6,905,351
SMITH	946,626	1,106,892	1,125,983	41,012,035
TITUS	328,643	292,964	260,160	15,907,867
UPSHUR	71,390	61,169	67,538	4,291,999
VAN ZANDT	459985	430701	455214	33,215,972
WOOD	3,277,599	3,104,099	3,036,865	146,509,885

(Source: Railroad Commission of Texas)

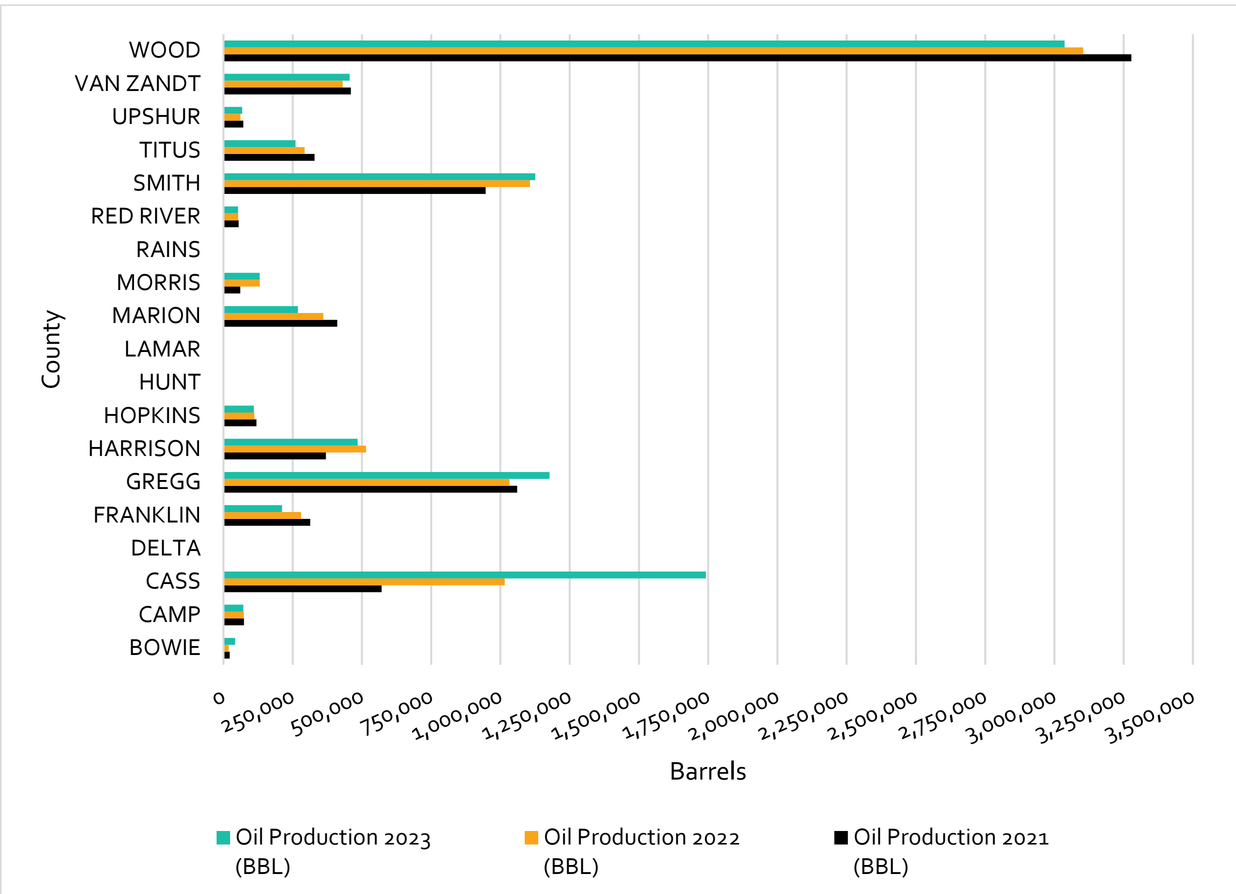


Figure 1.9 Oil Production by County (Barrels; 2021, 2022 & 2023)

(Source: Railroad Commission of Texas)

Lignite resources are also found in portions of northeast Texas (See Figure 1.10), and there are near-surface operating mines in Harrison, Titus, and Hopkins counties. Finally, both ceramic and non-ceramic iron oxide deposits are located in Cass, Harrison, Marion, Morris, Smith, and Upshur counties.

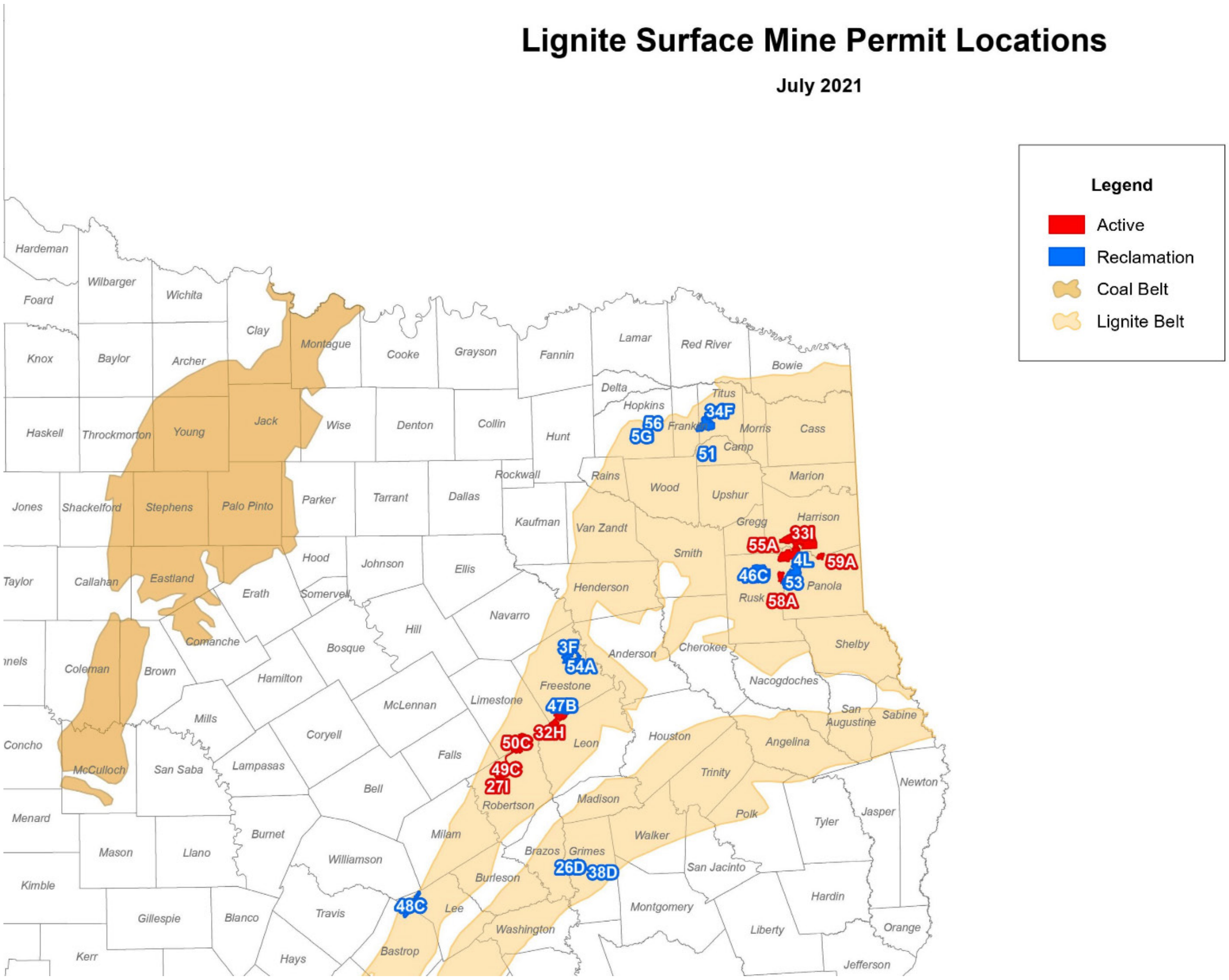


Figure 1.10 North East Texas Regional Water Planning Area Lignite Resources

Agricultural land is important to Northeast Texas and much agricultural production takes place on prime farm land. Prime farm land is defined by the Natural Resource Conservation Service as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses." Figure 1.11 shows locations of agricultural land in the Region. Timber is the second most important agricultural crop in Texas, and the most important timber producing area is in the Piney Woods of east Texas. Counties within the Region with significant timber production include Bowie, Camp, Cass, Gregg, Harrison, Marion, Morris, Red River, Smith, Upshur, and Wood. Of these counties, only Titus County produces more cubic feet of hardwoods than pine. Non-industrial parties own approximately 66 percent of timber production areas in the North East Texas Region, with industrial interests owning 25%, and the remainder used for public lands. Stumpage value of the East Texas timber harvest in 2019 was $67.7 million, and the delivered value of timber was $146.3 million.

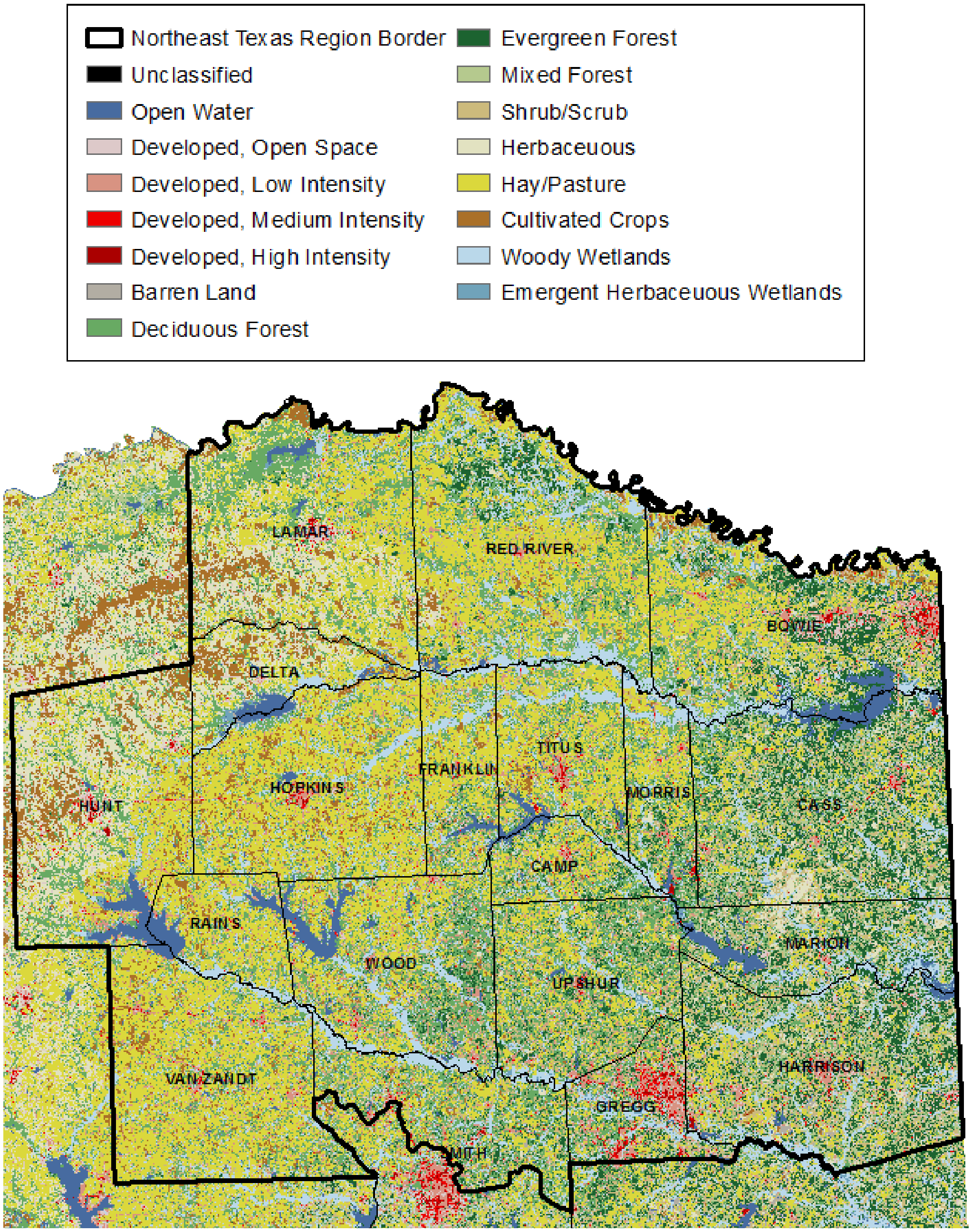
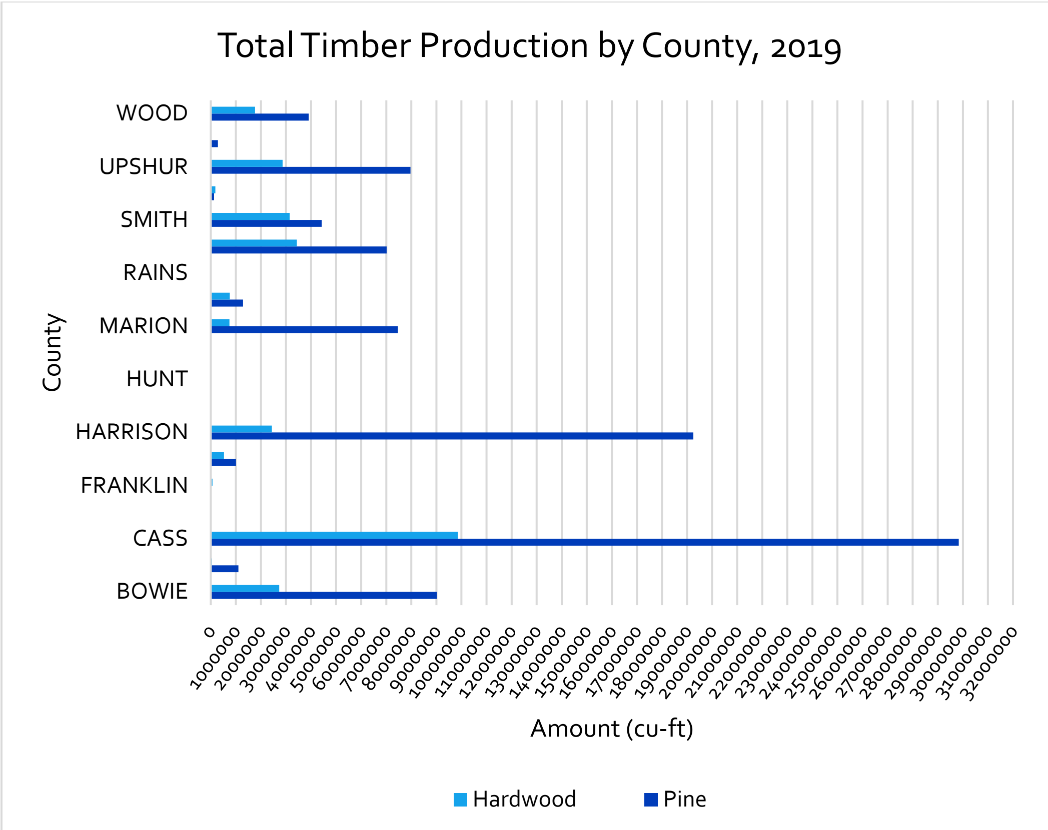


Figure 1.11 North East Texas Water Planning Area Land Use Map

(Source: U.S. Department of Agriculture, Natural Resource Conservation Service)

Data taken from Harvest Trends 2019 from the Texas A&M Forest Service (see Figure 1.12) depict the counties within the Region that are important timber producers.



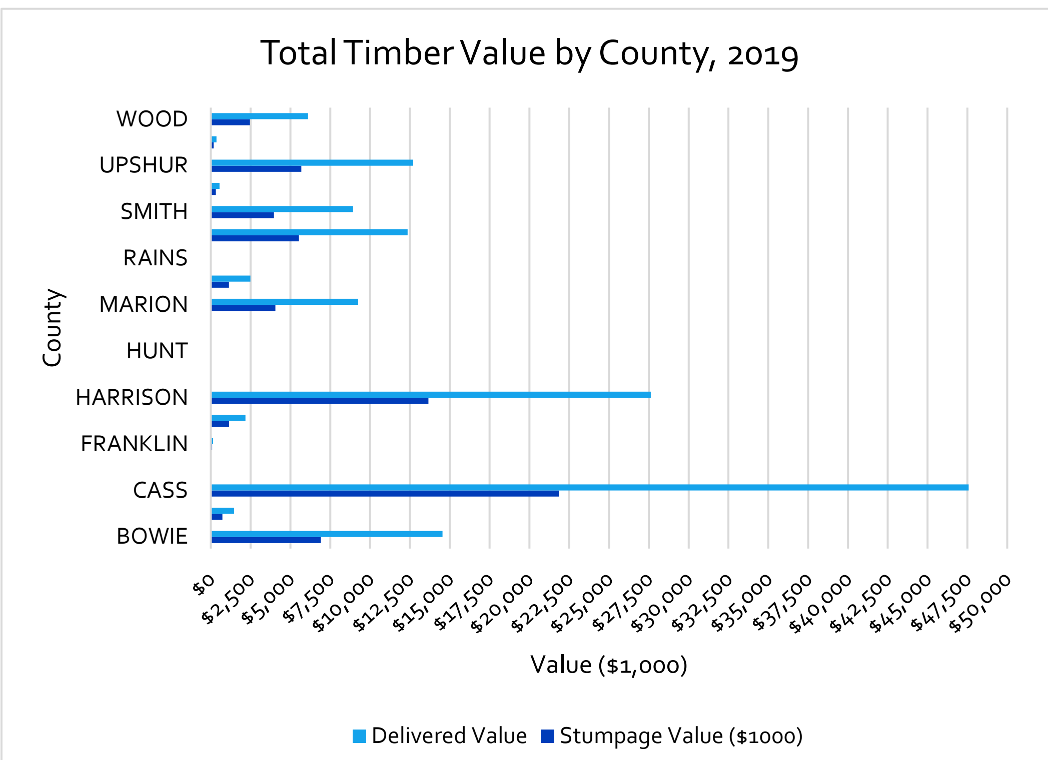


Figure 1.12 Total Timber Production and Value by County (2019)

(Source: Texas A&M Forest Service)

The timber industry in the Region is threatened by the proposed Marvin Nichols Reservoir, as determined in "The Economic Impact of the Proposed Marvin Nichols I Reservoir to the Northeast Texas Forest Industry" report (2002), created by the Texas Forest Service. The report estimates that, depending on what type of wildlife mitigation strategy is chosen, construction of the reservoir could impact the local economy with an annual loss of $51 to $164 million in industry output, $22 to $70 million in value-added, 417 to 1,334 jobs, and $13 to $41 million in labor income.

Types of business and industry in the North East Texas Region vary from county to county, depending on location and natural resources present. For example, Cass County has paper mills and sawmills because of the abundance of timber in the area. Wood, Harrison, and Gregg counties' economies are oil-based due to extensive oil resources. Hunt County is home to Texas A&M University – Commerce, and therefore has a percentage of its economic base in education. Hunt County is also located near the Dallas Metroplex, and many of its residents are employed there. While there are differences in the economic bases within the counties, there are also similarities. Government employment, tourism, manufacturing and agribusiness are present in every county within the Region. Northeast Texas's flora and fauna, as well as its rich history and local pride, are attractions for tourists. There are many things to see and do in northeast Texas, from visiting museums and local festivals to taking nature walks in state parks. Table 1.3 lists state parks in the region by county.

Table 1.3 State Parks by County

County	State Park(s)
CASS	Atlanta State Park
DELTA AND HOPKINS	Cooper Lake State Park
HARRISON	Caddo Lake State Park
HARRISON	Starr Family State Historic Park
HUNT AND VAN ZANDT	Lake Tawakoni State Park
LAMAR	Pat Mayse State Park
LAMAR	Sam Bell Maxey State Park
MORRIS	Daingerfield State Park
SMITH	Tyler State Park
TITUS	Lake Bob Sandlin State Park
VAN ZANDT	Purtis Creek State Park
WOOD	Governor Hogg Shrine State Park

The North East Texas Region has agricultural, art and cultural museums, including the Parchman House in Franklin County, the Marshall Pottery Museum, the Cotton Museum in Greenville, the North East Texas Rural Heritage Center Museum and the Texarkana Historical Museum, to name a few. Almost every town in the Region has at least one fair or festival throughout the year, from the East Texas Yamboree in Gilmer to the Four States Fair in Texarkana.

1.3 Socioeconomic Characteristics of the Region

1.3.1 Historical and Current Population

Population in the North East Texas Region has both increased and declined in the past 100 years due to economic (primarily agricultural) change. Much of the economy in northeast Texas has historically been based on agriculture, and many large on-farm families lived in the area until the 1930's. During the depression years, farmers had to look for work in the cities. Beginning in the 1950's, the region saw a resurgence, and has been growing steadily since. Booms in the oil, timber and tourism industries brought people back to northeast Texas in the 1970's and 1980's, and the 1990's have seen an increase in persons coming to northeast Texas to retire around area lakes.

Table 1.4 presents the historical population of each county. These population counts are provided by the United States 2020 census. The graph shows that most of the counties have seen growth of over 25 percent. Several counties, including Franklin, Hunt, Hopkins, Rains, Smith, Titus, Upshur, Van Zandt and Wood, experienced growth of over 75 percent. The Region grew almost 80 percent from 1970 to 2020, compared to a 160 percent growth in Texas and a 63 percent growth in the United States.

Table 1.4 Historic Population by County

County	1970	1980	% Growth	1990	% Growth	2000	% Growth	2010	% Growth	2020	% Growth	50 Yr. Growth
BOWIE	67,813	75,301	11.00%	81,665	8.50%	89,306	9.40%	92,565	3.60%	92,893	0.35%	36.98%
CAMP	8,005	9,275	15.90%	9,904	6.80%	11,549	16.60%	12,401	7.40%	12,464	0.51%	55.70%
CASS	24,133	29,430	21.90%	29,982	1.90%	30,438	1.50%	30,464	0.10%	28,454	-6.60%	17.90%
DELTA	4,927	4,839	-1.80%	4,857	0.40%	5,327	9.70%	5,231	-1.80%	5,230	-0.02%	6.15%
FRANKLIN	5,291	6,893	30.30%	7,802	13.20%	9,458	21.20%	10,605	12.10%	10,359	-2.32%	95.79%
GREGG	75,929	99,487	31.00%	104,948	5.50%	111,379	6.10%	121,730	9.30%	124,239	2.06%	63.63%
HARRISON	44,841	52,265	16.60%	57,483	10.00%	62,110	8.00%	65,631	5.70%	68,839	4.89%	53.52%
HOPKINS	20,710	25,247	21.90%	28,833	14.20%	31,960	10.80%	35,161	10.00%	36,787	4.62%	77.63%
HUNT	47,948	55,248	15.20%	64,343	16.50%	76,596	19.00%	86,129	12.40%	99,956	16.05%	108.47%
LAMAR	36,062	42,156	16.90%	43,949	4.30%	48,499	10.40%	49,793	2.70%	50,088	0.59%	38.89%
MARION	8,517	10,360	21.60%	9,984	-3.60%	10,941	9.60%	10,546	-3.60%	9,725	-7.78%	14.18%
MORRIS	12,310	14,629	18.80%	13,200	-9.80%	13,048	-1.20%	12,934	-0.90%	11,973	-7.43%	-2.74%
RAINS	3,752	4,839	29.00%	6,715	38.80%	9,139	36.10%	10,914	19.40%	12,164	11.45%	224.20%
RED RIVER	14,298	16,101	12.60%	14,317	-11.10%	14,314	0.00%	12,860	-10.20%	11,587	-9.90%	-18.96%
SMITH*	97,096	128,366	32.20%	151,309	17.90%	174,706	15.50%	209,714	20.00%	233,479	11.33%	140.46%
TITUS	16,702	21,442	28.40%	24,009	12.00%	28,118	17.10%	32,334	15.00%	31,247	-3.36%	87.09%
UPSHUR	20,976	28,595	36.30%	31,370	9.70%	35,291	12.50%	39,309	11.40%	40,892	4.03%	94.95%
VAN ZANDT	22,155	31,426	41.80%	37,944	20.70%	48,140	26.90%	52,579	9.20%	59,541	13.24%	168.75%
WOOD	18,589	24,697	32.90%	29,380	19.00%	36,752	25.10%	41,964	14.20%	44,843	6.86%	141.23%
TOTAL	**550,054**	**680,596**	**23.70%**	**751,994**	**10.50%**	**847,071**	**12.60%**	**932,864**	**12.60%**	**984,760**	**5.56%**	**79.03%**

Note: Population numbers reflect the whole of Smith County, not the portion in Region D.

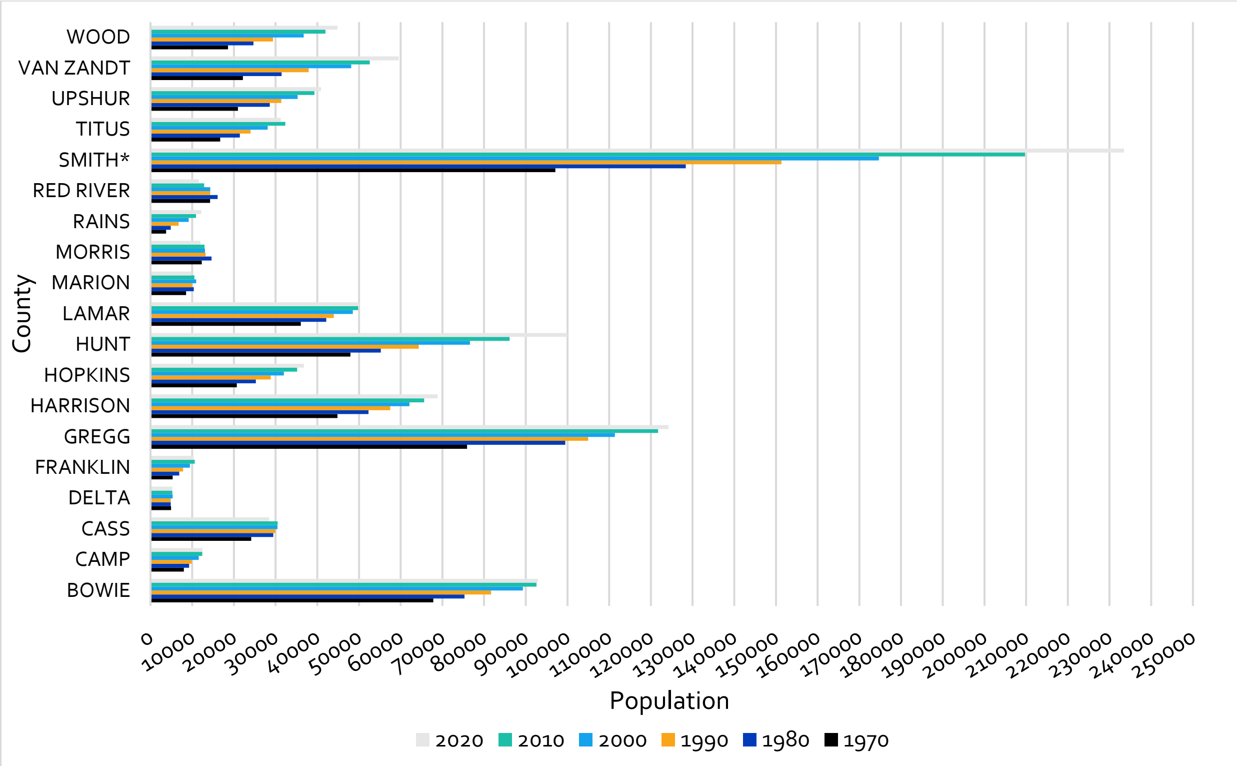


Figure 1.13 Historic Population by County, North East Texas Region (1970 – 2020)

1.3.2 Demographics

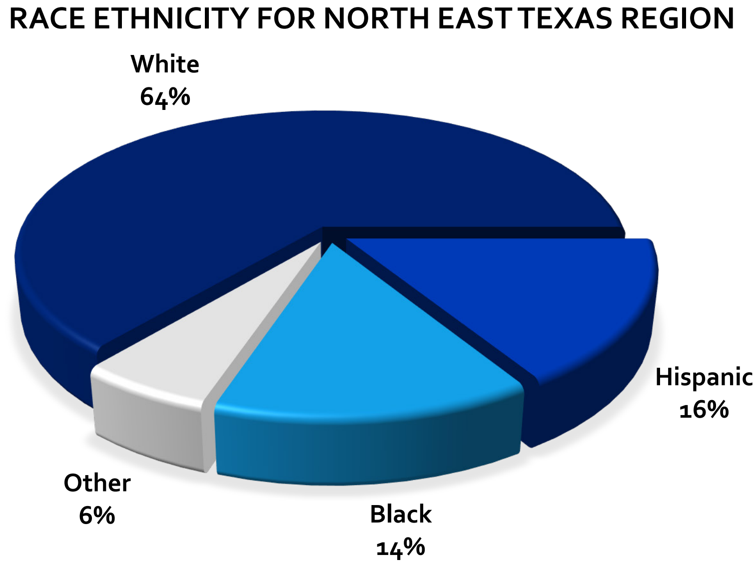
The North East Texas RWPA is largely rural. Most towns within the region have populations of less than 10,000, and there are many small, unincorporated areas within counties. Cities with populations over 10,000 are listed in Table 1.5.

Table 1.5 Cities with 2020 Populations over 10,000

City	2020 Census
GREENVILLE	28,164
KILGORE	13,376
LONGVIEW *	81,638
MARSHALL	23,392
MOUNT PLEASANT	16,047
PARIS	24,476
SULPHUR SPRINGS	15,941
TEXARKANA	36,193
TYLER	105,995
ROYSE CITY	13,508

**Gregg & Harrison*
(Source: U.S. Census Bureau)

The 2020 U.S. Census identifies totals of ethnic categories, including black, white, and other (Asian, American Indian, Hispanic, etc.). The graphs in Figure 1.14 illustrate ethnic percentages in the Region compared to the State.



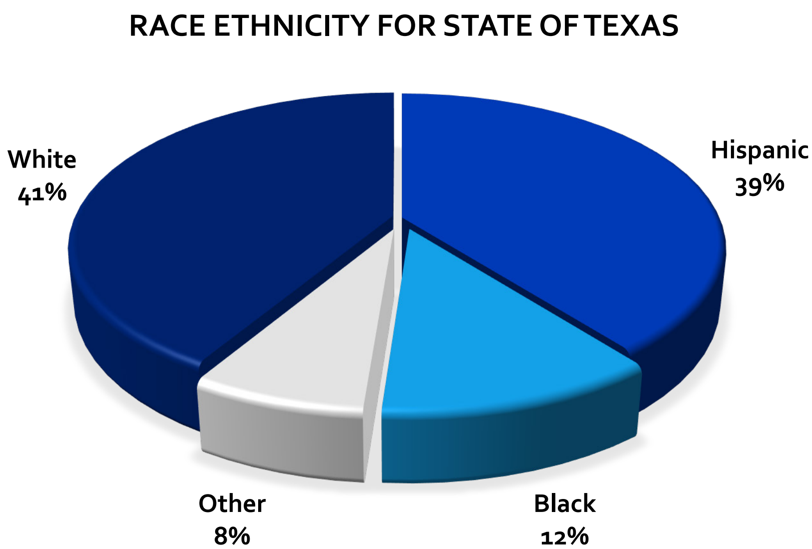


Figure 1.14 Comparison of Ethnic Percentages in the Region compared to the State.

(Source: US Census Bureau)

Incomes in the Region are earned through a variety of occupations, with many either directly or indirectly related to agriculture. The average median household income in the Region in 2021, as estimated by the U.S. Census Bureau, is $54,606, which is lower than the state average of $67,321. Red River County reported the lowest median income of the Region, at $40,674 and Smith County reported the highest income at $62,518. Figure 1.15 shows the median family income by county. The average 2021 per capita income for the Region is $28,249 compared to the state average of $30,255. Titus County reported the lowest per capita income of $22,855 and Franklin County reported the highest, at $34,631.

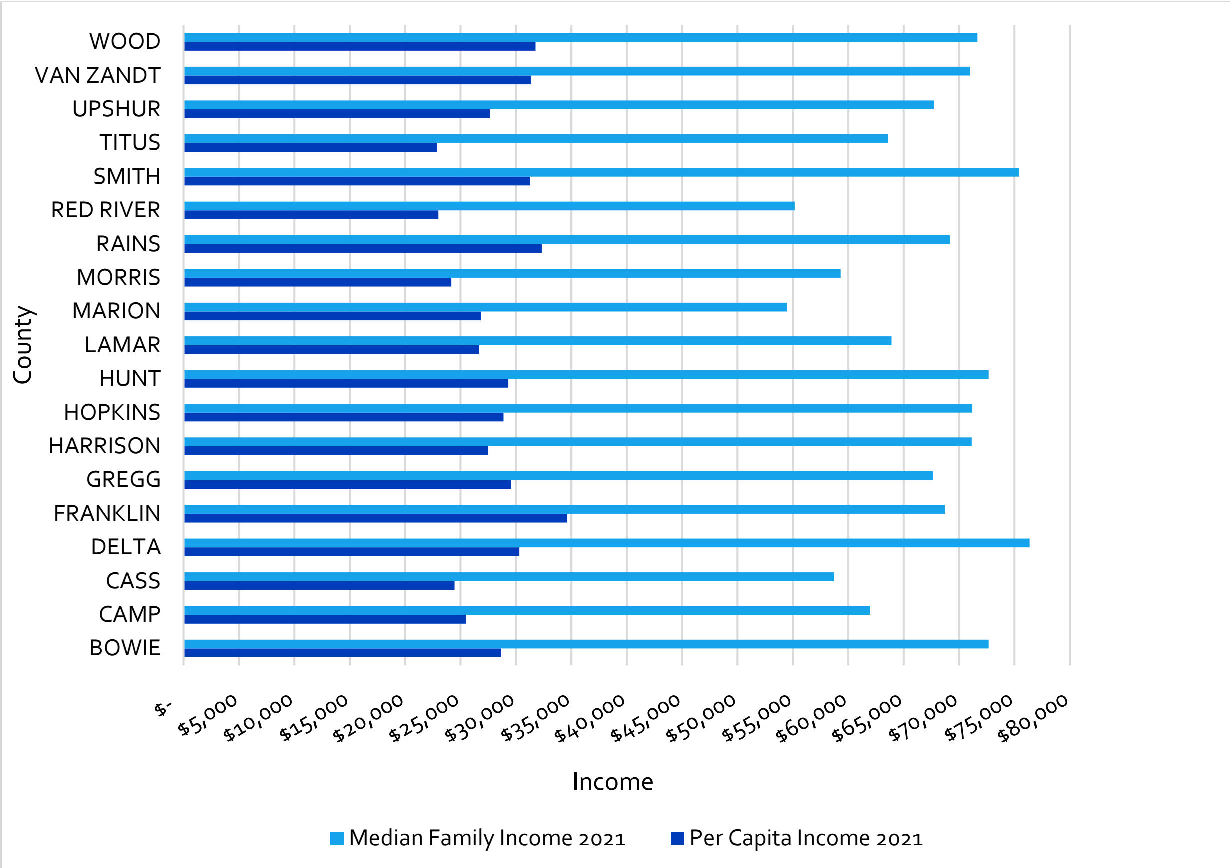


Figure 1.15 Regional Incomes by County

(Source: U.S. Census Bureau 2020)

1.3.3 Economic Activity

The North East Texas Region's main economic base is agribusiness. Crops are varied, and include vegetables, fruits, and grains. Cattle and poultry production are important – cattle for dairies and cow-calf operations, and poultry for eggs and broilers. Timber production is mostly confined to the eastern half of the region, and is an important sector. Oil and gas industries are also significant business sectors. Many residents on the western border of the region are employed in the Dallas-Fort Worth Metroplex.

The two largest sectors of agriculture within Region D are cattle and poultry. These sectors produce more than $800 million in annual sales within the region. Texas has more cattle than any other state in the U.S., and account for approximately one-half of total agricultural sales. There are cattle facilities in every county in the region, representing approximately 5.2% of the total population of cattle in Texas, with the largest population in Region D in Hopkins County. Approximately 12% of total agricultural sales are attributable to poultry, predominantly in broilers (chickens raised for meat production). The Texas poultry industry annually contributes $3 billion to the state's economy. Region D has some of the leading counties in Texas for producing broilers, with sales approximate to sales of cattle in Region D. Hopkins County is the leading broiler producer, and the region routinely has a broiler population approximating 35.33 million. Information regarding cattle and poultry are available from the U.S. Department of Agriculture (USDA) here: USDA Cattle Data; and USDA Poultry Data.

The Texas Department of Agriculture (TDA) provides further information accessible here: Statistics from Texas Department of Agriculture. The numbers for poultry in Region D are generally consistent with the trend identified by TDA. A compilation of 2022 census data from the USDA are presented in Table 1.6, which demonstrate the significant percentage of cattle and poultry production from within the region.

Table 1.6 2022 Census Data on Cattle and Poultry (Broilers) within Region D by County

Ranking	County	Number of Broilers (Million; rounded)	Percentage of All Texas*
1	HOPKINS	8.498337	5.81%
2	TITUS	7.979141	5.46%
3	WOOD	6.355406	4.35%
4	CASS	4.549591	3.11%
5	BOWIE	2.337463	1.60%
6	CAMP	2.160045	1.48%
7	MORRIS	1.715935	1.17%
8	UPSHUR	1.715441	1.17%
9	HUNT	0.018744	0.01%
10	VAN ZANDT	0.001085	0.00%
TOTAL		**35.33**	**24.17%**

Ranking	County	Number of Cattle	Percentage of All Texas**
1	HOPKINS	110,911	0.88%
2	VAN ZANDT	94,140	0.75%
3	LAMAR	88,004	0.70%
4	RED RIVER	78,680	0.63%
5	BOWIE	59,834	0.48%
6	HUNT	57,253	0.46%
7	SMITH	43,997	0.35%
8	UPSHUR	43,452	0.35%
9	WOOD	38,019	0.30%
10	FRANKLIN	37,932	0.30%
TOTAL		**652,222**	**5.20%**

** Total broilers in Texas is 146,162,793.*
*** Total cattle in Texas is 12,543,300.*

The North East Texas Region is traversed by several major highways, including Interstate 30 which passes from Dallas-Ft. Worth through the region to Texarkana. Interstate 20 runs from the Dallas Metroplex east/west across the southern portion of the region. Other major highways include U.S. 271, U.S. 69, U.S. 82, U.S. 59, U.S. 259, and U.S. 80.

Water travel is not significant in the Region. However, there are numerous airports including the East Texas Regional Airport in Longview as well as many county and municipal airports.

1.4 Descriptions of Water Supplies and Water Providers in the Region

1.4.1 Groundwater

The TWDB has identified two major aquifers and four minor aquifers in the North East Texas 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 the total volume available.

Major aquifers are the:

- Carrizo-Wilcox.
- Trinity.

Minor aquifers are the:

- Blossom.
- Nacatoch.
- Queen City.
- Woodbine.

The total groundwater usage in the North East Texas Region was 66,613 ac-ft during 2021, as represented by water use surveys. Fifty Seven percent of that groundwater was used for municipal purposes. About twenty four percent of the groundwater was used for irrigation purposes and the rest of the groundwater was used for manufacturing, mining, livestock, and steam electric power generation.

(1) **Major Aquifers** (see Figure 1.16)

a) Carrizo-Wilcox Aquifer

The Carrizo-Wilcox Aquifer is the most heavily used aquifer in the Region, producing approximately 79.14 percent of the total groundwater pumped in 2021. The Carrizo-Wilcox Aquifer is formed by the hydrologically connected Wilcox Group and the overlying Carrizo Formation of the Claiborne Group. This aquifer extends from the Rio Grande in south Texas northeast into Arkansas and Louisiana, providing water to 60 counties in Texas. In the outcrop, wells generally yield less than 100 gpm – downdip yields greater than 500 gpm are not uncommon. Regionally, water from the Carrizo-Wilcox Aquifer is fresh to slightly saline. Iron and manganese are frequently encountered. In the outcrop, the water is hard, yet usually low in dissolved solids. Hydrogen sulfide and methane may occur locally. Excessively corrosive water can occur in some areas of the Region.

Total groundwater pumpage from the Carrizo-Wilcox Aquifer in the North East Texas Region was 51,441 ac-ft during 2021. Groundwater Management Area (GMA) 11 adopted Desired Future Conditions (DFCs) for the Carrizo-Wilcox Aquifer in August of 2021. The June 2021 Modeled Available Groundwater (MAG) can be used to help evaluate available supply in this aquifer.

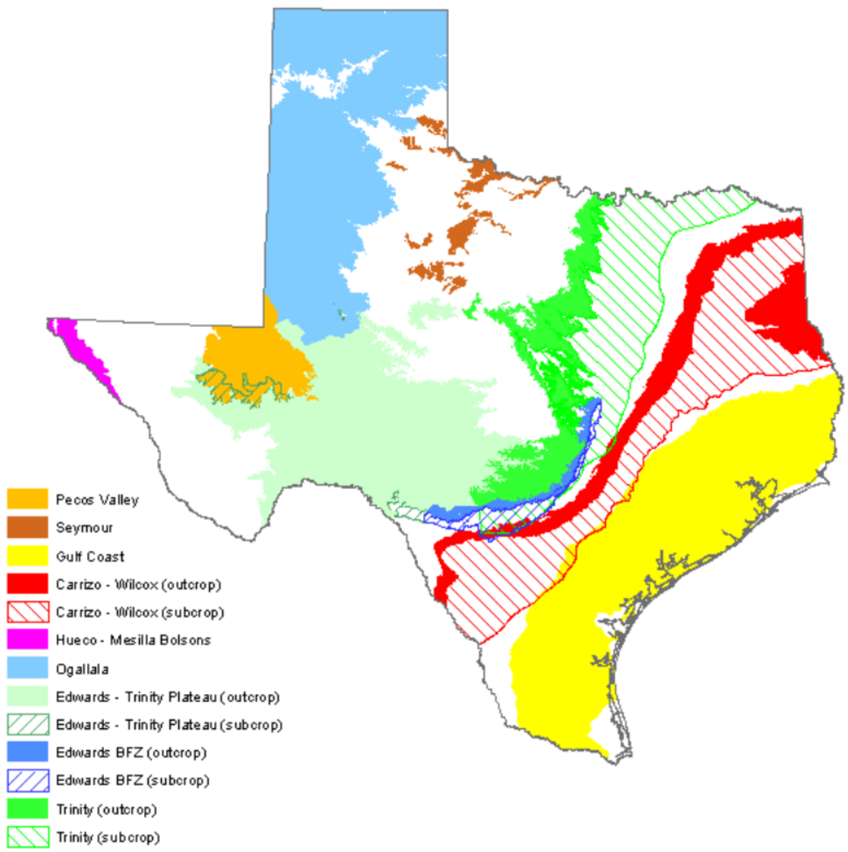


Figure 1.16 Major Aquifers

(Source: TWDB)

b) Trinity Aquifer

The Trinity Aquifer is composed of sand, clay, and limestone units which occur in a band from the Red River in north Texas, to the Hill Country of south-central Texas. It provides water in all or parts of 55 Texas counties. Sherman and Gainesville, located west of the Region, are two large public supply users of the Trinity Aquifer. The groundwater use from the Trinity Aquifer during 2021 in the Region was 1,236 ac-ft. This value is relatively small because only a small northwestern portion of the Region overlies the downdip portion of the Trinity Aquifer, and the groundwater from the Trinity Aquifer in the Region exceeds the 1,000 milligrams per liter (mg/l) TDS limits established by TCEQ for municipal supply.

GMA 8 re-adopted Desired Future Conditions (DFCs) for the Trinity Aquifer in January of 2017. The June 2017 MAG can be used to help evaluate available supply in this aquifer. GMA 11 determined the Trinity aquifer to be non-relevant for joint planning purposes in 2021 and therefore, DFCs and MAGs were not developed for this aquifer in GMA-11. Previous MAG estimates, historical use, and other local hydrogeologic information can be used to help evaluate available supply in this aquifer.

(2) **Minor Aquifers** (see Figure 1.17)

a) Queen City Aquifer

The Queen City Aquifer extends in a band across most of Texas from the Frio River in south Texas northeast 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 yields are typically low. A few wells exceed 400 gallons per minute (gpm). 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. Due to the relatively low well yields, overdrafting of the aquifer has not occurred. The groundwater usage from the Queen City aquifer during 2021 in the Region was 3,709 ac-ft. GMA 11 adopted Desired Future Conditions (DFCs) for the Queen City Aquifer in August of 2021. The June 2021 MAG and other information can be used to help assess available supply in this aquifer.

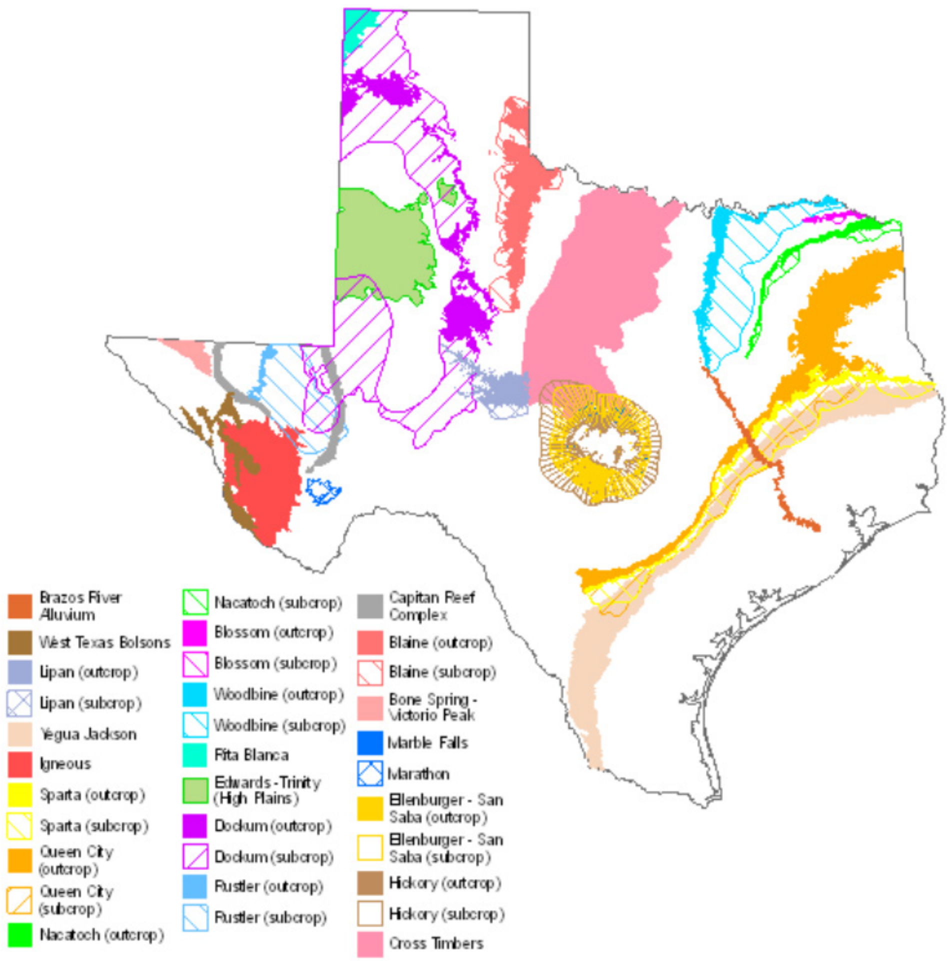


Figure 1.17 Minor Aquifers

(Source: TWDB)

b) Woodbine Aquifer

The Woodbine Aquifer extends from McLennan County in north-central Texas northward to Cooke County and eastward to Red River County, paralleling the Red River. The Woodbine Aquifer is composed of water bearing sand and sandstone beds interbedded with shale and clay. The water in storage is under water-table conditions in the outcrop and under artesian conditions in the subsurface. The aquifer dips eastward into the subsurface where it reaches a maximum depth of 2,500 feet below land surface and a maximum thickness of approximately 700 feet.

Yields of wells in the Woodbine Aquifer in the Region are generally less than 100 gpm. Water produced from the aquifer furnishes municipal, industrial, domestic, livestock, and small irrigation supplies throughout northeast Texas. Chemical quality of water deteriorates rapidly in well depths below 1,500 feet. In areas between the outcrop and this depth, quality is considered good overall as long as groundwater from the upper Woodbine Aquifer is sealed off. The upper Woodbine Aquifer contains water of extremely poor quality in downdip locales and contains excessive iron concentrations along the outcrop. Total pumpage from the Woodbine Aquifer in the Region during 2021 was 502 ac-ft. GMA 8 re-adopted Desired Future Conditions (DFCs) for the Woodbine Aquifer in August of 2021. The June 2021 MAG can be used to help evaluate available supply in this aquifer.

c) Nacatoch Aquifer

The Nacatoch Aquifer occurs in a narrow band in northeast Texas and extends eastward into Arkansas and Louisiana. The Nacatoch formation is composed of one to three sequences of sands separated by impermeable layers of mudstone or clay. The aquifer also includes a hydrologically connected mantle of alluvium up to 80 feet thick where it covers the Nacatoch formation along major drainage ways. Groundwater in this aquifer is usually under artesian conditions except in shallow wells on the outcrop where water-table conditions exist. Well yields are generally low, less than 50 gal/min, and rarely exceed 500 gal/min. The quality of groundwater in the aquifer is generally alkaline, high in sodium bicarbonate, and soft. Dissolved-solids concentrations increase in the downdip portion of the aquifer and are significantly higher downdip of faults.

During 2021, pumpage from the aquifer totaled 2,968 ac-ft. GMA 8 determined the Nacatoch aquifer to be non-relevant for joint planning purposes in 2021 and therefore, DFCs and MAGs were not developed for this aquifer. Previous MAG estimates, historical use, and other local hydrogeologic information can be used to help evaluate available supply in this aquifer.

d) Blossom Aquifer

The Blossom Aquifer occupies a narrow east-west band in parts of Bowie, Red River, and Lamar counties in the northeast corner of the State. The Blossom formation consists of alternating sequences of sand and clay. In places it attains a thickness of 400 feet, although no more than 29 percent of this thickness consists of water-bearing sand. The Blossom Aquifer yields water in small to moderate amounts over a limited area on and south of the outcrop area. Most of the water in storage is under water-table conditions. The average well yields 75 gal/min in Red River County. Production decreases in the western half of the aquifer where yields less than 50 gal/min are more typical. Wells producing fresh to slightly saline water are located on the formation outcrop in northwestern Bowie and eastern Red River counties and in the City of Clarksville. The groundwater is generally soft, slightly alkaline and, in some areas, high in sodium bicarbonate, iron, and fluoride.

In 2021, the total pumpage in the Region was 6,763 ac-ft from the Blossom Aquifer. GMA 8 determined the Blossom aquifer to be non-relevant for joint planning purposes in 2021 and therefore, DFCs and MAGs were not developed for the Blossom aquifer. Previous MAG estimates, historical use, and other local hydrogeologic information will be used to help evaluate available supply from this aquifer.

(3) **Springs**

There are over 150 springs of various sizes documented in the North East Texas Regional Water Planning Area (Brune, 1981). The majority of the largest springs (20 to 200 gpm) are located in the southern third of the Region. The northern third of the Region has smaller spring flows ranging from 0.2 to 20 gpm. A number of springs in Red River, Bowie, Hunt, Delta, Lamar and Titus counties have gone dry. Most springs discharge less than 10 gpm and are inconsequential for planning purposes.

In the northern third of the Region (Lamar, Red River, and Bowie counties) springs issue from the Upper Cretaceous Formations including the Woodbine, Navarro and Ozan Sands, Bonham and Blossom. Springs in the central and southern third of the Region issue from the Tertiary Eocene Sands including the Reklaw, Carrizo, Wilcox and Queen City. The water quality of springs in the Region is dominated by calcium and sodium bicarbonate type waters with locally high concentrations of iron, manganese and sulfate.

(4) **Threats and Constraints on Water Supply**

Potential threats to the groundwater resources of the Region include contamination from point and nonpoint sources. In general, contamination from point sources such as landfills, wastewater outfalls, hazardous waste spills, and leaking underground storage tanks have a relatively localized impact on the shallow water resources of the aquifers. Nonpoint source contamination from agricultural practices such as fertilization and application of herbicides and pesticides as well as urban runoff may have more regionalized impact on shallow groundwater. Adherence to TCEQ regulations concerning stormwater and wastewater discharges should reduce threats to groundwater from these sources.

(5) **Groundwater Management Areas (GMA)**

A GMA is defined as an area suitable for the management of groundwater resources. GMAs were created through Texas Water Code §35.001. The purpose of a GMA is to preserve, conserve, protect, recharge, and prevent waste of groundwater and groundwater reservoirs, and this is accomplished by joint planning. Each GMA is comprised of representatives of the Groundwater Conservation Districts (GCDs) within the GMA area. A key part of the aforementioned joint planning is determining "desired future conditions" (DFCs), conditions of the aquifer that are used to calculate "Modeled Available Groundwater (MAG)" values. These conditions and amounts are used for regional water plans, groundwater management plans, and permitting.

Within the North East Texas Region, there are two GMAs – 8 and 11. GMA 8 includes the Edwards and Trinity Aquifers, as well as the Blossom, Brazos River Alluvium, Ellenburger-San Saba, Hickory, Marble Falls, Nacatoch, and Woodbine Aquifers. It includes 11 Groundwater Conservation Districts (GCDs), none of which are located within Region D. GMA 8 has created desired future conditions (DFCs) for all of its aquifers, and Modeled Available Groundwater (MAG) reports have been created by TWDB for all of the aquifers within Region D.

GMA 11 includes the Carrizo-Wilcox and Gulf Coast Aquifers, as well as the Nacatoch, Queen City, Sparta, and Yegua-Jackson Aquifers. It does not list a managing entity, but is comprised of 5 GCDs, none of which are in Region D. A groundwater district for Harrison County was created by the 81st Legislature, but the County voters turned this down in 2010. GMA 11 adopted DFCs for its aquifers in June of 2017.

The concern in Region D with respect to GMAs, is that it has no representation in either of its management areas. Legislation states that the GMA has the authority to determine DFCs for all areas within the GMA; therefore, Region D's groundwater availability has historically been controlled by entities in different regions, sometimes hundreds of miles away. Senate Bill 1101, recently passed by the 84th Texas Legislature in 2015, allows a regional water planning group to define all groundwater availability as long as there are no groundwater conservation districts within the regional water planning area. In the State of Texas, this applies only to the Region D water planning area.

1.4.2 Surface Water Supplies

The North East Texas Region contains portions of the Red, Sulphur, Cypress and the Sabine River Basins. A small corner of Van Zandt County also lies in the Neches River Basin. Likewise, a small corner of Hunt County is in the Trinity Basin.

Groundwater is limited in quality and quantity in large portions of the North East Texas Region, and, consequently a majority of the Region relies on surface water supplies. For example, of the estimated 2021 supplies in the Sulphur Basin, 78 percent of the water is surface water; 73 percent of water supplied in the Cypress Creek Basin is surface water, and in the Sabine River Basin, some 80 percent of the need is met by surface water. However, in the portion of the Red River Basin in the Region, only 11 percent of the water supply used is surface water. These major river basins are shown in Figure 1.18.

Figure 1.18 Major River Basins in Texas

(Source: TWDB)

Within the Region, a number of surface water reservoirs greater than 500 surface acres exist as shown in Table 1.7. The larger of these reservoirs are illustrated on Figure 1.19.

Table 1.7 Existing Reservoirs

Lake/ Reservoir	County	Built	Conservation Pool			Volumetric Survey Date
			Area (acres)	Capacity (ac-ft)	Firm Yield (ac-ft)	
Red River Basin						
Lake Crook	Lamar	1923	1,060	9,210	7,290	2009
Pat Mayse Lake	Lamar	1967	5,638	117,844	59,670	2009
Sulphur River Basin						
Big Creek Lake	Delta	1986	520	4,890	2,162	
Cooper**	Delta	1991	17,958	298,900	113,849	2007
Rivercrest***	Red River	1953	555	7,000	8,624	
Langford Creek Lake	Red River	1966	162	947	440	2013
Lake Sulphur Springs	Hopkins	1974	1,557	14,370	11,464	

Lake/ Reservoir	County	Built	Conservation Pool			Volumetric Survey Date
			Area (acres)	Capacity (ac-ft)	Firm Yield (ac-ft)	
Lake Wright Patman*	Bowie/Cass	1956	17,907	96,430	347,566	2018
Elliott Creek Lake	Bowie				1,892	
Sulphur Turkey Creek Lakes	Fannin/ Hunt				200	
Cypress Creek Basin						
Lake Bob Sandlin	Wood Titus Franklin	1975	8,703	201,733	36,600	2008
Caddo Lake	Marion/ Harrison	1971	26,800	129,000	10,000	
Cypress Springs	Franklin	1971	3,252	66,756	11,800	2007
Ellison Creek	Morris	1943	1,516	24,700	33,643	
Lake Gilmer	Upshur	1998	895	12,720	6,180	
Johnson Creek Reservoir	Marion	1961	650	11,396	2,280	
Lake O' the Pines	Marion/ Upshur	1958	17,638	241,363	169,700	2009
Monticello Lake	Titus	1973	2,001	34,740	5,000	1998
Tankersley Lake	Titus		N/A	N/A	1,500	
Welsh Reservoir	Titus	1975	1,269	20,242	3,000	2002
Sabine River Basin						
Brandy Branch Reservoir	Harrison	1983	1,242	29,513	19,889	
Lake Cherokee	Gregg	1948	3,467	43,737	31,456	2015
Sabine Edgewood City Lake	Van Zandt				160	
Lake Gladewater	Upshur	1952	481	4,738	4,840	2000
Big Sandy Creek Lake					2,685	
Mill Creek	Van Zandt				1,192	
Greenville Lakes	Hunt	N/A	N/A	6,864	3,421	
Lake Fork**	Wood/Rains	1980	26,889	636,504	171,982	2009
Lake Hawkins	Wood	1962	776	11,890	0	
Lake Holbrook	Wood	1962	653	7,990	0	
Loma Lake					1,777	
Lake Quitman	Wood	1962	814	7,440	0	
Lake Winnsboro	Wood	1962	806	8,100	0	
Lake Tawakoni**	Rains/Van Zandt/Hunt	1960	37,325	871,693	229,647	2009

Source: 2002 – 2003 Texas Almanac, TWDB and other Reservoir Volumetric Surveys and Chapter 3 of this plan.

**Firm yield at ultimate curve reservoir operations with sedimentation. Permitted yield is currently 180,000 ac-ft/yr.*
***Firm yield goes partly to Region C.*
****Includes permitted diversion from Sulphur River*

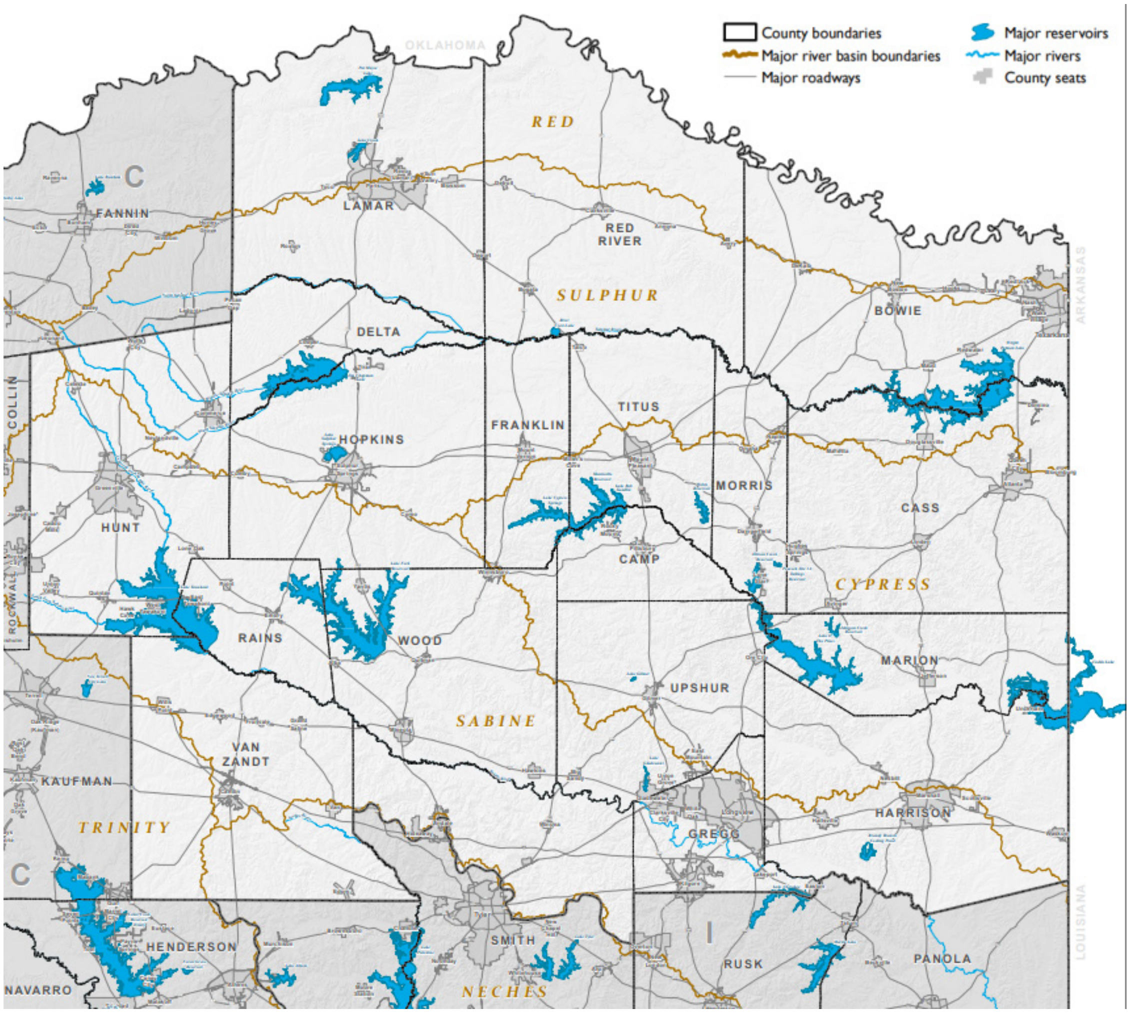


Figure 1.19 North East Texas Regional Water Planning Area Existing Reservoirs

(Source: TWDB)

Surface water reservoirs in the North East Texas Region are used for a variety of purposes, including municipal and industrial water supply, fishing, boating, water sports, cooling water for electric generation, irrigation, livestock, and flood control. State parks exist adjacent to several of the reservoirs, including: Caddo Lake State Park, Lake Bob Sandlin State Park, Tawakoni State Park, and Cooper Lake State Park. The Texas Parks and Wildlife Department maintains an 8,925 acre wildlife management area on Pat Mayse Lake in Lamar County. The Corps of Engineers maintains recreational areas on several reservoirs, including: Pat Mayse, Lake O' the Pines, and Wright Patman. The Sabine River Authority and various local districts and municipalities maintain recreation facilities on their respective reservoirs. Corps of Engineers lakes in the North East Texas Region such as Pat Mayse, Wright Patman, and Lake O' the Pines have a major operational goal of flood control, as well as water supply and recreation. Other reservoirs such as Monticello, Rivercrest, Johnson Creek, Brandy Branch and Welsh Reservoir provide cooling water for power generation as well as recreation.

Three major agreements that affect surface water availability in the North East Texas Region are the Red River Compact, the Cypress Basin Operating Agreement, and the Sabine River Compact. The Red River Compact, entered into by Arkansas, Oklahoma, Louisiana, and Texas was adopted in 1979, and apportions water from the Red, Sulphur, and Cypress Creek Basins between the various states. Water in the Cypress Basin is controlled by the Cypress Basin Operating Agreement. This agreement between the various water rights holders in the basin provides an accounting of water storage, and specifies the storage capabilities of Lakes Bob Sandlin and Cypress Springs, subject to calls for release by downstream Lake O' the Pines. The Sabine River Compact, to which Texas and Louisiana are partners, recognizes that neither entity will construct reservoirs which reduce the “Stateline” flow to less than 36 cubic feet per second.

Several of the water supply reservoirs in the North East Texas Region have been the subject of recent volumetric surveys, mostly performed by the TWDB. In each case, as shown on the next page in Table 1.8, the survey showed a lesser volume than originally estimated. While this can at least partially be attributed to sedimentation, it is difficult to draw any further conclusions since original estimating methodologies varied and generally lacked the precision of these latest surveys.

Surface water is currently imported to, and exported from, the North East Texas Region. In the Red River Basin, Texarkana Water Utilities imports from Arkansas, and exports to the City of Texarkana, Arkansas. In the Sulphur Basin, Cooper Lake serves as a supply for the City of Irving and the North Texas Municipal Water District, both in Region C. The City of Commerce has leased its water in Cooper Reservoir to Upper Trinity (Region C) for the next 50 years. In the Sabine Basin, Lake Tawakoni is a partial supply for Dallas Water Utilities, and that entity has rights to water in Lake Fork Reservoir. Several entities in Hunt County import water from Region C via the North Texas Municipal Water District. WUGs with identified surface and groundwater imports and exports are further identified in Table 1.9.

Table 1.8 Capacity of Reservoirs with Recent Volumetric Surveys

Reservoir	Originally Reported Capacity at Conservation Pool – (ac-ft)	Effective Date of Original Capacity Report	Recent Capacity at Conservation Pool – (ac-ft)	Study Date	Ac-Ft Reduction		Drainage Basin Area (sq. mi.)	Annual Sediment / sq. mi. Drainage Basin
					Total	Annual		
BOB SANDLIN LAKE/RESERVOIR	213,350	1,977	203,148	2,018	10,202	249	239	1.04
CHAPMAN/COOPER LAKE/RESERVOIR	273,120	1,991	247,395	2,022	25,725	830	479	1.73
LAKE CHEROKEE	49,295	1,948	44,475	2,015	4,820	72	158	0.46
LAKE CYPRESS SPRINGS	72,800	1,971	66,756	2,007	6,044	168	75	2.24
LAKE MONTICELLO	40,100	1,973	34,740	1,998	5,360	214	36	5.96
LAKE O' THE PINES	254,900	1,957	241,363	2,009	13,537	260	880	0.30
LAKE TAWAKONI	936,200	1,960	871,693	2,009	64,507	1,316	756	1.74
WRIGHT PATMAN LAKE (TO POOL ELEV. 220.6')	158,000	1,956	96,430	2,018	61,570	993	3,400	0.29
WRIGHT PATMAN LAKE (TO POOL ELEV. 224.0')	240,195	1,956	168,736	2,018	71,459	1,153	3,400	0.34
LAKE GLADEWATER	6,950	1,952	4,738	2,000	2,212	46	35	1.32
LAKE FORK	675,819	1,980	636,504	2,009	39,315	1,356	493	2.75
WELSH RESERVOIR	23,587	1,975	20,242	2,001	3,345	129	21	6.07
CROOK LAKE/RESERVOIR	11,487	1,923	9,210	2,003	2,277	28	52	0.54
PAT MAYSE LAKE/RESERVOIR	124,500	1,967	117,844	2,008	6,656	162	175	0.93
BIG CREEK LAKE/RESERVOIR	4,890	1,987	2,919	2,022	1,971	56	12	4.70

Table 1.9 Imported and Exported Water

Entity	Imported From	Exported To
ABLES SPRINGS WSC	Region C	Region C
BEN WHEELER WSC	-	Region I
BETHEL-ASH WSC	Region I	-
BHP WSC	Region C	-
BOIS D ARC MUD	Region C	-
BLACKLAND WSC		Region C
CADDO BASIN SPECIAL UTILITY DISTRICT	Region C	Region C
CADDO MILLS	Region C	-
CARROLL WSC	Region I	-
CASH SUD	Region C	Region C
CHALK HILL SUD	Region I	-
CROSS ROADS SPECIAL UTILITY DISTRICT	Region I	Region I
CRYSTAL SYSTEMS TEXAS	Region I	Region I
EDOM WSC	-	Region I
DELTA COUNTY MUD		Region C
ELDERVILLE WSC	Region I	Region I
FROGNOT WSC	Region C	-
GILL WSC	-	Region I
GUM SPRINGS WSC	Region I	-
HALLSVILLE	Region I	-
HICKORY CREEK SPECIAL UTILITY DISTRICT	-	Region C
JACKSON WSC	-	Region I
JOSEPHINE	Region C	Region C
KILGORE	-	Region I
LIBERTY UTILITIES SILVERLEAF WATER		Region I
LINDALE	Region I	-
LONGVIEW	Region I	-
MABANK	Region C	-
MACBEE WSC	-	Region C
NORTH HUNT SPECIAL UTILITY DISTRICT	-	Region C
OVERTON	Region I	-
PANOLA-BETHANY WSC	Region I	-
POETRY WSC	Region C	Region C
QUINLAN	-	-
ROYSE CITY	Region C	Region C
RPM WSC	-	Region I

Entity	Imported From	Exported To
SOUTHERN UTILITIES	-	Region I
TERRELL	-	Region C
WEST GREGG SPECIAL UTILITY DISTRICT	-	Region I
WEST LEONARD WSC	Region C	-
WOLFE CITY	Region C	Region C

1.4.3 Surface Water Quality

The TCEQ is the state agency responsible for monitoring water quality in Texas. The Texas Water Quality 2022 Inventory and 303(d) List is a statewide report on the status of the state waters which is prepared and submitted to EPA every two years. This list describes the condition of all surface water bodies of the state that were evaluated for the given assessment period. The 2022 list focused on all 374 classified water bodies with adequate data and those unclassified water bodies where there was pending regulatory reason or need to initiate or revise planning activities, a Total Maximum Daily Limits (TMDL), or watershed protection plan. The year 2022 303(d) list is the most recent list available from TCEQ. Table 1.10 presents a summary of segment impairments within the North East Texas RWPA on TCEQ's 2022 303(d) list.

Table 1.10 2022 Texas Surface Water Segments on 303(d) List

Segment ID	Segment	Pollutant	Category
0201A	MUD CREEK	bacteria	5b
0201A	MUD CREEK	depressed dissolved oxygen	5c
0202G	SMITH CREEK	bacteria	5b
0202I	LITTLE PINE CREEK	depressed dissolved oxygen	5c
0202I	LITTLE PINE CREEK	bacteria	5c
302	WRIGHT PATMAN LAKE	pH	5b
0303B	WHITE OAK CREEK	depressed dissolved oxygen	5c
0303B	WHITE OAK CREEK	bacteria	5b
0304C	WAGNER CREEK	depressed dissolved oxygen	5c
0304C	WAGNER CREEK	bacteria	5c
306	UPPER SOUTH SULPHUR RIVER	bacteria	5c
306	UPPER SOUTH SULPHUR RIVER	pH	5c
401	CADDO LAKE	mercury in edible tissue	5c
401	CADDO LAKE	depressed dissolved oxygen	5c
0401A	HARRISON BAYOU	depressed dissolved oxygen	5c
0401A	HARRISON BAYOU	bacteria	5c
402	BIG CYPRESS CREEK BELOW LAKE O' THE PINES	mercury in edible tissue	5c
402	BIG CYPRESS CREEK BELOW LAKE O' THE PINES	depressed dissolved oxygen	5c
403	LAKE O' THE PINES	pH	5c
404	BIG CYPRESS CREEK BELOW LAKE BOB SANDLIN	bacteria	5b
0404A	ELLISON CREEK RESERVOIR	dioxin in edible tissue	5a

Segment ID	Segment	Pollutant	Category
0404A	ELLISON CREEK RESERVOIR	PCBs in edible tissue	5c
0404A	ELLISON CREEK RESERVOIR	toxicity in sediment	5c
0404B	TANKERSLEY CREEK	bacteria	5b
0404C	HART CREEK	bacteria	5b
0404N	LAKE DAINGERFIELD	mercury in edible tissue	5c
405	LAKE CYPRESS SPRINGS	excessive algal growth	5n
405	LAKE CYPRESS SPRINGS	pH	5c
0405A	BIG CYPRESS CREEK	bacteria	5b
0405A	BIG CYPRESS CREEK	depressed dissolved oxygen	5c
406	BLACK BAYOU	depressed dissolved oxygen	5c
406	BLACK BAYOU	bacteria	5c
407	JAMES' BAYOU	depressed dissolved oxygen	5c
407	JAMES' BAYOU	bacteria	5b
409	LITTLE CYPRESS BAYOU (CREEK)	bacteria	5c
409	LITTLE CYPRESS BAYOU (CREEK)	depressed dissolved oxygen	5c
0409A	LILLY CREEK	bacteria	5b
0409B	SOUTH LILLY CREEK	bacteria	5b
0409B	SOUTH LILLY CREEK	depressed dissolved oxygen	5c
410	BLACK CYPRESS BAYOU (CREEK)	Lead in water	5c
410	BLACK CYPRESS BAYOU (CREEK)	copper in water	5c
410	BLACK CYPRESS BAYOU (CREEK)	depressed dissolved oxygen	5c
410	BLACK CYPRESS BAYOU (CREEK)	mercury in edible tissue	5c
0410A	BLACK CYPRESS CREEK/BAYOU	bacteria	5b
505	SABINE RIVER ABOVE TOLEDO BEND RESERVOIR	bacteria	5c
0505B	GRACE CREEK	bacteria	5b
0505G	WARDS CREEK	depressed dissolved oxygen	5c
0506A	HARRIS CREEK	depressed dissolved oxygen	5c
0507G	SOUTH FORK OF SABINE RIVER	bacteria	5b
0512A	RUNNING CREEK	bacteria	5b
0512B	ELM CREEK	bacteria	5b
514	BIG SANDY CREEK	bacteria	5c
514	BIG SANDY CREEK	pH	5c
0605A	KICKAPOO CREEK IN HENDERSON COUNTY	bacteria	5c
0605A	KICKAPOO CREEK IN HENDERSON COUNTY	depressed dissolved oxygen	5c
606	NECHES RIVER ABOVE LAKE PALESTINE	bacteria	5c
606	NECHES RIVER ABOVE LAKE PALESTINE	depressed dissolved oxygen	5b
0606A	PRAIRIE CREEK	bacteria	5b

1.4.4 Feral Hogs

The population of feral hogs has increased substantially in the northeast Texas region over the last decade. As feral hogs congregate around water sources to drink and wallow, this concentration of high numbers in small riparian areas poses a threat to water quality. Fecal matter deposited directly in streams by feral hogs contributes bacteria and nutrients, polluting water belonging to the State. In addition, extensive rooting activities of groups of feral hogs can cause extreme erosion and soil loss. The destructive habits of feral hogs cause an estimated $52 million worth of damage each year in Texas alone. Landowners are encouraged to seek assistance and information on feral hog biology, behavior, and management options for the proper control of feral hogs. It is recommended that landowners should take actions to reduce the population, limit the spread of these animals, and minimize their effects on water quality and the surrounding environment. State agencies together with local and regional entities are monitoring water quality which should lead to a more informed assessment of the effects that the feral hogs are having on the environment. In the event that the adverse effects of the feral hog population cannot be adequately minimized with existing laws and control mechanisms, additional measures to limit the problems being created by the feral hog population may deserve consideration.

1.4.5 Wholesale Water Providers and Major Water Providers

TWDB rules for regional water planning require each RWPG to identify and designate "wholesale water providers." TWDB guidelines define a "wholesale water provider" as:

> *"…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. RWPGs shall identify the WWPs within each region to be evaluated for plan development."*

The intent of these requirements is to ensure that there is an adequate future supply of water for each entity that receives all or a significant portion of its current water supply from another entity. This requires an analysis of projected water demands and currently available water supplies for the primary supplier, each of its wholesale customers, and all of the suppliers in the aggregate as a "system." For example, a city that serves both retail customers within its corporate limits as well as other nearby public water systems would need to have a supply source(s) that is adequate for the combined total of future retail water sales and future wholesale water sales. If there is a "system" deficit currently or in the future, then recommendations are to be included in the regional water plan with regard to strategies for meeting the "system" deficit.

Based upon this explanation, the NETRWPG identified 25 wholesale water providers (WWPs), as shown in Table 1.11, along with identified customers of these entities.

TWDB rules further offer RWPGs the opportunity to identify and designate "major water providers," or MWPs. TWDB guidelines define a "major water provider" as:

> *"a water user group or wholesale water provider of particular significance to the region's water supply as determined by the RWPG. This may include public or private entities that provide water for any water use category."*

At its October 4, 2023, meeting, the NETRWPG designated wholesale water providers as the major water providers for the Region. Thus, entities designated as WWPs are also designated as MWPs, and there is no difference between these two designations for the purposes of the 2026 Region D Plan.

Table 1.11 Wholesale Providers of Municipal and Manufacturing Water Supply

Wholesale Water Provider	Available 2020 Supply (ac-ft)	Wholesale Customers
Bi County WSC	1,846	Manufacturing, Camp, Steam-Electric Power Titus
Bright Star Salem SUD	1,131	South Rains SUD
Cash SUD	3,129	Caddo Mills, Quinlan
Cherokee Water Company	31,456	Longview, Steam-Electric Power Gregg
Commerce	1,951	Gafford Chapel WSC, Manufacturing Hunt, North Hunt SUD, Texas A&M University Commerce
Cooper	1,767	Delta County MUD
Emory	1,218	East Tawakoni, South Rains SUD
Franklin County WD	8,036	Cypress Springs SUD, Mount Vernon, Winnsboro
Grand Saline	472	Manufacturing Van Zandt
Greenville	13,615	Caddo Mills, Manufacturing Hunt, Shady Grove SUD, Steam Electric Power Hunt
Hughes Springs	656	Holly Springs WSC
Kilgore	3,794	Cross Roads SUD
Lamar County WSD	13,442	410 WSC, Blossom, Manufacturing Lamar, Red River County WSC, Reno Lamar
Longview	65,511	Elderville WSC, Gum Springs WSC, Hallsville, Manufacturing Gregg, Manufacturing Harrison, Steam Electric Power Harrison, White Oak
Marshall	16,240	Gill WSC, Manufacturing Harrison
Mount Pleasant	23,264	Manufacturing Titus, Tri SUD
Northeast Texas MWD	189,080	Avinger, Daingerfield, Diana SUD, Harleton WSC, Hughes Springs, Jefferson, Lone Star, Longview, Manufacturing Camp, Manufacturing Morris, Marshall, Mims WSC, Ore City, Pittsburg, Steam-Electric Power Harrison, Steam-Electric Power Marion, Steam-Electric Power Titus, Tryon Road SUD
Paris	31,836	Lamar County WSD, Manufacturing Lamar, Steam Electric Power Lamar
Point	376	Manufacturing Rains
Riverbend Water Resources District	122,630	Central Bowie County WSC, De Kalb, Hooks, Macedonia Eylau MUD 1, Manufacturing Bowie, Manufacturing Cass, Maud, Nash, New Boston, Red River County WSC, Redwater, Texarkana, Wake Village

Wholesale Water Provider	Available 2020 Supply (ac-ft)	Wholesale Customers
Sabine River Authority	300,851	Dallas, North Texas MWD, Bright Star Salem SUD, Cash SUD, Combined Consumers SUD, Commerce, Edgewood, Emory, Greenville, Irrigation Van Zandt, Kilgore, Longview, MacBee SUD, Manufacturing Harrison, Point, Quitman, South Tawakoni WSC, West Tawakoni, Wills Point, G M WSC, Hemphill, Henderson, Huxley, Irrigation Orange, Manufacturing Jefferson, Manufacturing Orange, Mining Panola, Mining Sabine, Mining Shelby, Steam-Electric Power Newton, Steam-Electric Power Orange, Steam-Electric Power Rusk
Sulphur River MWD	13,738	Cooper, Sulphur Springs
Sulphur Springs	13,873	Brashear WSC, Brinker WSC, Gafford Chapel WSC, Livestock Hopkins, Manufacturing Hopkins, Manufacturing Hunt, Martin Springs WSC, Mining Hopkins, North Hopkins WSC, Shady Grove No 2 WSC
Texarkana	122,760	Riverbend Water Resources District
Titus County FWD #1	26,200	Mount Pleasant, Steam Electric Power Titus
WWP with no sales or only County-Other customers are Gladewater, Golden WSC, Tri SUD, White Oak		

**Note: Sabine River Authority included herein as this entity is a significant WWP to Region D.*

1.5 Description of Water Demand in the Region

1.5.1 Historical and Current Water Use

Historical and current uses in the North East Texas Region include municipal, manufacturing, recreation, irrigation, mining, power generation and livestock. As depicted in Figure 1.20, municipal and manufacturing uses are the predominant use categories. Mining and livestock are relatively insignificant water uses in the Region.

In addition to these uses, which are mostly consumptive uses, there are non-consumptive uses such as flows in rivers, streams, and lakes that have been relied upon to maintain healthy ecological conditions, navigation, recreation and other conditions or activities that bring benefit to the Region. These historic non-consumptive uses and future needs have not yet been the subject of detailed consideration in the State's Senate Bill 3 planning process, but are discussed in *Section 8.7 Voluntary Instream Flow Goals and Proposals*.

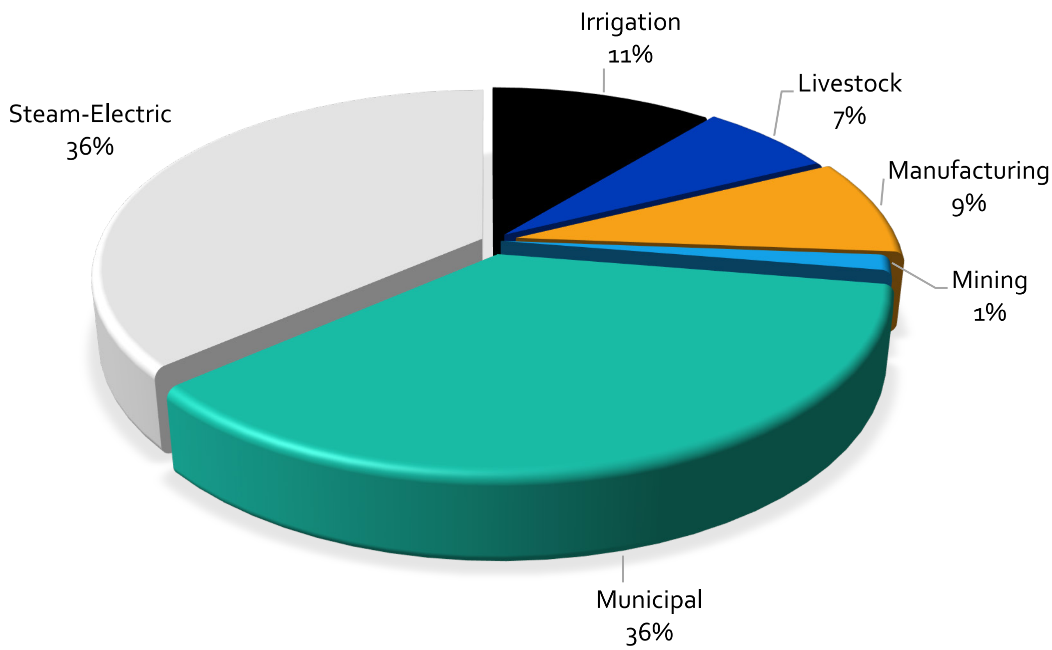


Figure 1.20 2021 Water Use Survey Summary Estimates

(Source: TWDB)

The North East Texas Region utilizes both ground and surface water supplies. Figure 1.21 shows a total percent water usage in 2020 and the projected usage in 2080.

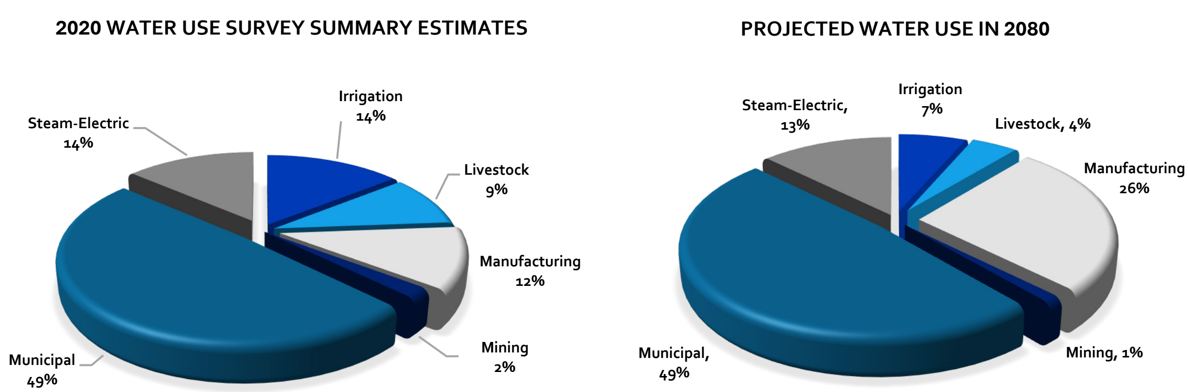


Figure 1.21 Comparison of 2020 Water Use and Projected 2080 Water Use for the North East Texas Region

(Source: TWDB)

In 2020, total estimated usage in the North East Texas Region – both ground and surface – was 231,616 ac-ft/yr, distributed as shown in Figure 1.20. By 2080, projections developed in this plan indicate usage will reach 505,535 ac-ft/yr, a 118 percent increase from 2020. Historic reported use in the North East Texas Region is presented in Table 1.12.

Table 1.12a Water Use by County and Category

County	Municipal					Manufacturing					Mining					Power				
	1990	2000	2010	2016	2021	1990	2000	2010	2016	2021	1990	2000	2010	2016	2021	1990	2000	2010	2016	2021
BOWIE	10,052	13,205	19,882	18,848	17,328	1,736	1,897	1,610	171	298	29	0	0	0	0	0	0	0	0	0
CAMP	1,429	1,486	1,473	843	1722	0	37	32	37	35	71	0	3	0	0	0	0	0	0	0
CASS	4,445	2,968	2,728	2,672	3,642	81,743	118,718	32,724	32,311	2,846	787	0	18	37	0	0	0	0	0	0
DELTA	587	848	666	621	672	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FRANKLIN	1,652	1,549	1,970	1,744	1,674	0	127	4	0	0	706	0	1	0	0	0	0	0	0	0
GREGG	17,666	25,501	25,122	24,567	20,205	14,634	1,917	1,158	787	331	124	114	163	106	0	465	414	825	361	246
HARRISON	7,773	10,068	10,021	8,949	9,795	75,039	16,646	19,366	17,265	9,537	351	219	1,356	371	4268	4,869	24,336	12,193	13,103	102,048
HOPKINS	4,890	6,285	5,848	5,260	5,952	591	640	944	904	1160	123	69	995	0	0	0	0	0	0	0
HUNT	12,000	12,644	13,776	11,975	13,694	521	361	555	285	178	0	0	70	0	0	834	498	343	191	167
LAMAR	10,692	8,889	6,394	5,866	6,207	4,635	4,530	5,019	4,662	4,824	20	0	0	0	0	0	1,135	336	4,708	5,602
MARION	1,341	1,494	1,171	1,053	1,015	0	72	0	18	226	68	0	212	11	0	1,953	2,917	2,659	1,992	2,239
MORRIS	1,500	1,723	1,709	2,023	1,478	126,770	53,402	25,148	462	12	7	0	0	0	0	8	16,775	3,421	5	0
RAINS	1,096	1,661	1,870	1,559	2,083	0	2	12	0	1	0	0	0	0	0	0	0	0	0	0
RED RIVER	1,893	1,964	1,857	1,966	1,598	5	5	3	1	1	0	0	1	0	0	1,494	162	0	0	0
SMITH	27,265	41,117	36,261	45,647	44,577	3,341	2,941	2,781	1,877	3,406	696	1	252	212	297	0	0	0	0	0
TITUS	4,135	6,506	5,307	4,856	3,889	2,252	2,510	2,885	2,806	3,424	1,711	9	1,705	590	0	36,406	27,527	52,424	38,735	6,256
UPSHUR	4,592	4,699	4,850	3,923	5,059	192	161	69	20	82	0	0	63	24	3	0	0	0	0	0
VAN ZANDT	5,356	5,542	7,793	6,380	7,047	223	23	203	133	92	836	315	235	8	4	0	0	0	0	0
WOOD	4,250	5,442	5,743	5,307	5,666	41	366	1,739	2,580	2,418	3,162	0	15	45	88	0	0	0	0	0
TOTAL	**122,614**	**153,591**	**154,441**	**154,059**	**153,303**	**311,723**	**204,355**	**94,252**	**64,319**	**28,871**	**8,691**	**727**	**5,089**	**1,404**	**4,660**	**46,029**	**73,764**	**72,201**	**59,095**	**116,558**

Table 1.12b Water Use by County and Category

County	Irrigation					Livestock					Total				
	1990	2000	2010	2016	2021	1990	2000	2010	2016	2021	1990	2000	2010	2016	2021
BOWIE	3959	2,204	7,889	9,302	10,193	1,571	1,439	2,098	1,763	1,299	17347	18745	31479	30084	29118
CAMP	87	0	0	0	12	688	930	4849	5468	700	2275	2453	6357	6348	2469
CASS	0	6	0	0	0	835	834	2,896	2,611	730	87,810	122526	38366	37631	7,218
DELTA	2000	585	333	2704	3001	770	11903	524	679	334	3357	13336	1523	4004	4007
FRANKLIN	33	0	0	99	189	1,303	1122	2930	2872	1463	3694	2798	4905	4715	3326
GREGG	0	0	38	28	33	230	239	260	133	157	33119	28185	27566	25982	20972
HARRISON	100	106	765	404	371	991	875	631	621	512	89,123	52250	44332	40,713	126,531
HOPKINS	0	50	7,867	2,591	3,885	5,990	4856	5524	5614	4184	11594	11900	21178	14369	15181
HUNT	271	1,938	341	232	457	1,127	1120	1180	1223	1199	14753	16561	16265	13906	15695
LAMAR	4417	5,768	11,579	7,632	10,218	1,526	830	1,467	1,587	1,728	21,290	21152	24795	24455	28,579
MARION	0	68	0	0	6	162	1085	243	188	102	3524	5636	4285	3262	3588
MORRIS	192	0	0	8	16	414	485	1,725	1,622	481	128891	72385	32003	4120	1987
RAINS	20	0	65	63	96	790	675	424	466	560	1906	2338	2371	2088	2740
RED RIVER	100	3,751	4,637	2,932	3,979	1,183	1610	1756	1507	1894	4675	7492	8254	6406	7472
SMITH	180	774	818	762	626	1,208	1,254	1,200	936	856	32,690	46087	41312	49434	49,762
TITUS	0	0	954	1,125	1,063	1,174	1,007	3,079	2,936	1,251	45,678	37,559	66354	51,048	15,883
UPSHUR	0	240	116	112	71	1,325	1530	1675	1756	1148	6109	6630	6773	5835	6363
VAN ZANDT	50	33	625	58	487	2,213	2434	2046	1808	1981	8678	8347	10902	8387	9611
WOOD	354	373	562	512	578	1,816	2063	3281	3,345	1,508	9,623	8,244	11340	11789	10,258
TOTAL	**11,763**	**15,896**	**36,589**	**28,564**	**35,281**	**25,316**	**36,291**	**37,788**	**37,135**	**22,087**	**526,136**	**484,624**	**400,360**	**344,576**	**360,760**

1.5.2 Major Demand Centers

Major water demand centers include:

City	2021 Use* (MG/Y)
Longview	6,854
Texarkana	5,605
Paris	5,519
Mount Pleasant	2,332
Sulphur Springs	1,795
Marshall	1,617
Greenville	1,610
Kilgore	1,356

**From TWDB 2021 Water Use Survey Summary Estimates by WUG Utility in Texas (Intake Total).*

1.5.3 Recreational Demands

Recreational demands for water revolve principally around the Region's reservoirs. Recreational activities include fishing, boating, swimming, water sports, picnicking, camping, wildlife observation, and others. Waterside parks attract over 2 million visitors each year.

Recreational use of the Region's reservoirs is coincidental with other purposes, including flood control and water supply. Conflicts arise when the designated use for flood control keeps water elevations too high for recreation or, in the opposite, when drought conditions and water supply demands leave boathouses and marinas dry.

1.5.4 Navigation

The lack of perennial streams limits the viability of navigation projects in northeast Texas. However, a significant portion of flows from the Sabine River Basin in Region D contribute to the significant tonnage that moves through certain Texas ports, as evidenced in Table 1.13. Flows from the Cypress Creek and Sulphur River basins contribute to downstream navigable waters and ports located downstream in Louisiana. There are several partners that play important roles in maintaining navigation activities within Region D, and several projects are noted herein.

Table 1.13 Texas Rankings from Leading U.S. Ports Coastal Navigation Values based on 2021 Tonnage (based on USACE July 2023)

Port	National Rank	Tonnage (Millions)	Description	Contributing Basin
Houston Port Authority, TX	1	266.5	#1 Foreign Tonnage & #2 Total Tonnage	Trinity & San Jacinto Rivers
Corpus Christi, TX	3	164.4	America's Energy Gateway	Nueces
Beaumont, TX	7	74.6	#1 Military Port in World	Sabine & Neches Rivers
Port Arthur, TX	16	40.2	Vital Break-Bulk Port	Sabine & Neches Rivers
Texas City, TX	23	28.0	Services Largest Petrochemical Complex	Trinity & San Jacinto Rivers

The Cypress Valley Navigation District (CVND) is a unit of government in the state of Texas that was formed as a Navigation, Conservation and Reclamation District in the 1960's. The district is composed of all the territory in the watershed of the Cypress Bayou and its tributaries in Harrison and Marion Counties. CVND is funded by yearly contributions from both Harrison and Marion Counties and by an MOU with the TPWD. CVND has all the powers and rights generally granted to other navigation districts including the ability to own land, issue bonds, operate marinas, ports and other aids to navigation. The district also possesses the right to use eminent domain and to serve as the local sponsor for federal navigation projects on the Cypress Bayou and its tributaries. One such project was the now defunct Daingerfield Reach Project. This project was investigated as a possible way to enable goods to be shipped from Northeast Texas downstream to Shreveport and, using the Locks and Dams on the Red River, to other ports of commerce along the Mississippi River. This project was found not to be feasible and was never fully authorized. The possible development of new navigation projects upstream of Shreveport on the Red River are now being investigated. The location of the area under consideration begins just north of Shreveport and extends to Lake Texoma.

The main activities that CVND engages in are to maintain navigation in and around Caddo Lake and upstream to Jefferson Texas. This maintenance has historically included dredging, log and tree removal, navigational marker repair, replacement and updating. With the discovery of the invasive aquatic plant, Giant Salvinia, in 2006 on Caddo Lake, the CVND role was increased to include efforts to suppress the spread of this plant. CVND has taken an active role in combatting this problem, participating in the Rapid Response Budget Committee which raised funds to combat Giant Salvinia and authorized CVND to construct a 2-mile barrier across Caddo Lake to slow the spread of the plant, along with public information campaigns and development of funding for a herbicide application program on Caddo Lake.

The work of CVND also helps to address concerns about logjams and siltation problems arising from previous alterations of the streams. The beneficial impacts of CVND's work include water quality improvements for water removed by the intake of the city of Marshall and uses involving the shoreline of the river and lake. These changes in the natural condition of Big Cypress and its tributaries below Jefferson were made in an attempt at facilitating steamboat traffic in the 19th Century. VND has been working to limit the impacts of the 19th Century modifications for more than five decades.

CVND is an example of a specially created water district that has adjusted its mission to address emerging issues of concern. It is an example of a unit of government that is largely dependent on other taxing entities to provide financial support for it. Further, it is an example of an organization that is successfully working with federal, state, and local governments to achieve improvements involving water resources. The enjoyment of Caddo Lake is enabled by CVND and the individuals who provide time and energy to assure the health of Caddo Lake.

One project considered in the North East Texas Region is the "Red River Waterway Project – Shreveport to Daingerfield Reach." The Shreveport to Daingerfield navigation channel, with accompanying locks, would be an extension of the Red River Waterway Project, Mississippi River to Shreveport, Louisiana, which is in operation. A channel to Daingerfield was authorized by Congress in 1968. As envisioned, it would begin at the Red River and would be routed through Twelve-mile Bayou, Caddo Lake, Cypress Bayou, and Lake O' the Pines. However, an updated review of this project was conducted by the United States Army Corps of Engineers (USACE) in the early 1990's, which concluded that the project was not currently economically feasible and could result in significant environmental impacts for which mitigation was not considered to be practicable.

A second navigation project under study is the Southwest Arkansas Navigation Study. This joint project between the USACE and the Arkansas Red River Commission is studying the feasibility of making the Red River navigable from Shreveport, Louisiana, through southwest Arkansas to near Texarkana, Texas. The Red River is already navigable below Shreveport-Bossier City, through the construction of five locks and dams, and various channel modifications, and this project would extend that to more northern reaches. According to the USACE Vicksburg, the draft study was completed in 2005, but questions about the economic feasibility have resulted in the need for additional analyses.

While transportation cost savings are the primary factor in the feasibility of a navigation project, there can often be associated benefits, including such things as hydropower, bank stabilization, recreation, flood control, water supply, and fish and wildlife habitat. From a water planning perspective, navigation can provide supply, as well as demands. Pools associated with the various locks and dams may be beneficial for water supply. On the other hand, low flow demands may be placed upon contributory streams to maintain navigable levels. Lake O' the Pines, for example, is obligated to supply up to 3,600 ac-ft of water per year in conjunction with navigability of the Red River below Shreveport. Extension of this project northward would likely require similar releases from the Sulphur Basin.

A report from the USACE regarding the J. Bennett Johnston Waterway (JBJWW) offers insight as to the ongoing benefits of that navigation project. Located in the central and northwestern part of Louisiana, this project receives water from Cypress, Sulphur, and Red River Basins located within Region D. Opened on December 31, 1994, the project consists of a 9-foot deep by 200-foot wide navigation channel that extends 236 miles from the junction of the Old River and Red River to the Shreveport-Bossier City area, with five navigation locks. This navigation project has been found to be economically justified both on a total project basis and a remaining project basis, offering numerous benefits such as avoided and reduced waterway shutdowns, limiting costs for dredging, and decreased navigation delays.

1.5.5 Environmental Water Needs

Environmental water demands in the Region include the need for water and associated releases necessary to support migratory water fowl, threatened and endangered species, and populations of sport and commercial fish. Flows must remain sufficient to assimilate wastewater discharges or there will be higher costs associated with wastewater treatment and nonpoint discharge regulations. Periodic "flushing" events should be allowed for channel maintenance, and low flow conditions must consider drought periods as well as average periods. In recognition of the importance that the ecological soundness of our riverine, bay, and estuary systems and riparian lands has on the economy, health, and well-being of our state, the 80th Texas Legislature created the Environmental Flows Advisory Group.

The Environmental Flows Advisory Group has conducted public hearings and studied public policy implications for balancing the demands on the water resources of the state resulting from a growing population and the requirements of the riverine, bay, and estuary systems. In the course of this effort, this Advisory Group has established and implemented a schedule for the development of environmental flow standards for instream and bay and estuary freshwater inflows. In July 2008, the Advisory Group appointed a Science Advisory Committee, and appointed a Basin and Bay Area Stakeholders Committee (BBASC) for the Sabine-Neches Estuary and Lower Tidal Sabine River (i.e., the Sabine-Neches BBASC). Similar processes were established for the remaining river basins contributing to bay and estuary systems in Texas. The Sabine-Neches BBASC subsequently appointed a Basin and Bay Expert Science Team (BBEST) that ultimately developed recommendations for environmental flow needs in the Sabine and Neches River

Basins. These recommendations, along with recommendations from the Sabine-Neches BBASC that were developed in an attempt to balance environmental needs with the needs for other human uses, were then submitted to the Texas Commission on Environmental Quality (TCEQ). The TCEQ then underwent a rulemaking process, establishing standards for environmental flows for the Sabine and Neches River Basins.

Although a SB 3 process has not been undertaken for the river basins in Region D other than the Sabine, another ongoing study is the Cypress Basin Flows Project, initiated in 2004. Over the past 10 years, a number of stakeholders have worked with the USACE and the NETMWD to develop a set of environmental flow regimes in the Cypress Basin. The USACE and NETMWD have worked to meet those flow regimes through voluntary changes in the water release patterns from Lake O' the Pines. Because of the success of this project to date, NETRWPG considers those regimes as voluntary goals for instream flows for the purposes of this 2026 North East Texas Water Plan.

While a process similar to that used in the Cypress Basin has not yet been developed for the Sulphur Basin, a potential first step has been taken that is important to the NETRWPG. This step includes an individual analysis calculating a potential environmental flow regime for the Sulphur River Basin. Although these calculated flows are not presented herein as requirements to be implemented on water management strategies, the identified flow regime does provide additional information for consideration of potential impacts on the agricultural and natural resources of the region and the state. This initial work provides a point of reference for considering the pulse flows necessary for the flood plain forests below the Marvin Nichols reservoir site.

1.6 Existing Water Planning in the Region

1.6.1 Initial Assessment for Drought Preparedness

Texas is no stranger to drought; drought conditions in 1996 caused greater economic losses to agriculture than any previously recorded one-year drought event. The drought of 1998, though relatively short, caused agricultural impacts with total losses estimated to be just over $6 billion, or slightly higher than those recorded in 1996. In Region D, droughts in the mid- to late 1990s caused emergency actions such as lowering the intake structures around Lake Tawakoni to accommodate critically low levels of the lake.

The State responded to drought situations in recent years in several ways. HB 2660 formed the Drought Preparedness Council (DPC) in 1999. The DPC was requested to support drought management efforts, emphasizing drought monitoring, assessment, preparedness, mitigation, and assistance. The DPC created the State Drought Preparedness Plan. In addition, the State started requiring all water systems to create drought contingency plans with measurable triggering conditions. As well, any TWDB loan in excess of $500,000 requires the borrowing entity to have a drought contingency plan in place. These plans must be revised every five years. These requirements, as well as recent drought experiences, have caused the Region to look closely at drought preparedness.

TWDB provides much drought assistance on its website, including tips on drought planning, drought monitoring, weather conditions reports, climate predictions, etc. The TCEQ Map of Water Systems Under Water Use Restriction maps systems on a monthly basis that are affected by water use restrictions.

In addition to drought response, the State also encourages continual water conservation. In a report to the 81st legislature in 2008, the Water Conservation Advisory Council made several recommendations regarding the state's role in funding and support, monitoring implementation progress, defining measurement methodology, promoting conservation awareness and recognition, and developing supporting resources that include information, tools, and expertise. In 2013, the 83rd Texas Legislature appropriated funds to the TWDB to streamline the online data collection for water planning and conservation programs. The bill called for the development of "an online tool to consolidate reporting requirements related to the Water Use Survey, annual Water Loss Report, and annual Water Conservation Report…".

According to the Texas Water Conservation Implementation Task Force's 2004 report to the Texas Legislature, the Task Force adopted a recommendation that the goal of a Municipal Water User Group with unmet water needs in the applicable Regional Water Plan should be to first meet or reduce that need using advanced water conservation techniques, including any appropriate Best Management Practices (BMPs) or other water conservation strategies selected by the Water User Group. "Advanced water conservation techniques" means conservation techniques that go beyond implementation of the state plumbing fixture requirements and beyond adoption and implementation of water conservation education programs." Therefore, Region D supports advanced conservation efforts for those WUGs that have projected water shortages.

In response to conservation efforts, the Region determined that a reasonable upper municipal level consumption goal should be established at 140 gallons per capita per day (gpcd) for all municipal water user groups; this target was selected to coincide with the State's Water Conservation Implementation Task Force. The Region recommended that systems which experience a per capita usage greater than 140 gpcd should consider advanced water conservation as a water management strategy. In addition, systems with water "loss" greater than 15% should be encouraged to perform physical and records surveys to identify the sources of this unaccounted-for water. Finally, the planning group encourages funding and implementation of educational water conservation programs and campaigns for the water-using public; and continued training and technical assistance to enable water utilities to reduce water losses and improve accountability.

As reported by the Texas State Soil and Water Conservation Board (TSSWCB), 83% of Texas' land area is privately-owned and are working lands, involved in agricultural, timber, and wildlife operations. These lands are important as they provide substantial economic, environmental, and recreational resources that benefit both the landowners and public. They also provide ecosystem services that are relied upon for everyday necessities, such as air and water quality, carbon sequestration, and wildlife habitat. These working lands are where the vast majority of rain falls, which ultimately supplies water for municipal, industrial, wildlife, and agricultural needs.

Texas' private working lands are a valuable resource for all Texans. The private landowners of these working lands have been good stewards of their property, and have been indirectly assisting RWPGs in achieving their goals through voluntary, incentive-based land conservation practices and the implementation of BMPs that slow water runoff and provide for soil stabilization, which also slows the sedimentation of reservoirs and allows for more water infiltration into aquifers. Some common BMPs include brush management, prescribed grazing, fencing, grade stabilization, irrigation land leveling, terrace, contour farming, cover crop, residue and tillage management, and riparian herbaceous cover.

The TSSWCB has been the lead agency for planning, implementing, and managing coordinated natural resource conservation programs for preventing and abating agricultural and sivicultural nonpoint sources of water pollution. The TSSWCB also works to ensure that the State's network of over 2,000 flood control dams are protecting lives and property by providing operation, maintenance, and structural repair grants to local government sponsors.

The TSSWCB delivers technical and financial assistance to private landowners of Texas through Texas' 216 local Soil and Water Conservation Districts (SWCD), which are led by 1,080 locally elected district directors who are active in agriculture. Through the TSSWCB Water Quality Management Plan Program (WQMP), farmers, ranchers, and silviculturalists receive technical and financial assistance to voluntarily conserve and protect natural resources. Participants receive assistance with conservation practices – BMPs – that address water quality, water quantity, and soil erosion while promoting the productivity of agricultural lands. This efficient, locally led conservation delivery system ensures that those most affected by conservation programs can make decisions on how and what programs will be implemented voluntarily on their private lands.

Education and implementation of proper land management and BMPs continues to be essential. Voluntary, incentive-based programs are essential to continue to address soil and water conservation in Texas. These BMPs implemented for soil and water conservation provide benefits not only to the landowner but ultimately to all Texans and water supply.

1.6.2 Water Loss Audits

Water is a precious and finite resource. Water loss control benefits utilities by conserving their water and diminishing their need for future acquisitions of additional water supply. Reducing water loss offers utilities the ability to increase their water use efficiency, improve their financial status, and assist with long-term water sustainability.

In 2003, the 78th Texas Legislature, Regular Session, enacted House Bill 3338 to help conserve the State's water resources by reducing water loss occurring in the systems of drinking water utilities. This statute requires that all retail public utilities with more than 3,300 connections or a financial obligation to TWDB are required to submit a standardized water audit annually. All other retail public water suppliers are required to submit a water loss audit to TWDB every five years. The next five-year required submittal is due by May 1, 2026, for the 2025 audit year. However, it is strongly encouraged that all retail public water suppliers complete an audit annually to better track water loss and identify issues that need immediate addressing.

In response to the mandates of House Bill 3338, TWDB developed a water audit methodology for utilities that measures efficiency, encourages water accountability, quantifies water losses, and standardizes water loss reporting across the State. This standardized approach to auditing water loss provides utilities with a reliable means to analyze their water loss performance. Utilizing a methodology derived from the American Water Works Association (AWWA) and the International Water Association (IWA), the TWDB has published a manual that outlines the process of completing a water loss audit: "Water Loss Audit Manual for Texas Utilities" – TWDB Report 367 (2008), which can be viewed at: TWDB Water Loss Manual (2008)

Additionally, for the sixth cycle of regional water planning, the TWDB developed several helpful resource guides regarding water loss performance targets and water loss threshold values. These documents can be accessed here: TWDB Conservation Resources.

Historically, the AWWA recommended that entities with more than 10 percent water loss take corrective action. However, water loss industry standards have changed from recommending a one-size-fits-all target for water loss, to recommending water loss key performance indicators of apparent loss per connection per day, real loss per connection per day, and/or real loss per mile per day. Uses and limitations of key performance indicators have been developed by the AWWA's Water Loss Control Committee in their AWWA Water Loss Control Committee Report (2020).

The TWDB is required to evaluate the water loss of retail public utilities that request financial assistance for a water supply project using water loss thresholds as an indicator of whether a utility must include funds for mitigating water loss as part of their request for financial assistance. RWPGs must consider strategies to address any issues identified in the water loss audit information. In order to determine a water loss threshold, TWDB established benchmarking values detailed in the Conservation Resource Guide for Development of the 2026 Regional Water Plans, which uses six years of water loss audit data and finds the median for two distinct groups of utilities for real loss, which is defined as the physical leakage of water from the distribution system. The two distinct groups of utilities identified are as follows:

(1) retail public utilities located in less dense communities (less than 32 connections per mile), for which the threshold or median is 57 gallons per connection per day, and

(2) retail public utilities located in more dense communities (32 or more connections per mile), for which the threshold or median is 30 gallons per connection per day.

These water loss thresholds are not a target but are only used for determining whether a utility may need to mitigate their water loss.

Appendix C1-1 provides a listing of reported utility audits performed in Region D that exceed the key performance indicators discussed above. More details regarding reported annual water loss audit data can be accessed here: TWDB Conservation Resources.

1.7 Existing Local Water Plans

An evaluation of sub-regional water supply master plans pertinent to the North East Texas Region is included in Appendix C1-2. In general, the smaller water systems allocate insufficient funds for long range planning purposes. Instead, the systems rely on periodic inspections by TCEQ, and then respond in a "reactive" mode to correct the deficiencies encountered by the regulators.

1.8 Existing Regional Water Plans

A number of major suppliers in the North East Texas Region maintain regional plans. Among these are the Sabine River Authority, which has completed two studies entitled "Comprehensive Sabine Watershed Management Plan" and "Upper Sabine Basin Water Supply Study," dealing with water resources in the Sabine River Basin. The City of Longview prepared a water supply study in 1982, and the City of Paris performed a water supply study, in conjunction with the City of Irving. In addition, NETMWD has completed studies on sources of additional water supply. Lamar County Water Supply District maintains a master plan for its two county service area in the northwest corner of the Region. The NETRWPG prepared a feasibility study of regionalization of clusters of small systems in the 2006 and 2011 Region D Water Plans.

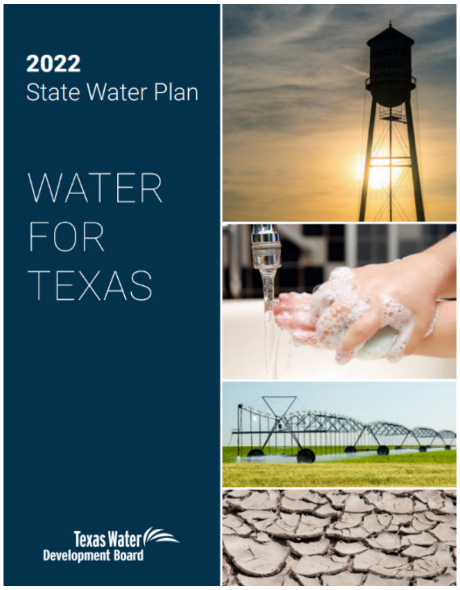
In October 2018, Riverbend Water Resources District produced the Riverbend Regional Water Master Plan Study, evaluating the feasibility of a regional water system to replace and/or supplement the multiple systems currently in service for the District and its member entities, investigate water management strategies as they apply to the District, evaluating treatment options and existing facilities to provide a cost-effective and reliable water supply (potable and raw) to meet the future demands of municipal and industrial customers. This plan also includes a high-level condition assessment of the existing water treatment facilities in the study area, and provides information on the population and water demand projections for the project participants located in Bowie, Cass, and Red River Counties.

The Sulphur River Basin Authority previously developed the "Sulphur River Feasibility Study", in cooperation with the United States Corps of Engineers, and more recently performed a study evaluating projections of population growth within the Sulphur River Basin. A Comprehensive Water Study is available for the City of Greenville. The TWDB completed the development of a Groundwater Availability Model of the northern part of the Carrizo-Wilcox aquifer in 2003, the Queen City aquifer in 2004, the Woodbine in 2004, the Nacatoch in 2009, and the Blossom aquifer in 2010.

Each of these regional plans pertains to the existing and fringe service areas of the entity involved. There are expanses of the planning area which are not covered by any regional plan. The region is divided among four river basins and three council of government planning areas. Thus, regional planning is hampered by the numerous entities with conflicting and competing goals and by the lack of an entity with authority throughout a substantial portion of the Region. Nevertheless, regionalization efforts have been and continue to be investigated by water providers in the region, recognizing the potential benefits of , collaborative efforts. The 2026 Region D Plan has been developed to support such efforts where possible, through engagement with water providers, development of WMSs and WMSPs reflective of such efforts where identified, and in promoting the benefits of regionalization in water projects that may not be accomplished individually, but successfully when planned together.

The planning group is not aware of any other agricultural, manufacturing, power generation, or commercial water users in the North East Texas RWPA with publicly available plans of a magnitude sufficient to impact the Regional Plan.

1.9 Summary of Recommendations from the 2022 State Water Plan



The 2022 State Water Plan "Water for Texas" aggregates the work of the 16 regional water plans of the State, including the 2016 Region D Water Plan prepared for the NETRWPG.

The State Plan highlights the additional water supply for the Region D RWPA needed in 2070 as being approximately 117,000 ac-ft/yr, with water management strategies equaling 221,000 ac-ft/yr for a total capital cost of $730 million. The State Plan notes that for Region D there were projected unmet needs for non-municipal uses such as irrigation, manufacturing, steam-electric power generation, and mining. Policy recommendations in the State Plan for Region D include designation of 3 stream segments of unique ecological value, and designation of Parkhouse II (North) in the Sulphur River Basin as a unique reservoir site.

There was a 2020 water need in the Region of 81,000 ac-ft/yr. By 2070, the need was projected at 117,000 ac-ft/yr. Region D generally proposed two kinds of water management strategies for its water shortages, including new groundwater wells and new surface water purchases. If fully implemented, recommended water management strategies would provide an additional 221,000 acre-feet at a total capital cost of $730 Million.

1.10 Threats to Agricultural and Natural Resources

1.10.1 Prime Farmland

The federal government has instituted the Farmland Protection Policy Act to protect prime farmland from being converted to other uses in order to provide for adequate farmland for the future. Developments, such as subdivisions, schools, industrial parks, and others, can wipe out hundreds of acres of prime farmland. When rivers and streams reroute themselves over time, they may encroach upon prime farmlands. Finally, building new reservoirs on prime farmland will reduce the amount of this valuable resource. It has been estimated by the Texas Parks and Wildlife Department that the construction of the Marvin Nichols Reservoir would result in the loss of 10,000 acres of agricultural land. The New Bonham site would cost 7,000 acres, and George Parkhouse I would cost 14,000 acres in prime farmland.

1.10.2 Surface Water

The North East Texas Region has many lakes and reservoirs as well as ponds and streams. Currently, most of the Region uses surface water as a primary source for drinking water, although a majority of the region's small rural systems utilize groundwater. Surface water quality is threatened by point and nonpoint source pollution from wastewater treatment facilities, industry, farms and ranches, recreational vehicles, etc.

Ducks on Lake Tawakoni, Lake Tawakoni.com

Specific steps for minimizing threats to surface water supplies from point and non-point source pollution include the following:

1. Continuation of the efforts of the Texas Pollutant Discharge Elimination System (TPDES) permitting process for point sources including enforcement procedures for permit violations.
2. Continuation of the 303d assessment program under the auspices of the TCEQ and the Texas State Soil and Water Conservation Board.

3. Encouragement of reservoir owners/operators to participate in watershed protection programs such as the TWDB Source Water Assessment Program, part of the Clean Water State Revolving Fund; and the Section 319 Program offered by the Texas State Soil and Water Conservation Board.
4. Active enforcement, by county on-site system regulatory agencies, of TCEQ on-site sewage system regulations, particularly within critical areas around drinking water supply resources.
5. Continuation of the funding of data gathering and research activities for the TCEQ Clean Rivers Program throughout the North East Texas Region.

Surface water quality has been recently threatened by giant salvinia (*Salvinia molesta*), a floating plant that was first reported in Texas lakes in 1999, and made its way to east Texas. According to Texas Parks & Wildlife Department officials, it is threatening to overtake Caddo Lake and other bodies of water. Since 2008, giant salvinia has expanded in Caddo Lake from two acres of coverage to 1,000. Giant salvinia floats on the surface of the water and multiplies rapidly, limiting boater access and choking out sunlight and oxygen to other water plants, fish and wildlife. It cannot be eradicated, but officials are using herbicides and mechanical harvesting to attempt to control infestations. Giant salvinia is a serious threat to the Region’s water sources and of great concern to water suppliers. There are also several other species of concern which could be a detriment to the natural resources of the Region including water hyacinth, hydrilla, zebra mussels and other exotic species.

Surface water quantity is threatened by short and long term overuse, and by exportation. Short-term overuse can occur during drought conditions when conservation practices are not implemented. Long term overuse, the constant depletion of the resource, is a more serious problem. These threats can be controlled by proactive use of conservation practices, judicious construction of new supplies, and active enforcement of prohibitions and controls on use of potential contaminants in the watershed.

Exportation of the Region's surface water to other regions can limit supplies available for regional growth and industry development. In addition, agriculture interests could suffer if water were exported to other regions who can afford to pay more for the water. Thus, a balance must be reached between meeting the needs of the Region and sharing our resources with others. This highlights the importance of conservation efforts in all regions of the State.

1.11 Groundwater

In areas where a sufficient quality and quantity groundwater is available in northeast Texas, it is utilized. Groundwater, like surface water, is threatened in both quantity and quality. Water levels in several aquifers have declined over the past several decades due to extensive pumping by municipalities, agriculture, and industries, and will continue to do so if conservation practices are not followed. Continued over-pumping can degrade water quality, as less desirable water is drawn into the aquifer. Abandoned wells must be adequately plugged. Groundwater quality can be degraded by waste activity such as landfills and waste spills where contaminants seep into aquifers. Groundwater is a key supply for many entities in the Region and should be protected through wellhead protection and similar programs.

In Hunt County, for example, usage of the Woodbine Aquifer is decreasing as larger regional systems absorb and/or contract with smaller groundwater entities. The larger regional systems such as Cash SUD rely on surface water from Lake Tawakoni and/or other regions. In Bowie, Hopkins, and Hunt counties, reliance on the Nacatoch Aquifer is also declining. The City of Commerce, once a major user of Nacatoch

Aquifer resources, now relies predominantly on supply from Lake Tawakoni. The city is also wholesaling surface water to area groundwater suppliers.

Finally, usage in the Blossom Aquifer is decreasing due to conversion to surface water and the availability of larger regional supplies such as the Lamar County Water Supply District in Lamar and Red River counties, and Riverbend Water Resources District in Red River, Bowie, and Cass Counties. Both of these regional systems utilize surface water supplies.

GMAs that encompass the Region are GMA 8, which includes the northern half of the Region, and GMA 11, which includes the southern half of the Region (See Figure 1.22 and Figure 1.23). These GMAs contain Groundwater Conservation Districts (GCDs), which work together to protect and manage local groundwater resources, although none of these GCDs are located within Region D. GMA 8 released "desired future conditions" of the Blossom, Nacatoch, Trinity, and Woodbine aquifers in 2021. GMA 11 adopted desired future conditions in the Carrizo-Wilcox and Queen City aquifers in 2021 as well.

There has been debate over the need for GCDs in the Region because of the rule of capture, which allows a landowner to pump as much groundwater from his property as he chooses, without liability to neighbors whose wells might be depleted. It has been cited by opponents that GCDs violate the freedom of the landowner. In addition, opponents in GMAs without a GCD for representation are concerned that those controlling the GMA might not share their interests and goals. As noted previously, within Region D, there are no GCDs, but there are several GCDs further west and south of the Region on the GMA 8 board, and south of the Region on the GMA 11 board. A groundwater district was created by the 81st Legislature in Harrison County (Harrison County Groundwater Conservation District) but was rejected by county voters 2:1 in a May, 2010 confirmation election. There has been concern that the Region's interests might not be represented fully by the DFCs and MAGs determined through the joint groundwater planning process required to be completed by GMAs. However, as was noted previously, because there are no GCDs in Region D, the NETRWPG has some latitude to develop more refined estimates of groundwater availability based on local hydrogeologic information, historical use, and other information.

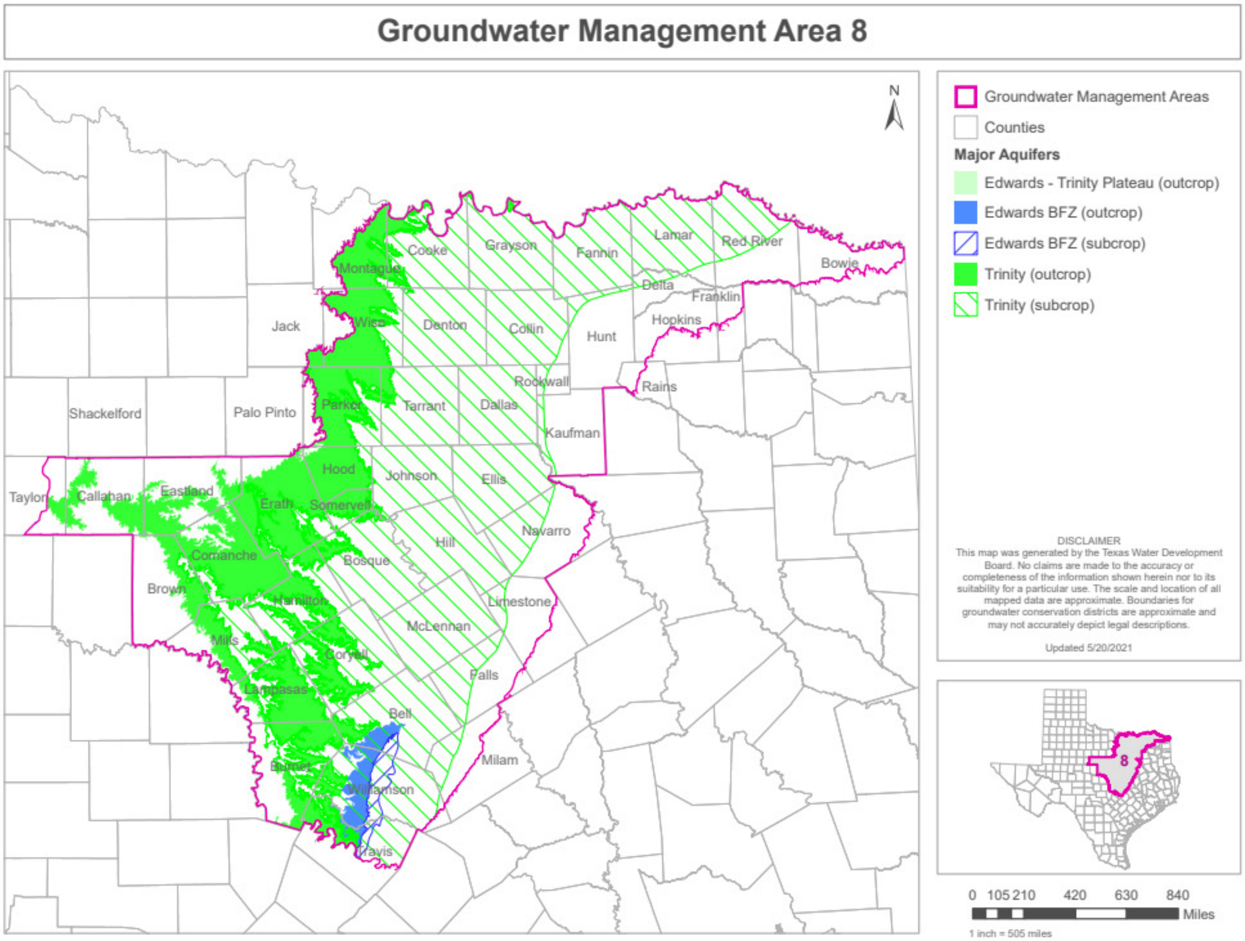


Figure 1.22 Groundwater Management Area #8

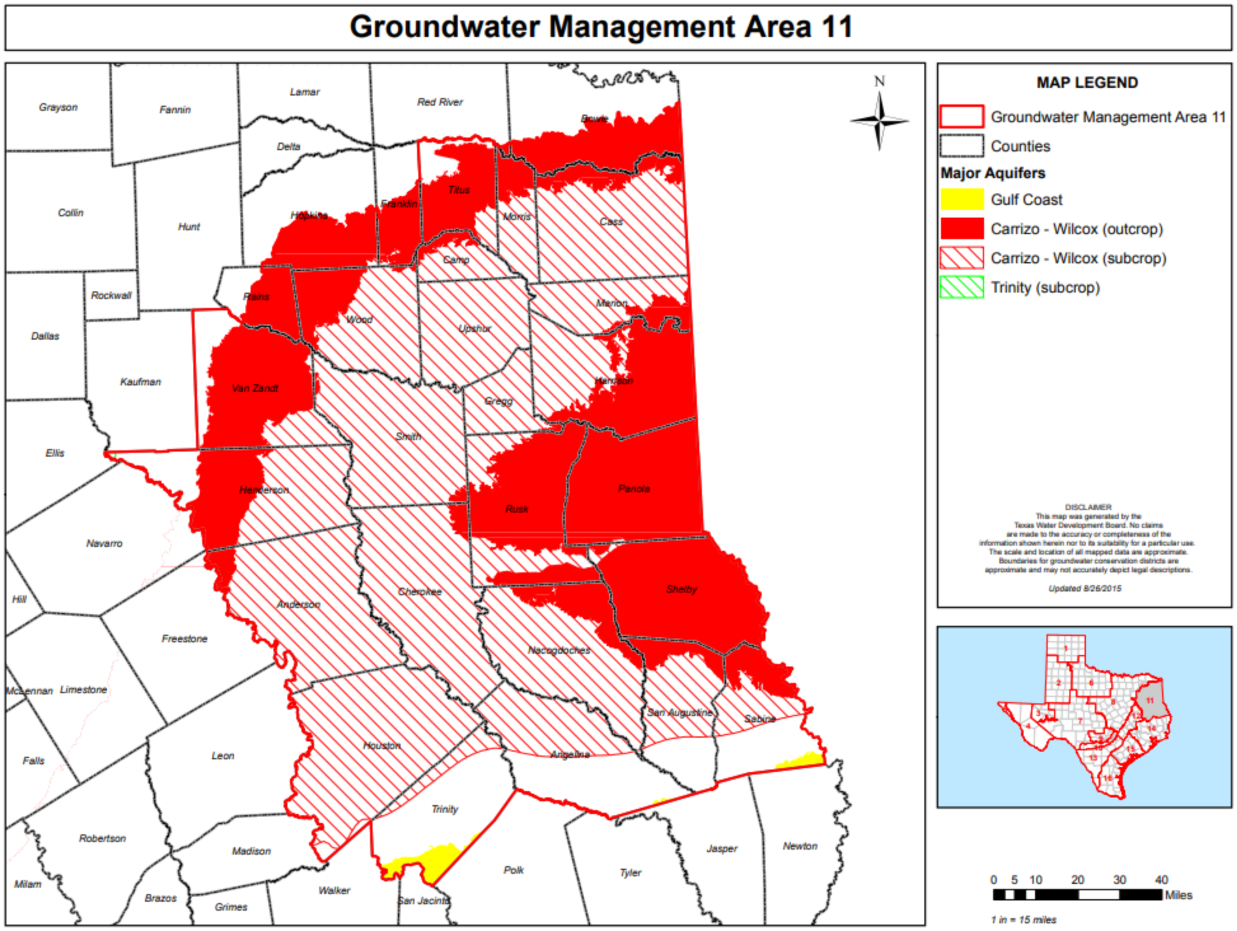


Figure 1.23 Groundwater Management Area #11

1.12 Wildlife and Vegetation

Increased population and development in northeast Texas causes increased stress on vegetation and wildlife resources. Urbanization destroys natural habitat and pushes animals into smaller and smaller territories. Loss of vegetation affects even those species that are abundant, such as deer, opossum, rabbit, and dove. Currently, there are 223 plant and animal species on the Texas threatened and endangered species list and/or federally listed, and 33 of those species can be found in the NETRWPA. (See Table 1.14 for a regionally specified listing of threatened and endangered species from the Texas Parks and Wildlife Department's County List of Protected Species and Species of Greatest Conservation Need, September 2023.) Efforts to protect these natural resources are ongoing, and must be continued in order to save the species of plants and animals that are in decline in North East Texas. Within Region D, recent attention has been given to specific types of mussels, the western chicken turtle and Louisiana pigtoe, along with the alligator snapping turtle.

Investigations into rare mussels such as the Louisiana Pigtoe, and Texas Heelsplitter continue within Region D and throughout the state. The U.S. Environmental Protection Agency (EPA) is overseeing the assessment of the status of these mussels, and work is ongoing to assure and improve their habitat.

Mussels are an important component in the aquatic ecosystem, filtering water and removing algae, bacteria, and other undesirables from water sources.

The western chicken turtle is a small to medium-sized freshwater turtle that is easily identified by its' long, striped neck. In Texas, the western chicken turtle's historical range once comprised the entire eastern third of the state. The western chicken turtle is found in semi-aquatic areas that contain slow-moving and shallow water, such as ponds, lakes, streams, and swamps. The western chicken turtle is presumed to be rare and declining throughout its range; however, no range-wide assessment has been conducted; therefore, the current understanding of population status and trends is limited. Commercial harvest for the pet trade and habitat loss are believed to be the greatest threats. The State of Texas, the Sabine River Authority, researchers, and others are actively involved in activities investigating the western chicken turtle. Information about these activities can be found at: https://comptroller.texas.gov/programs/natural-resources/research/ongoing-studies/wct/.

Federal agencies are also concerned with the alligator snapping turtle. Several regional water authorities are involved in studying and developing an improved understanding of their distribution in the state. The Sabine River Authority, in consultation with the TPWD and other water providers, are cooperatively working to increase the state of knowledge and public awareness of this turtle. An elevated awareness of this protected species within Region D will improve efforts to preserve this important component to the ecological health of the region's water resources. The collection of verifiable sighting data will aid researchers in determining distribution and abundance of the species.

According to "An Analysis of Bottomland Hardwood Areas at Three Proposed Reservoir Sites in Northeast Texas (TPWD)," there are 36,177 acres of bottomland hardwood forests on the Marvin Nichols I reservoir site. According to TPWD, these are the best remaining bottomland hardwood areas in the State. These forests, and associated fish and wildlife, are threatened by proposed reservoir construction.

Giant salvinia is a serious threat to the region's water sources; however, additional non-native species of concern represent a potential detriment to the natural resources of the Region. Water hyacinth, hydrilla, zebra mussels each pose a threat to the region's water resources. The TPWD recommends avoiding transport of water from basins where these species are known to occur to prevent the transmission of such invasive species. Where unavoidable, such transfers of water should be directly to water treatment plants.

Table 1.14 Texas Parks and Wildlife Department Listed Threatened and Endangered Species in the North East Texas Region

Birds – Common Name	Birds – Scientific Name
White-faced ibis	Plegadis chihi
Wood Stork	Mycteria americana
Swallow-tailed Kite	Elanoides forficatus
Bald Eagle	Haliaeetus leucocephalus
Black Rail	Laterallus jamaicensis
Whooping Crane	Grus americana
Piping Plover	Charadrius melodus
Rufa Red Knot	Calidris canutus rufa
Franklin's Gull	Leucophaeus pipixcan

Birds – Common Name	Birds – Scientific Name
Western Burrowing Owl	Athene cunicularia hypugaea
Sprague's Pipit	Anthus spragueii
Bachman's Sparrow	Peucaea aestivalis
Chestnut-Collared Longspur	Calcarius ornatus

Fish – Common Name	Fish – Scientific Name
Shovelnose Sturgeon	Scaphirhynchus platorynchus
Paddlefish	Polyodon spathula
Goldeye	Hiodon alosoides
Highland Stoneroller	Campostoma spadiceum
Mississippi Silvery Minnow	Hybognathus nuchalis
Blackspot Shiner	Notropis atrocaudalis
Red River Shiner	Notropis bairdi
Ironcolor Shiner	Notropis chalybaeus
Taillight Shiner	Notropis maculatus
Chub Shiner	Notropis potteri
Sabine Shiner	Notropis sabinae
Silverband Shiner	Notropis shumardi
Silver Chub	Macrhybopsis storeriana
Bluehead Shiner	Pteronotropis hubbsi
Blue Sucker	Cycleptus elongatus
Western Creek Chubsucker	Erimyzon claviformis
Western Sand Darter	Ammocrypta clara
Orangebelly Darter	Etheostoma radiosum
Blackside Darter	Percina maculata
River Darter	Percina shumardi

Plants – Common Name	Plants – Scientific Name
Goldenwave Tickseed	Coreopsis intermedia
Topeka Purple-Coneflower	Echinacea atrorubens
Pygmy Prairie Dawn	Hymenoxys perpygmaea
Barbed Rattlesnake-Root	Prenanthes barbata
Rough-Stem Aster	Symphyotrichum puniceum var. scabricaule
Threadleaf Bladderpod	Physaria angustifolia
Clasping Twistflower	Streptanthus maculatus ssp. maculatus
Earth Fruit	Geocarpon minimum
Marsh-Elder Dodder	Cuscuta attenuata

Plants – Common Name	Plants – Scientific Name
Smooth Indigobush	Amorpha laevigata
Panicled Indigobush	Amorpha paniculata
Soxman's Milkvetch	Astragalus soxmaniorum
Arkansas Oak	Quercus arkansana
Texas Sandmint	Rhododon ciliatus
Neches River Rose-Mallow	Hibiscus dasycalyx
Carrizo Sands Leather-Flower	Clematis carrizoensis
Arkansas Meadow-Rue	Thalictrum arkansanum
Nixon's Dwarf Hawthorn	Crataegus nananixonii
Sutherland Hawthorn	Crataegus viridis var. glabriuscula
Texas Cornsalad	Valerianella florifera
Cypress Knee Sedge	Carex decomposita
Shinner's Sedge	Carex shinnersii
Mohlenbrock's Sedge	Cyperus grayioides
Large Beakrush	Rhynchospora macra
Small-Headed Pipewort	Eriocaulon koernickianum
Texas Trillium	Trillium texanum
Oklahoma Grass Pink	Calopogon oklahomensis
Southern Lady's-Slipper	Cypripedium kentuckiense
Texas Ladies'-Tresses	Spiranthes brevilabris
Chapman's Yellow-Eyed Grass	Xyris chapmanii
Roughleaf Yellow-Eyed Grass	Xyris scabrifolia

Reptiles – Common Name	Reptiles – Scientific Name
Alligator Snapping Turtle	Macrochelys temminckii
Western Chicken Turtle	Deirochelys reticularia miaria
Eastern Box Turtle	Terrapene carolina
Western Box Turtle	Terrapene ornata
Smooth Softshell	Apalone mutica
Slender Glass Lizard	Ophisaurus attenuatus
Texas Horned Lizard	Phrynosoma cornutum
Prairie Skink	Plestiodon septentrionalis
Northern Scarlet Snake	Cemophora coccinea
Western Hognose Snake	Heterodon nasicus
Louisiana Pine Snake	Pituophis ruthveni
Texas Garter Snake	Thamnophis sirtalis annectens
Timber (Canebrake) Rattlesnake	Crotalus horridus

Reptiles – Common Name	Reptiles – Scientific Name
Pygmy Rattlesnake	Sistrurus miliarius

Mammals – Common Name	Mammals – Scientific Name
Southeastern Myotis Bat	Myotis austroriparius
Tricolored Bat	Perimyotis subflavus
Big Brown Bat	Eptesicus fuscus
Eastern Red Bat	Lasiurus borealis
Hoary Bat	Lasiurus cinereus
Rafinesque's Big-Eared Bat	Corynorhinus rafinesquii
Swamp Rabbit	Sylvilagus aquaticus
Muskrat	Ondatra zibethicus
Black Bear	Ursus americanus
Louisiana Black Bear	Ursus americanus luteolus
Long-Tailed Weasel	Mustela frenata
Eastern Spotted Skunk	Spilogale putorius
Mountain Lion	Puma concolor

Amphibians – Common Name	Amphibians – Scientific Name
Eastern Tiger Salamander	Ambystoma tigrinum
Spotted Dusky Salamander	Desmognathus conanti
Gulf Coast Waterdog	Necturus beyeri
Woodhouse's Toad	Anaxyrus woodhousii
Strecker's Chorus Frog	Pseudacris streckeri
Southern Crawfish Frog	Lithobates areolatus areolatus

Crustaceans – Common Name	Crustaceans – Scientific Name
No accepted common name	Orconectes maletae
blackbelted crayfish	Procambarus nigrocinctus
Parkhill Prairie crayfish	Procambarus steigmani
No accepted common name	Faxonella blairi

Insects – Common Name	Insects – Scientific Name
American Burying Beetle	Nicrophorus americanus
American Bumblebee	Bombus pensylvanicus
Comanche Harvester Ant	Pogonomyrmex comanche
Sage Sphinx Moth	Lintneria eremitoides

Mollusks – Common Name	Mollusks – Scientific Name
Ouachita Rock Pocketbook	Arcidens wheeleri
Texas Pigtoe	Fusconaia askewi
Sandbank Pocketbook	Lampsilis satura
Southern Hickorynut	Obovaria arkansasensis
Louisiana Pigtoe	Pleurobema riddellii
Texas Heelsplitter	Potamilus amphichaenus

(Source: Texas Parks and Wildlife Department, County Lists of Protected Species and Species of Greatest Conservation Need. Sept 2023)

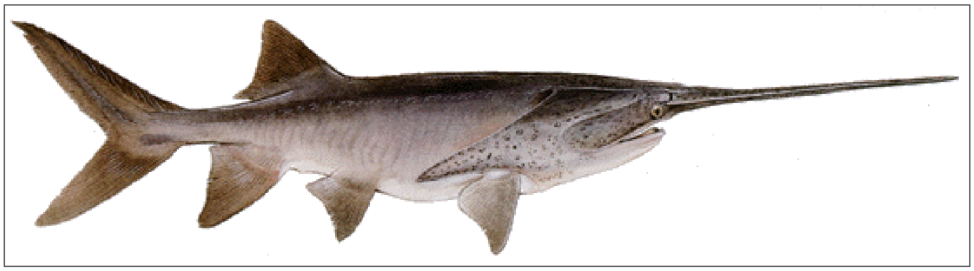


Figure 1.24 Texas Paddlefish

Source: TPWD

1.13 Petroleum Resources

The oil industry is economically important in northeast Texas, but remaining supplies become increasingly expensive to extract. Oil is a non-renewable resource, and exhausting this resource is a possibility. Careful monitoring of petroleum resources is important to ensure that they will be available in the future. Additionally, the Haynesville Shale is currently being developed in Harrison, Gregg and Marion Counties in Region D. The development of this oil/gas resource requires a significant consumption of water resources which will have a negative impact on available water resources.

1.14 Air

Clean air is vital to both humans and the environment. Air quality in the North East Texas Region complies with national ambient air quality standards in all areas, except the Tyler-Longview-Marshall area and western portions of Hunt County. This area is compliant with all standards except those of ozone. Air quality problems result from vehicle emissions, industrial exhaust, fire, and similar contaminants. Organizations such as Northeast Texas Air Care, through the East Texas Council of Governments (COG), are committed to improving air quality in Northeast Texas.

1.15 Wetlands

The U.S. Army Corps of Engineers defines wetlands as, “those areas that are inundated or saturated by surface or groundwater at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” Wetlands are an important natural resource in northeast Texas for several reasons. Wetlands support numerous plant and animal species including several threatened and endangered species. When wetlands are harmed, fish, birds, and other species that make their homes there are also harmed. In addition, wetlands influence the flow and quality of water by acting as sponges. They are able to store flood water and then slowly release it, reducing water’s erosive potential. Finally, wetlands improve water quality by removing nutrients, processing organic wastes, and reducing sediment load. Destruction of wetlands has a documented negative impact on the environment.

CHAPTER 2 POPULATION AND WATER DEMAND PROJECTIONS

In each planning cycle, the regional water planning groups are required to revisit past planning efforts and revise population and water demand projections to reflect changes that have occurred since the previous round of planning and to incorporate any newly available information. Per the Texas Water Development Board's (TWDB's) "General Guidelines for Development of the 2026 Regional Water Plans" (2nd Amended), the population and water demand projections have been revised from previous planning rounds, utilizing the 2020 decennial U.S. Census data, most recent county-level population projections from the Texas Demographic Center, and the most recent utility boundary information. Further, non-population-related water demand projections consisting of manufacturing, irrigation, and steam-electric power generation have been developed by TWDB using newly adopted methodologies. The TWDB, in conjunction with the Texas Commission on Environmental Quality (TCEQ), Texas Parks and Wildlife Department (TPWD), and Texas Department of Agriculture (TDA), prepared population and water demand projections for all water demands and all Water User Groups (WUGs). Draft population and water demand projections were provided to the NETRWPG for review, with requested changes to the projections made where provided by the RWPG. The population and water demand projections have been formally adopted for use in development of the 2026 RWPs.

The new population projections used in the 2026 Regional Water Plans (RWPs) increase population projections in some locations while decreasing population projections in other locations, relative to the population projections in the 2021 RWPs. TWDB has directly populated the Regional Water Planning Application (DB27) with all WUG-level projections.

The following sections of this chapter describe the methodology that has been used in the current (sixth) round of planning, to develop regional population and water demand projections. This chapter presents projections for population and water demand for major cities, providers of municipal and manufacturing water, and for categories of water use including municipal, manufacturing, irrigation, steam electric power generation, mining and livestock. Projected demands are also provided for each of the six river basins located within the North East Texas Region.

The results presented herein represent the population and water demand projections that received final approval from the Region D – Regional Water Planning Group for inclusion in the 2026 Regional Water Plan and approval from the TWDB for inclusion in the 2027 State Water Plan.

Both population and water demand are projected to grow by approximately 13% and 11%, respectively, from the years 2030 to 2080. The largest percentage of water is currently used for municipal, manufacturing, and steam-electric power generation uses.

Table 2.1 Population and Water Demand Projections for the North East Texas Region

Total Regional Projection	2030	2040	2050	2060	2070	2080
Population						
Total	873,433	904,455	928,548	947,851	964,080	983,981
Water Demand (ac-ft per year)						
Municipal	156,589	162,106	166,418	169,711	172,670	176,095
Manufacturing	108,499	112,529	116,707	121,036	125,527	130,187
Irrigation	32,608	32,608	32,608	32,608	32,608	32,608
Steam Electric	64,012	64,012	64,012	64,012	64,012	64,012
Mining	5,307	5,326	5,418	5,495	5,557	5,604
Livestock	22,535	22,444	22,305	22,192	22,172	22,172
TOTAL WATER DEMAND (AC-FT)	**389,550**	**399,025**	**407,468**	**415,054**	**422,546**	**430,678**

2.1 Methodology

2.1.1 Population Projections

Population projections were developed using the 2020 Census data and other available sources. Projections were first developed at the county level, and then allocated to municipal and county-other WUG's. For this planning round, population projections and the associated water demand projections have again been developed for utility service area boundaries, rather than using political boundaries (e.g. city limits) as was done in rounds previous to the 2022 State Water Planning process. TWDB staff summed the county populations in the state to regional totals. Any adjustments to a county-level population required a justifiable redistribution of projected county populations within the region so that the summed regional total remained the same.

Per TWDB Guidelines, municipal WUGs in the 2026 Region D Plan are defined as:

- 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 paragraphs (A) and (B) 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 (A)-(D).

The list of WUGs for the 2026 Region D Plan was prepared based on the rules listed above and TWDB Water Use Survey data for the 2010-2022 period, revised based on input provided by the NETRWPG to the TWDB, and ultimately adopted by both the NETRWPG and TWDB. Importantly, for the first time in the regional water planning process TWDB no longer allows the default assumption that declining populations would be held constant (an assumption utilized in all previous regional water planning processes). This, in effect, allows for projections of *declining* population where such declines are presently observed.

2.1.2 Water Demand Projections

Discussion of how demand projections were developed in the sixth round of planning is presented in the following paragraphs. Water demand projections for RWPs are based upon dry-year conditions, so the base year for the projections is intended to be the driest year from 2006 onwards. TWDB staff determined that the baseline dry-year per capita usage amounts (measured in gallons per capita daily, i.e., GPCD) were to remain consistent with those identified for the purposes of the 2021 regional water plans (typically 2011) for use as the default dry-year baseline for the water demand projections, with water efficiency savings due to more efficient plumbing fixtures and appliances through 2020 subtracted. Reported municipal water use data through the TWDB Water Use Survey for the designated dry year was used to calculate the base per capita water use for each WUG. TWDB prepared draft population and municipal water demand projections for 2030 – 2080 for all municipal WUGs using the population projection trends.

Demand projections for non-municipal WUG's were also developed. For manufacturing, irrigation, and steam-electric power generation, newly adopted methodologies were employed by TWDB and made available to the RWPG for review.

For irrigation water demand projections, the baseline methodology for draft irrigation water demand projections is the average of the most recent five-years (2015-2019) of water use estimates held constant between 2030 and 2080. In counties where the total groundwater availability over the planning period is projected to be less than the groundwater-portion of the baseline water demand projections, the draft irrigation water demand projections will begin to decline starting in 2040, or a later decade, commensurate with the decline in the associated groundwater availability.

For manufacturing, the baseline for draft manufacturing water demand projections was based on the highest county-aggregated manufacturing water use in the most recent five years (2015-2019), plus estimated unaccounted water use. The most recent 10-year historical number of establishments from the U.S. Census Bureau County Business Pattern data or other relevant economic measures available are used as proxy for growth between 2030 and 2080.

For steam-electric power generation, the baseline for draft water demand projections are based on the highest county aggregated historical steam-electric power water use in the most recent five years (2015-2019). Subsequent demand projections after 2030 are held constant throughout the planning period. The anticipated water use of future facilities listed in state and federal reports is added to the demand projections from the anticipated operation date through 2080. The reported water use of power generation facilities scheduled for retirement in the state and federal reports is subtracted from the baseline or the decade in which they are projected to retire.

For mining, the TWDB's annual mining water use estimates are comprised of data from both surveyed and non-surveyed entities and are based on the mining study conducted in partnership with the U.S. Geological Survey and the University of Texas Bureau of Economic Geology.

For livestock, the draft water demand projections for each county were based on the average of the most recent five-years (2015-2019) of water use estimates. The rate of change for 2020-2070 from the 2022 State Water Plan was then applied to the new baseline.

Similar to the population projections, the water demand projections were released for the planning groups to review and request revisions as necessary.

2.2 Population Projections

The population of the nineteen county North East Texas Region is projected to grow over the fifty year planning period. Figure 2.1 below illustrates the historical and projected population for the North East Texas Region. The tables on the following pages break down the population projections by county and river basin. The figures illustrate the percent of population growth by county and population by river basin.

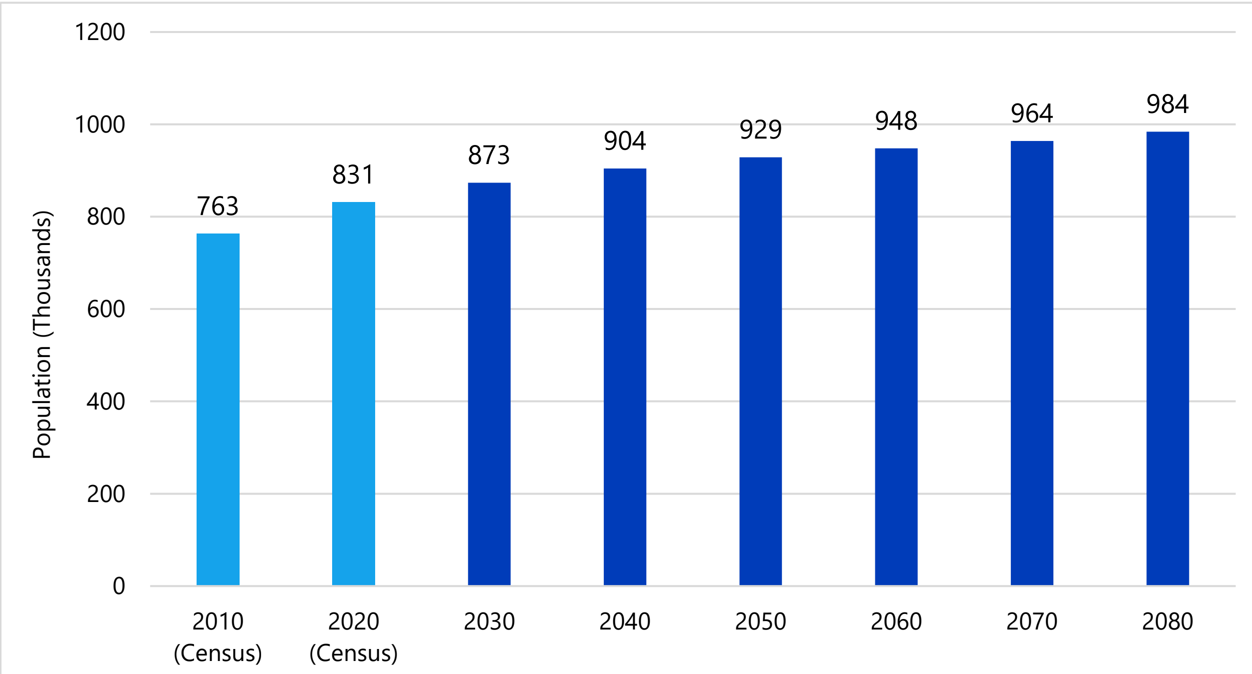


Figure 2.1 Historical and Projected Population for Region D

The Region's population is anticipated to grow by 12.7% overall (from 2030 to 2080) with the largest percentage growth (57%) occurring in Van Zandt County and 37% in Hunt County. In the year 2030, the counties with the largest projected population are Hunt, Gregg, and Bowie Counties. These counties include the Cities of Grenville, Commerce, Longview, and Texarkana, Texas, respectively. By 2080, the largest county populations in the region are expected to be Hunt County and Gregg County, with Bowie County falling to the fourth largest county in the region behind Van Zandt County. Although population is expected to increase at varying rates in each county throughout the region, the particularly large population growth in Hunt County can be attributed to the anticipated growth of the City of Greenville and urban sprawl from the Dallas-Fort Worth Metroplex to the east. Declines in population are projected for Red River, Marion, Morris, Delta, Upshur, Cass, and Bowie Counties.

Table 2.2 Population Projection by County

County	2030	2040	2050	2060	2070	2080
BOWIE	94,952	94,456	93,769	92,482	91,181	89,866
CAMP	12,874	13,015	13,053	13,162	13,269	13,378
CASS	27,472	26,187	24,777	23,650	22,525	21,400
DELTA	5,284	5,256	5,220	5,152	5,082	5,012
FRANKLIN	10,466	10,398	10,258	10,335	10,413	10,490
GREGG	126,860	128,531	129,120	128,404	127,669	126,995
HARRISON	71,617	73,196	73,568	73,623	73,688	73,681
HOPKINS	42,832	44,267	45,327	46,304	47,242	48,242
HUNT	141,169	154,138	167,439	176,811	183,183	193,165
LAMAR	51,278	51,417	51,179	50,940	50,700	50,460
MARION	9,244	8,630	7,950	7,495	7,041	6,587
MORRIS	12,076	11,775	11,342	11,042	10,718	10,342
RAINS	13,570	14,398	15,177	16,172	17,133	18,137
RED RIVER	10,868	10,029	9,214	8,548	7,882	7,216
SMITH	48,406	51,319	53,377	54,771	56,186	57,610
TITUS	36,045	38,565	40,257	41,949	43,552	45,080
UPSHUR	42,212	42,590	42,433	41,825	41,214	40,591
VAN ZANDT	67,646	75,479	82,956	90,698	98,528	106,444
WOOD	48,562	50,809	52,132	54,488	56,874	59,285
REGION TOTAL	**873,433**	**904,455**	**928,548**	**947,851**	**964,080**	**983,981**

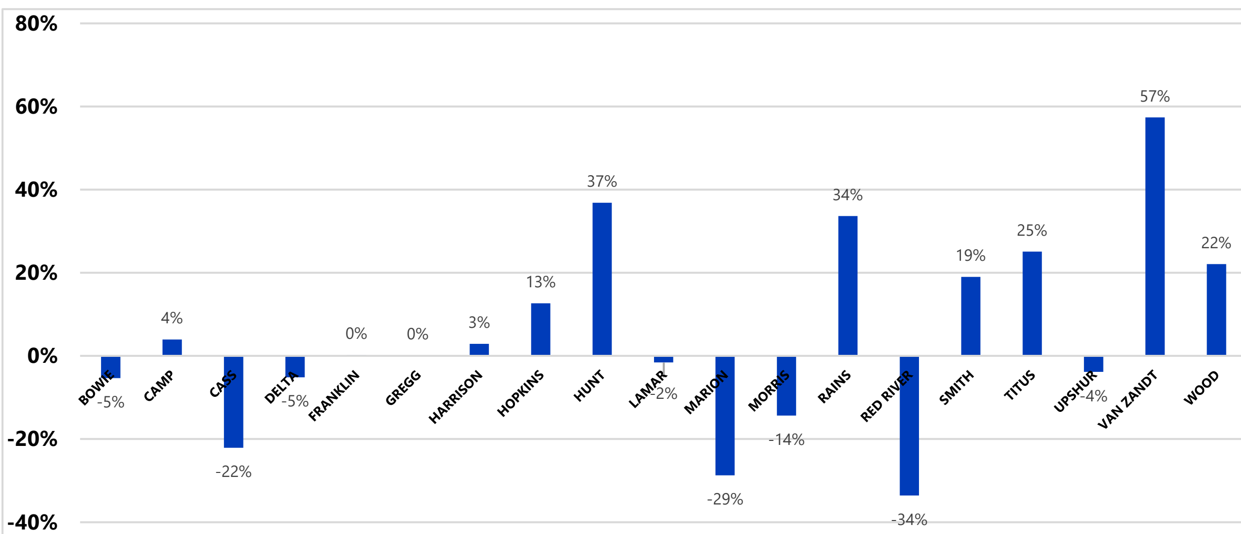


Figure 2.2 Percent Population Growth by County (2020 – 2070)

As depicted in Table 2.3 and Figure 2.3, the largest portion of the Region's population is within the Sabine River Basin. The Cities of Greenville, Longview, Kilgore, and portions of Marshall are within the Sabine River Basin, as well as a large geographic area comprised of many smaller WUG's. The Sabine River Basin is anticipated to grow more quickly than other basins in the region because of the large population growth expected in the eastern portion of Hunt County, as mentioned previously.

A more detailed breakdown of population projections for the North East Texas Region is presented in Appendix C2-1 for this chapter.

Table 2.3 Population Projections by River Basin

Basin	2030	2040	2050	2060	2070	2080
CYPRESS	154,363	155,358	154,560	153,854	153,098	152,287
NECHES	15,055	16,579	17,817	18,894	19,724	20,280
RED	43,065	42,994	42,736	42,401	42,064	41,743
SABINE	456,821	481,882	503,266	520,209	534,293	552,218
SULPHUR	186,578	186,910	186,257	185,028	183,684	182,196
TRINITY	17,551	20,732	23,912	27,465	31,217	35,257
REGION TOTAL	**2,620,299**	**2,713,365**	**2,785,644**	**2,843,553**	**2,892,240**	**2,951,943**

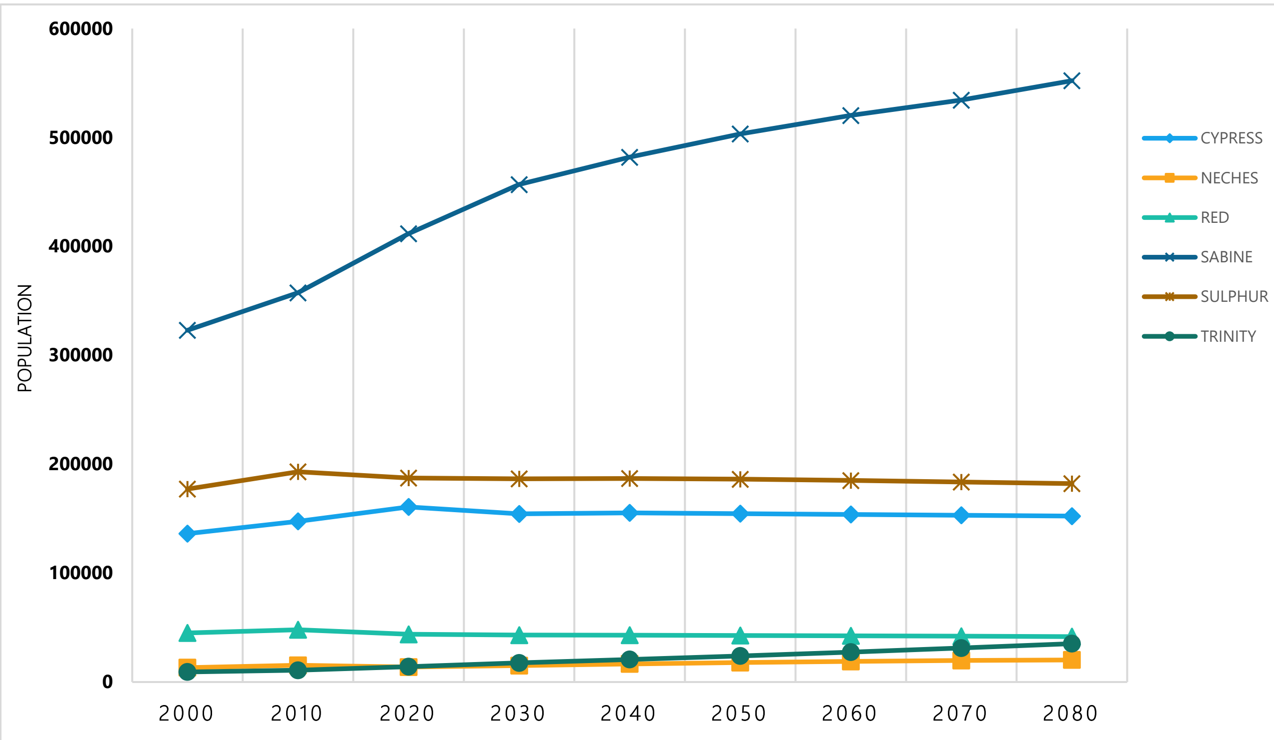


Figure 2.3 Population Projections by River Basin

2.3 Water Demand Projections

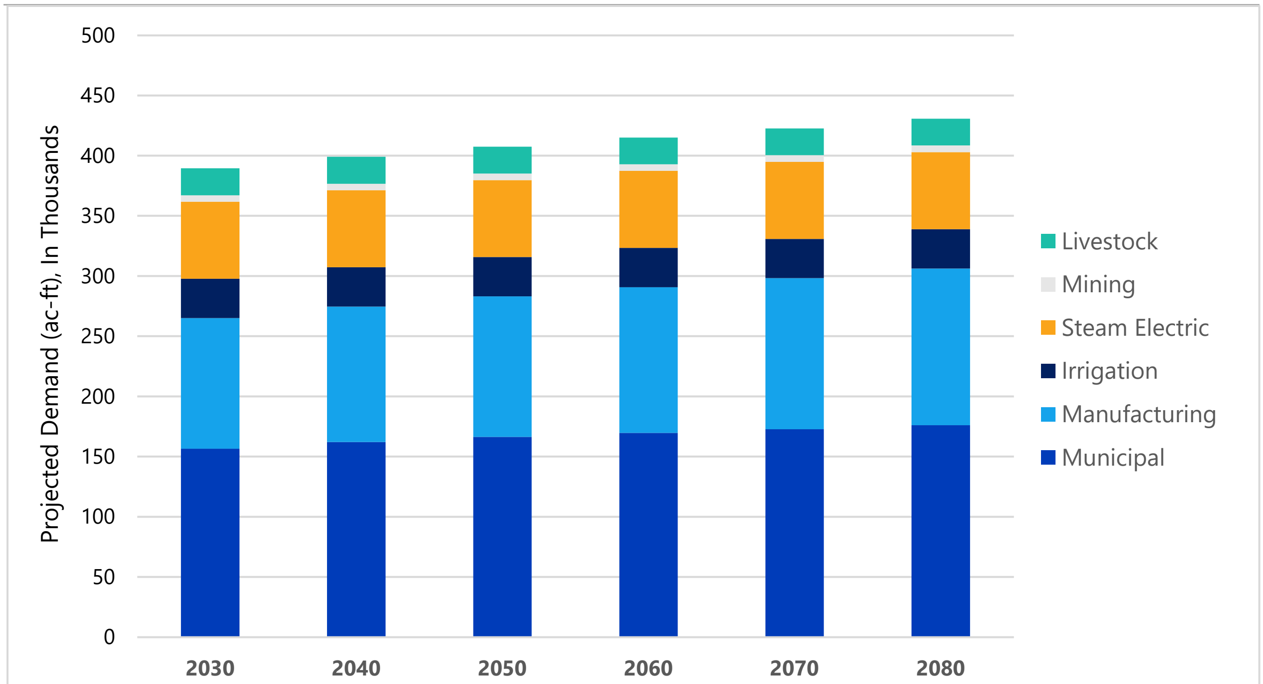
While the overall projected regional population amounts and accordant municipal demands are generally similar, the population projections to be used in the 2026 Region D Water Plan for individual municipal WUGs differ from those employed for the 2021 Plan, as for the present round of planning the decennial census forms the basis for population projections and declining projections are no longer assumed to remain at present levels. Projections for non-municipal demands also differ from projections of non-municipal demand employed in previous rounds of water planning for the region. This difference is primarily due to the new methods adopted by the TWDB for the present cycle, resulting in significantly smaller projections of demand for manufacturing and steam-electric power generation (the latter of which also reflecting the closure of facilities). These differences are apparent in the resultant projections of demand for Region D.

Total annual water demand is expected to increase approximately 11% or 41,128 ac-ft/yr, from 2030 to 2080. The projected increase in regional water demand is predominantly due to increases in municipal and manufacturing water demands. Table 2.4 and Figure 2.4 summarize and illustrate the projected water demand by category.

Table 2.4 Regional Water Demand Projections by Category of Use (acre-feet)

Total Water Demand	2030	2040	2050	2060	2070	2080
Municipal	156,589	162,106	166,418	169,711	172,670	176,095
Manufacturing	108,499	112,529	116,707	121,036	125,527	130,187
Irrigation	32,608	32,608	32,608	32,608	32,608	32,608
Steam Electric	64,012	64,012	64,012	64,012	64,012	64,012
Mining	5,307	5,326	5,418	5,495	5,557	5,604
Livestock	22,535	22,444	22,305	22,192	22,172	22,172
TOTAL WATER DEMAND (AC-FT)	**389,550**	**399,025**	**407,468**	**415,054**	**422,546**	**430,678**

Figure 2.4 Regional Water Demand Projections by Category of Use (acre-feet)



Total water demand by county and by river basin, as presented in Tables 2.5 and 2.6, respectively, are cumulative measures of all water demand in the region for municipal, manufacturing, mining, steam electric, livestock and irrigation purposes. Harrison, Titus, Cass, and Gregg Counties currently have – and are projected to continue to have – the highest overall water demand through 2080. Due primarily to growth in municipal demand, the Sabine River Basin is projected to have the highest overall water demand of the six river basins within the region. Approximately 186,000 acre-feet of water will be needed in 2080 for the portion of the Sabine River Basin that is in the North East Texas RWPA. This growth in water demand by river basin is depicted graphically in Figure 2.5.

Table 2.5 Total Water Demand Projections by County (acre-feet)

County	2030	2040	2050	2060	2070	2080
BOWIE	29,111	28,929	28,809	28,611	28,489	28,409
CAMP	3,080	3,092	3,098	3,113	3,129	3,145
CASS	40,437	41,597	42,807	44,102	45,453	46,858
DELTA	4,319	4,316	4,311	4,303	4,295	4,286
FRANKLIN	3,293	3,273	3,249	3,261	3,275	3,286
GREGG	35,503	35,898	36,144	36,051	35,953	35,877
HARRISON	64,682	65,873	66,970	68,058	69,194	70,307
HOPKINS	16,394	16,631	16,849	17,050	17,244	17,449
HUNT	33,739	36,860	39,444	41,384	42,959	44,993
LAMAR	28,486	28,673	28,852	29,036	29,231	29,433
MARION	5,661	5,595	5,529	5,486	5,442	5,399
MORRIS	29,856	30,845	31,863	32,935	34,046	35,193
RAINS	2,915	3,022	3,136	3,261	3,383	3,508
RED RIVER	7,208	7,055	6,907	6,789	6,670	6,547
SMITH	9,995	10,575	11,012	11,321	11,637	11,955
TITUS	42,860	43,342	43,734	44,128	44,519	44,911
UPSHUR	7,098	7,119	7,092	7,006	6,917	6,827
VAN ZANDT	12,140	13,130	14,125	15,147	16,207	17,286
WOOD	12,773	13,200	13,537	14,012	14,503	15,009
REGION TOTAL	**389,550**	**399,025**	**407,468**	**415,054**	**422,546**	**430,678**

Table 2.6 Total Water Demand Projections by River Basin (acre-feet)

River Basin	2030	2040	2050	2060	2070	2080
CYPRESS	95,668	96,942	98,120	99,326	100,584	101,854
NECHES	2,766	2,909	3,036	3,141	3,220	3,273
RED	24,924	24,897	24,877	24,855	24,864	24,887
SABINE	161,385	167,702	173,008	177,434	181,585	186,258
SULPHUR	102,140	103,549	105,031	106,488	108,041	109,670
TRINITY	2,667	3,026	3,396	3,810	4,252	4,736
Total Water Demand (ac-ft)	1,168,650	1,197,075	1,222,404	1,245,162	1,267,638	1,292,034

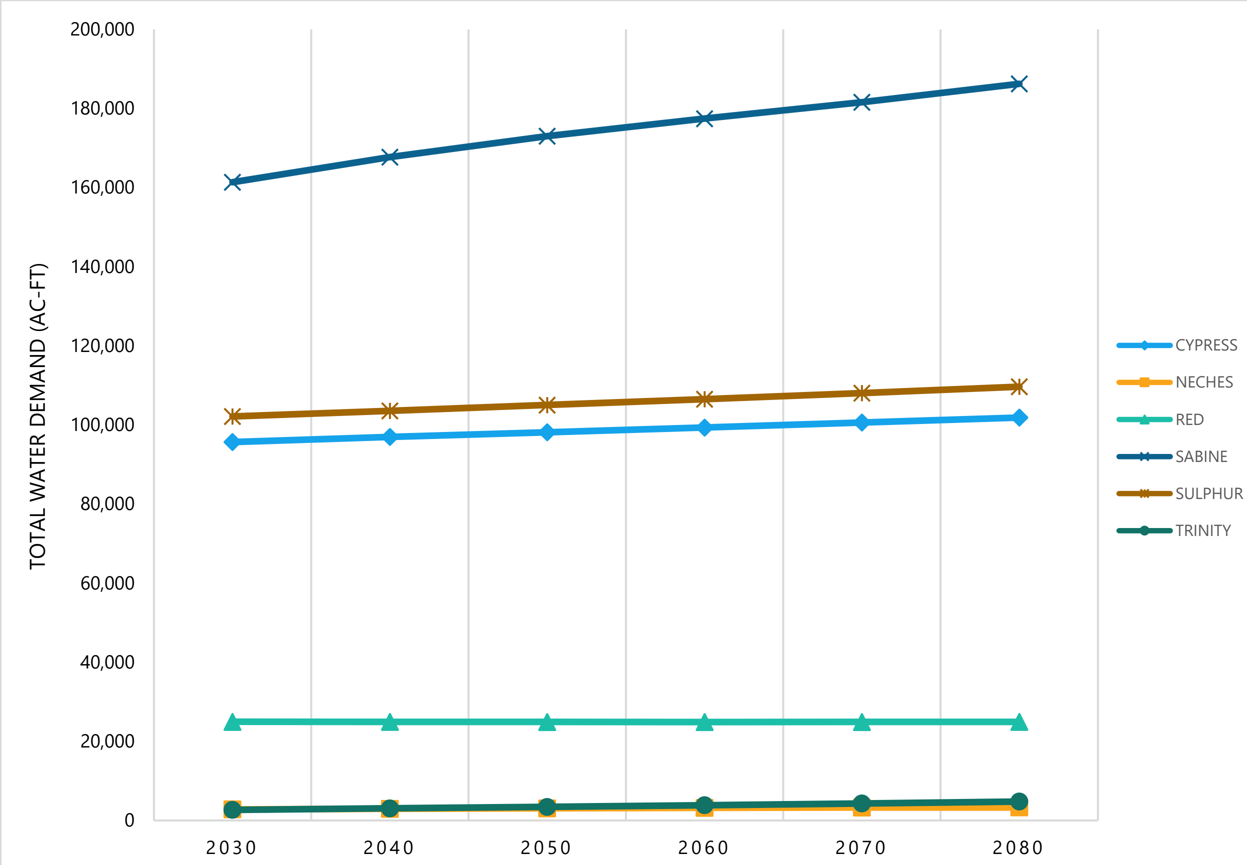


Figure 2.5 Water Demand Projections by River Basin

2.3.1 Municipal Water Demand

Municipal water use is comprised of residential (single and multifamily housing) and commercial/institutional water uses. Commercial use includes water used by business establishments, public offices, and institutions, but does not include industrial water use. The TWDB has grouped residential, commercial, and institutional water use into the municipal category because of the similarity of usage. Each of the three requires water primarily for drinking, cleaning, sanitation, air cooling and outdoor use.

2.3.1.1 Methodology

Municipal water demand was calculated for each of the WUGs designated in the population projection portion of the study. The municipal water demand projections are based on population and per capita water usage (gpcd).

- Reported municipal water use data through the TWDB Water Use Survey for the identified dry year (e.g., 2011) is used to calculate the base per capita water use for each WUG.

- For planning purposes in previous rounds, the North East Texas Regional Water Planning Group (NETRWPG) employed a minimum baseline per capita water use rate of 115 gpcd for entities with current municipal water demand below that level. Historical records indicate that communities use more water as they become more affluent and as a steady supply of water is available. However, this assumption has not been used for this present round of planning, as TWDB has employed a minimum baseline per capita water use rate of 60 gpcd.

  A. Municipal demands have incorporated water savings due to the installation of water efficient plumbing fixtures and appliances. These amounts have been subtracted from the base gpcd for each projected decade. The recommended reductions in gpcd from the base year are mandated in State and Federal Legislation. Recommended savings were based on a state-wide formula.

  B. After subtraction of plumbing code savings from the per capita water demand for each planning year, the average per capita water demand per WUG was multiplied by the WUG's projected population for that decade to obtain a projected decadal water demand.

2.3.1.2 Regional Municipal Water Demand Projections

Approximately 40% of the total regional water demand is for municipal purposes. Municipal water demand for the North East Texas Region is projected to increase by approximately 19,506 acre-feet, or 12% over the fifty year planning period (2030 to 2080). Table 2.7 and Table 2.8 summarize the projected municipal water demand by county and by river basin for the region. Municipal water demand is currently concentrated in Gregg, Bowie, Harrison, and Hunt Counties. Driven by the large population growth, Hunt County municipal water demand is projected to grow by approximately 36% through the year 2080.

A more refined breakdown of demand for each WUG can be found in Appendix C2-2, while estimated water efficiency savings per specific WUG can be found in Appendix C2-3.

Table 2.7 Municipal Water Demand by County (acre-feet)

County	2030	2040	2050	2060	2070	2080
BOWIE	13,907	13,762	13,652	13,453	13,253	13,047
CAMP	1,583	1,593	1,597	1,610	1,624	1,638
CASS	3,458	3,280	3,103	2,960	2,819	2,677
DELTA	759	756	751	743	735	726
FRANKLIN	1,801	1,781	1,757	1,769	1,783	1,794
GREGG	32,717	33,054	33,240	33,085	32,923	32,780
HARRISON	11,673	11,867	11,930	11,944	11,963	11,958
HOPKINS	7,187	7,385	7,563	7,722	7,873	8,033
HUNT	31,193	34,290	36,849	38,764	40,313	42,320
LAMAR	7,547	7,529	7,495	7,459	7,425	7,390
MARION	1,055	983	911	862	812	763
MORRIS	1,649	1,613	1,568	1,538	1,506	1,467
RAINS	2,351	2,458	2,572	2,697	2,819	2,944
RED RIVER	1,830	1,677	1,529	1,411	1,292	1,169
SMITH	9,200	9,779	10,215	10,523	10,838	11,155
TITUS	6,499	6,815	7,035	7,251	7,457	7,657
UPSHUR	5,623	5,641	5,611	5,522	5,430	5,336
VAN ZANDT	9,238	10,207	11,181	12,181	13,218	14,273
WOOD	7,319	7,636	7,859	8,217	8,587	8,968
REGION TOTAL	**156,589**	**162,106**	**166,418**	**169,711**	**172,670**	**176,095**

Table 2.8 Municipal Water Demand by River Basin (acre-feet)

River Basin	2030	2040	2050	2060	2070	2080
CYPRESS	22,197	22,258	22,177	22,077	21,977	21,863
NECHES	1,598	1,729	1,843	1,935	2,001	2,041
RED	6,596	6,550	6,501	6,443	6,387	6,327
SABINE	91,496	96,278	100,048	102,944	105,511	108,563
SULPHUR	28,668	28,552	28,433	28,226	28,003	27,760
TRINITY	2,028	2,374	2,732	3,133	3,563	4,034
REGION TOTAL	**152,583**	**157,741**	**161,734**	**164,758**	**167,442**	**170,588**

2.3.2 Industrial Water Demand

Water used in the production of manufactured products, steam-electric power generation and mining activities, including water used by employees for drinking and sanitation, are included in the Industrial Water Use Category. Water demands have been divided into these three sub-categories for greater clarity.

2.3.2.1 Methodology

Like municipal water demand, the TWDB recommended water demand projections for manufacturing, steam-electric power generation, and mining to the NETRWPG. The NETRWPG further evaluated water demand estimates from the TWDB industrial and mining water use database by surveying WUGs to update water demand information and adding known water users not previously included. This updated information was obtained largely through surveys of water providers who supplied water to manufacturing facilities. The recommended demands were revised as necessary and approved for presentation to the TWDB by the Planning Group. The methods employed for each water use category, as well as the resultant projections, are described below.

2.3.2.2 Regional Manufacturing Demand Projections

Per TWDB Guidelines, manufacturing water use is defined as water used to produce manufactured goods. Manufacturing facilities report their water use to the TWDB annually through the Water Use Survey. Different manufacturing sectors are denoted by North American Industrial Classification System (NAICS) codes. The baseline for draft manufacturing water demand projections is based on the highest county-aggregated manufacturing water use in the most recent five years (2015-2019), plus estimated unaccounted water use. The most recent 10- year historical number of establishments from the U.S. Census Bureau County Business Pattern data or other relevant economic measures available are used as proxy for growth between 2030 and 2080. The water use within each North American Industry Classification System (NAICS) category is multiplied by the employment growth rate.

Over the fifty-year period from 2030 to 2080, 28% to 30% of the total water demand in the North East Texas Region is projected to be manufacturing demand. Overall manufacturing water demand for the region is projected to slightly grow by approximately 20% over the 2030 to 2080 planning period. Harrison, Cass, and Morris counties currently have the greatest demand for water used for manufacturing purposes.

The three largest water using industries in the region, in order of size, are:

- Graphics Packaging International (GPI, formerly International Paper).
- U.S. Steel.
- Eastman Chemical Company.

Table 2.9 Manufacturing Demand by County (acre-feet)

County	2030	2040	2050	2060	2070	2080
BOWIE	1,835	1,903	1,974	2,047	2,123	2,202
CAMP	44	46	48	50	52	54
CASS	36,152	37,490	38,877	40,315	41,807	43,354
DELTA	0	0	0	0	0	0
FRANKLIN	0	0	0	0	0	0
GREGG	1,552	1,610	1,670	1,732	1,796	1,863
HARRISON	25,986	26,952	27,954	28,993	30,071	31,189
HOPKINS	1042	1081	1121	1163	1206	1251
HUNT	635	659	684	709	735	762
LAMAR	5,510	5,715	5,928	6,148	6,377	6,614
MARION	151	157	163	169	175	181
MORRIS	27,561	28,586	29,649	30,751	31,894	33,080
RAINS	1	1	1	1	1	1
RED RIVER	3	3	3	3	3	3
SMITH	19	20	21	22	23	24
TITUS	4,455	4,621	4,793	4,971	5,156	5,348
UPSHUR	85	88	91	94	97	101
VAN ZANDT	556	577	598	620	643	667
WOOD	2,912	3,020	3,132	3,248	3,368	3,493
REGION TOTAL	**108,499**	**112,529**	**116,707**	**121,036**	**125,527**	**130,187**

Table 2.10 Manufacturing Water Demand by River Basin (acre-ft)

River Basin	2030	2040	2050	2060	2070	2080
CYPRESS	32,270	33,471	34,717	36,007	37,346	38,733
NECHES	0	0	0	0	0	0
RED RIVER	1529	1586	1644	1705	1769	1834
SABINE	31,682	32,861	34,081	35,347	36,659	38,023
SULPHUR	42,999	44,591	46,244	47,955	49,730	51,573
TRINITY	0	0	0	0	0	0
REGION TOTAL	**108,480**	**112,509**	**116,686**	**121,014**	**125,504**	**130,163**

2.3.2.3 Regional Steam Electric Demand Projections

Per TWDB Guidelines, water use for steam-electric power generation is consumptive use reported to the TWDB through the annual Water Use Survey. Steam-electric power water demand projections do not include water used in cogeneration facilities (included in manufacturing projections) or facilities which do not require water for production (wind, solar, dry-cooled generation), or hydro-electric generation facilities. The baselines for draft water demand projections are based on the highest county-aggregated historical steam-electric power water use in the most recent five years (2015- 2019). Subsequent demand projections after 2030 are held constant throughout the planning period. The anticipated water use of future facilities listed in state and federal reports is added to the demand projections from the anticipated operation date through 2080. The reported water use of power generation facilities scheduled for retirement in the state and federal reports is subtracted from the baseline or the decade in which they are projected to retire. Annual steam electric water demand is projected to remain constant from the year 2030 to 2080. In 2030, steam electric power generation projections represent approximately 16% of water demand for this Region. By 2080 steam electric is anticipated to require 15% of the region's water demand.

Table 2.11 Steam Electric Water Demand by County (acre-ft)

County	2030	2040	2050	2060	2070	2080
BOWIE	0	0	0	0	0	0
CAMP	0	0	0	0	0	0
CASS	0	0	0	0	0	0
DELTA	0	0	0	0	0	0
FRANKLIN	0	0	0	0	0	0
GREGG	940	940	940	940	940	940
HARRISON	23,145	23,145	23,145	23,145	23,145	23,145
HOPKINS	0	0	0	0	0	0
HUNT	373	373	373	373	373	373
LAMAR	5,706	5,706	5,706	5,706	5,706	5,706
MARION	4,257	4,257	4,257	4,257	4,257	4,257
MORRIS	50	50	50	50	50	50
RAINS	0	0	0	0	0	0
RED	0	0	0	0	0	0
SMITH	0	0	0	0	0	0
TITUS	29,541	29,541	29,541	29,541	29,541	29,541
UPSHUR	0	0	0	0	0	0
VAN ZANDT	0	0	0	0	0	0
WOOD	0	0	0	0	0	0
REGION TOTAL	**64,012**	**64,012**	**64,012**	**64,012**	**64,012**	**64,012**

Table 2.12 Steam Electric Water Demand by River Basin (acre-ft)

River Basin	2030	2040	2050	2060	2070	2080
CYPRESS	33,848	33,848	33,848	33,848	33,848	33,848
NECHES	0	0	0	0	0	0
RED	386	386	386	386	386	386
SABINE	24,458	24,458	24,458	24,458	24,458	24,458
SULPHUR	5,320	5,320	5,320	5,320	5,320	5,320
TRINITY	0	0	0	0	0	0
REGION TOTAL	**64,012**	**64,012**	**64,012**	**64,012**	**64,012**	**64,012**

2.3.2.4 Regional Mining Demand Projections

Per TWDB Guidelines, mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. Projections do not include water use required for the transportation or refining of materials. The TWDB's annual mining water use estimates are comprised of data from both surveyed and non-surveyed entities and are based on the mining study conducted in partnership with the U.S. Geological Survey and the University of Texas Bureau of Economic Geology. The BEG estimated recent mining water use and projected the use across the planning horizon using data collected from trade organizations, government agencies, and other industry representatives. County-level projections were developed as the sum of individual projections for four sub-sector mining categories: oil and gas, aggregates, coal and lignite, and other. Water use estimates are developed through the TWDB's annual Water Use Survey and FracFocus.

Mining water demand represents a very small portion of the regional water demand (about 1%). Annual water demand for mining purposes is anticipated to grow by about 6% for the fifty-year period from 2030 to 2080. Mining water demand is largest in Harrison County

Table 2.13 Mining Water Demand by County (acre-ft)

County	2030	2040	2050	2060	2070	2080
BOWIE	1981	1998	2088	2164	2225	2272
CAMP	0	0	0	0	0	0
CASS	35	35	35	35	35	35
DELTA	0	0	0	0	0	0
FRANKLIN	0	0	0	0	0	0
GREGG	82	82	82	82	82	82
HARRISON	2,691	2,691	2,691	2,691	2,691	2,691
HOPKINS	2	2	2	2	2	2
HUNT	0	0	0	0	0	0
LAMAR	0	0	0	0	0	0
MARION	24	24	24	24	24	24
MORRIS	0	0	0	0	0	0
RAINS	0	0	0	0	0	0
RED	0	0	0	0	0	0
SMITH	0	0	0	0	0	0
TITUS	0	0	0	0	0	0
UPSHUR	139	139	139	139	139	139
VAN ZANDT	6	6	6	6	6	6
WOOD	347	349	351	352	353	353
REGION TOTAL	**5,307**	**5,326**	**5,418**	**5,495**	**5,557**	**5,604**

Table 2.14 Mining Water Demand by Basin (acre-ft)

River Basin	2030	2040	2050	2060	2070	2080
CYPRESS	801	801	801	801	801	801
NECHES	0	0	0	0	0	0
RED	753	760	794	823	846	864
SABINE	2,525	2,527	2,529	2,530	2,531	2,531
SULPHUR	1228	1238	1294	1,341	1,379	1,408
TRINITY	0	0	0	0	0	0
REGION TOTAL	**5,307**	**5,326**	**5,418**	**5,495**	**5,557**	**5,604**

2.3.3 Livestock Demand

Livestock water demand is the water consumed in the production of cattle, hogs, pigs, sheep, goats, chickens and horses.

2.3.3.1 Methodology

Livestock water use was defined as water used in the production of livestock, both for drinking and for cleaning or environmental purposes. The 2020 water demand projections for each county are based on the average of the most recent five years (2016–2019) of water use estimates. Water use estimates are calculated by applying a water use coefficient for each livestock category to county level inventory estimates from the Texas Agricultural Statistics Service. The rate of change for projections from the 2021 Regional Water Plans was then applied to the new base.

2.3.3.2 Regional Livestock Water Demand Projections

Livestock water demand is projected to be approximately 6% of water demand in the North East Texas Region in the year 2030. Livestock water demand is expected to remain relatively constant over the 50-year planning period, with a reduction to 2% of the Region's water demand by 2070. Livestock water demand is spread relatively evenly throughout the region with Hopkins County having the largest demand of approximately 4,253 acre-feet annually. Tables 2.15 and 2.16 present livestock water demand for Region D.

Table 2.15 Livestock Water Demand by County (acre-ft)

County	2030	2040	2050	2060	2070	2080
BOWIE	1,321	1,199	1,028	880	821	821
CAMP	1,448	1,448	1,448	1,448	1,448	1,448
CASS	792	792	792	792	792	792
DELTA	511	511	511	511	511	511
FRANKLIN	1,354	1,354	1,354	1,354	1,354	1,354
GREGG	179	179	179	179	179	179
HARRISON	627	658	690	725	764	764
HOPKINS	4,253	4,253	4,253	4,253	4,253	4,253
HUNT	1,222	1,222	1,222	1,222	1,222	1,222
LAMAR	1,628	1,628	1,628	1,628	1,628	1,628
MARION	169	169	169	169	169	169
MORRIS	586	586	586	586	586	586
RAINS	503	503	503	503	503	503
RED RIVER	1,592	1,592	1,592	1,592	1,592	1,592
SMITH	465	465	465	465	465	465
TITUS	1,173	1,173	1,173	1,173	1,173	1,173
UPSHUR	1,108	1,108	1,108	1,108	1,108	1,108
VAN ZANDT	1,934	1,934	1,934	1,934	1,934	1,934
WOOD	1,670	1,670	1,670	1,670	1,670	1,670
REGION TOTAL	**22,535**	**22,444**	**22,305**	**22,192**	**22,172**	**22,172**

Table 2.16 Livestock Water Demand by River Basin (acre-feet)

River Basin	2030	2040	2050	2060	2070	2080
CYPRESS	5,791	5,809	5,827	5,846	5,868	5,868
NECHES	628	628	628	628	628	628
RED	1,564	1,519	1,456	1,402	1,380	1,380
SABINE	5,511	5,524	5,538	5,554	5,571	5,571
SULPHUR	8,052	7,975	7,867	7,773	7,736	7,736
TRINITY	524	524	524	524	524	524
REGION TOTAL	**22,070**	**21,979**	**21,840**	**21,727**	**21,707**	**21,707**

2.3.4 Irrigation Demand

Per TWDB Guidelines, irrigation water demand projections include the water necessary for irrigation activities, primarily field crops, but also include orchards, pasture, turf grass farms, vineyards, and self-supplied golf courses. Note that for the purposes of regional water planning, irrigation demands account for the amount of water pumped for irrigation, not the water needed or used by the crop or associated with dry-land farming.

2.3.4.1 Methodology

The baseline methodology for the development of irrigation water demand projections is the average of the most recent five-years (2015-2019) of water use estimates held constant between 2030 and 2080. In counties where the total groundwater availability over the planning period is projected to be less than the groundwater-portion of the baseline water demand projections, the draft irrigation water demand projections will begin to decline starting in 2040, or a later decade, commensurate with the decline in the associated groundwater availability.

Annual water use estimates were developed at the county level by applying a calculated evapotranspiration-based "crop water need" estimate to reported irrigated acreage from the Farm Service Agency. These estimates are then adjusted based on surface water release data from the TCEQ and comments from groundwater conservation districts (although none presently exist within Region D), irrigation districts, and river authorities. The adopted projections took into consideration requested adjustments by regional water planning groups based upon required criteria and supporting data. Any economic, technical, and/or water supply-related evidence showing cause for adjustment in the future rate of change in irrigation water use was utilized where available.

2.3.4.2 Regional Irrigation Water Demand Projections

Projected irrigation water demand similarly represents approximately 8% of the projected water demand in the year 2030. Irrigation demand is projected to remain constant over the 50 year planning period.. Irrigation water demand is concentrated in Lamar, Red River, Bowie, Hopkins and Delta Counties. Tables 2.17 and 2.18 present irrigation water demand for Region D.

Table 2.17 Irrigation Water Demand by County (acre-ft)

County	2030	2040	2050	2060	2070	2080
BOWIE	10,067	10,067	10,067	10,067	10,067	10,067
CAMP	5	5	5	5	5	5
CASS	0	0	0	0	0	0
DELTA	3,049	3,049	3,049	3,049	3,049	3,049
FRANKLIN	138	138	138	138	138	138
GREGG	33	33	33	33	33	33
HARRISON	560	560	560	560	560	560
HOPKINS	3,910	3,910	3,910	3,910	3,910	3,910
HUNT	316	316	316	316	316	316
LAMAR	8,095	8,095	8,095	8,095	8,095	8,095
MARION	5	5	5	5	5	5
MORRIS	10	10	10	10	10	10
RAINS	60	60	60	60	60	60
RED	3,783	3,783	3,783	3,783	3,783	3,783
SMITH	311	311	311	311	311	311
TITUS	1,192	1,192	1,192	1,192	1,192	1,192
UPSHUR	143	143	143	143	143	143
VAN ZANDT	406	406	406	406	406	406
WOOD	525	525	525	525	525	525
REGION TOTAL	**32,608**	**32,608**	**32,608**	**32,608**	**32,608**	**32,608**

Table 2.18 Irrigation Water Demand by River Basin (acre-ft)

River Basin	2030	2040	2050	2060	2070	2080
CYPRESS	730	730	730	730	730	730
NECHES	406	406	406	406	406	406
RED	14,094	14,094	14,094	14,094	14,094	14,094
SABINE	1,184	1,184	1,184	1,184	1,184	1,184
SULPHUR	15,873	15,873	15,873	15,873	15,873	15,873
TRINITY	10	10	10	10	10	10
REGION TOTAL	**32,297**	**32,297**	**32,297**	**32,297**	**32,297**	**32,297**

2.3.5 Demands Associated with Major Water Providers by Category of Use

Demands may also be disaggregated based upon the provision of supply from a Major Water Provider (MWP). Table 2.19 and Table 2.20 presents projected demands associated with each MWP in the North East Texas Region by category of water use. Table 2.19 presents the contractual amounts of demand for each MWP customer, aggregated by each MWP in Region D. This provides a reference as to how much demand has been contracted by each MWP. Table 2.20 provides the projected demands from each customer upon the respective MWP, based upon each individual WUG's projected demands as adopted by for the purposes of the 2026 Region D Plan per TWDB guidelines. Note that for MWPs that are also a WUG (denoted as a WUG/SELLER below), the demands presented below represent contractual demands, and thus do not reflect demands from the WUG itself. It should again be noted that Major Water Providers (MWPs) have been designated to be the same as Wholesale Water Providers (WWPs) for the purposes of the 2026 Region D Plan.

Table 2.19 Projected Demands by Major Water Provider in terms of Contract Demand

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Bi County WSC	MWP	Manufacturing	Camp	Cypress	2	2	2	2	2	2
Bi County WSC	MWP	Steam Electric Power	Titus	Cypress	3	3	3	3	3	3
Bright Star Salem SUD	MWP	Municipal	Rains	Sabine	90	90	90	90	90	90
Cash SUD	MWP	Municipal	Hunt	Sabine	67	67	67	67	67	67
Cash SUD	MWP	Municipal	Hunt	Sabine	181	358	582	960	1,603	1,620
Cash SUD	MWP	Municipal	Hunt	Sulphur	369	531	578	802	1,143	1,126
Cash SUD	MWP	Municipal	Hunt	Trinity	0	0	0	0	0	0
Cash SUD	MWP	Municipal	Hunt	Sabine	605	605	605	605	605	605
Cherokee Water Company	MWP	Municipal	Gregg	Sabine	15,659	15,640	15,634	15,600	15,567	15,540
Cherokee Water Company	MWP	Municipal	Harrison	Sabine	341	360	366	400	433	460
Cherokee Water Company	MWP	Steam Electric Power	Gregg	Sabine	2,000	2,000	2,000	2,000	2,000	2,094
Commerce	MWP	Municipal	Delta	Sulphur	74	74	74	74	74	74
Commerce	MWP	Municipal	Hopkins	Sulphur	3	3	3	3	3	3
Commerce	MWP	Municipal	Delta	Sulphur	49	54	47	54	55	55
Commerce	MWP	Municipal	Hunt	Sulphur	586	582	586	580	578	575
Commerce	MWP	Municipal	Hunt	Sulphur	1	1	1	1	1	1
Cooper	MWP	Municipal	Delta	Sulphur	41	42	41	40	38	37
Cooper	MWP	Municipal	Delta	Sulphur	41	42	41	40	38	37
Cooper	MWP	Municipal	Hunt	Sabine	2	3	4	6	10	11
Cooper	MWP	Municipal	Hunt	Sabine	1	1	1	2	3	4
Cooper	MWP	Municipal	Hunt	Sulphur	1	1	1	2	3	4
Cooper	MWP	Municipal	Hunt	Trinity	1	1	1	2	3	4
Cooper	MWP	Municipal	Delta	Sulphur	191	194	196	199	201	102
Cooper	MWP	Municipal	Delta	Sulphur	0	0	0	0	0	102
County-Other, Upshur	WUG Seller	Irrigation	Upshur	Cypress	350	350	350	350	350	350
Emory	MWP	Municipal	Rains	Sabine	773	773	773	773	773	773
Emory	MWP	Municipal	Rains	Sabine	192	188	187	187	188	188
Farmersville	WUG Seller	Municipal	Hunt	Sabine	14	14	19	27	33	47

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Farmersville	WUG Seller	Municipal	Hunt	Sabine	21	17	18	22	29	42
Farmersville	WUG Seller	Municipal	Hunt	Sabine	60	46	50	60	71	98
Farmersville	WUG Seller	Municipal	Hunt	Sabine	3	1	2	1	2	2
Franklin County WD	MWP	Municipal	Franklin	Cypress	2,265	2,219	2,171	2,136	2,103	2,066
Franklin County WD	MWP	Municipal	Franklin	Sulphur	1,194	1,172	1,150	1,136	1,118	1,103
Franklin County WD	MWP	Municipal	Hopkins	Cypress	224	232	237	238	239	240
Franklin County WD	MWP	Municipal	Hopkins	Sulphur	352	365	370	371	373	374
Franklin County WD	MWP	Municipal	Titus	Cypress	131	152	186	207	227	255
Franklin County WD	MWP	Municipal	Titus	Sulphur	96	111	133	149	167	184
Franklin County WD	MWP	Municipal	Wood	Cypress	237	248	253	263	273	279
Franklin County WD	MWP	Municipal	Franklin	Sulphur	3,000	3,000	3,000	3,000	3,000	3,000
Franklin County WD	MWP	Municipal	Franklin	Cypress	454	441	430	423	417	411
Franklin County WD	MWP	Municipal	Wood	Cypress	753	759	764	770	770	775
Franklin County WD	MWP	Municipal	Wood	Sabine	793	800	805	807	812	814
Gladewater	MWP	Municipal	Gregg	Sabine	154	154	154	154	154	54
Gladewater	MWP	Municipal	Smith	Sabine	23	23	23	23	23	23
Gladewater	MWP	Municipal	Upshur	Cypress	84	83	83	83	82	82
Gladewater	MWP	Municipal	Upshur	Sabine	28	29	29	29	30	30
Grand Saline	MWP	Manufacturing	Van Zandt	Sabine	15	15	15	15	14	14
Greenville	MWP	Municipal	Hunt	Sabine	1,129	1,129	1,129	1,129	1,129	1,129
Greenville	MWP	Municipal	Hunt	Sabine	806	806	806	806	806	806
Greenville	MWP	Manufacturing	Hunt	Sabine	85	87	89	94	91	103
Greenville	MWP	Manufacturing	Hunt	Sabine	712	878	1,057	1,225	1,347	1,521
Greenville	MWP	Municipal	Hunt	Sabine	1,064	1,062	1,060	1,059	1,062	1,061
Greenville	MWP	Municipal	Hunt	Sulphur	65	67	69	70	67	68
Greenville	MWP	Steam Electric Power	Hunt	Sabine	373	373	373	373	373	373
Hooks	WUG Seller	Municipal	Bowie	Red	201	199	196	194	193	193
Hughes Springs	MWP	Municipal	Cass	Cypress	54	55	57	58	60	61

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Hughes Springs	MWP	Municipal	Morris	Cypress	38	37	35	34	32	31
Kilgore	MWP	Municipal	Gregg	Cypress	25	27	30	34	36	37
Kilgore	MWP	Municipal	Gregg	Sabine	596	636	700	774	864	863
Kilgore	MWP	Municipal	Gregg	Sabine	37	39	41	45	49	48
Lamar County WSD	MWP	Municipal	Red River	Red	94	92	92	91	92	92
Lamar County WSD	MWP	Municipal	Red River	Sulphur	124	121	120	120	119	119
Lamar County WSD	MWP	Municipal	Lamar	Sulphur	230	245	245	245	245	245
Lamar County WSD	MWP	Municipal	Lamar	Red	24	25	24	24	24	24
Lamar County WSD	MWP	Municipal	Lamar	Sulphur	256	260	259	257	255	255
Lamar County WSD	MWP	Municipal	Red River	Red	76	75	75	74	70	70
Lamar County WSD	MWP	Municipal	Red River	Sulphur	174	172	172	173	177	177
Lamar County WSD	MWP	Manufacturing	Lamar	Red	900	941	976	1,042	1,077	1,077
Lamar County WSD	MWP	Municipal	Red River	Red	323	323	323	323	323	323
Lamar County WSD	MWP	Municipal	Lamar	Red	47	49	53	57	61	62
Lamar County WSD	MWP	Municipal	Lamar	Sulphur	652	705	761	816	874	873
Longview	MWP	Municipal	Gregg	Cypress	2	2	2	2	2	2
Longview	MWP	Municipal	Gregg	Sabine	48	48	48	48	48	48
Longview	MWP	Municipal	Gregg	Sabine	528	532	537	544	533	535
Longview	MWP	Municipal	Gregg	Sabine	536	541	546	550	575	577
Longview	MWP	Municipal	Harrison	Cypress	37	37	37	37	37	37
Longview	MWP	Municipal	Harrison	Cypress	144	144	144	144	144	144
Longview	MWP	Municipal	Harrison	Cypress	385	385	385	385	386	386
Longview	MWP	Municipal	Harrison	Sabine	157	157	157	157	157	157
Longview	MWP	Municipal	Harrison	Sabine	602	602	602	602	602	602
Longview	MWP	Municipal	Harrison	Sabine	1,615	1,615	1,615	1,615	1,614	1,614
Longview	MWP	Municipal	Harrison	Sabine	689	689	689	689	689	689
Longview	MWP	Municipal	Harrison	Sabine	416	416	416	416	416	416
Longview	MWP	Manufacturing	Gregg	Sabine	1,092	1,094	1,094	1,094	1,094	1,094
Longview	MWP	Manufacturing	Harrison	Sabine	7,726	7,726	7,726	7,726	7,726	7,726
Longview	MWP	Manufacturing	Harrison	Sabine	618	618	618	618	618	618
Longview	MWP	Steam Electric Power	Harrison	Sabine	6,161	6,161	6,161	6,161	6,161	6,161
Longview	MWP	Municipal	Gregg	Sabine	5,600	5,600	5,600	5,600	5,600	5,600

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Manufacturing, Cass	WUG Seller	Municipal	Cass	Cypress	2,319	2,321	2,320	2,320	2,319	2,319
Manufacturing, Cass	WUG Seller	Municipal	Cass	Sulphur	9	7	8	8	9	9
Manufacturing, Cass	WUG Seller	Municipal	Cass	Sulphur	44	44	44	44	44	44
Marshall	MWP	Municipal	Harrison	Cypress	278	280	281	283	285	284
Marshall	MWP	Municipal	Harrison	Sabine	45	43	42	40	38	39
Marshall	MWP	Municipal	Harrison	Sabine	69	71	73	73	74	75
Marshall	MWP	Manufacturing	Harrison	Sabine	2,000	2,000	2,000	2,000	2,000	2,000
Mount Pleasant	MWP	Municipal	Franklin	Sulphur	14	16	17	17	17	17
Mount Pleasant	MWP	Municipal	Titus	Cypress	344	372	388	405	424	445
Mount Pleasant	MWP	Municipal	Titus	Sulphur	344	372	388	405	424	445
Mount Pleasant	MWP	Manufacturing	Titus	Cypress	2,795	2,859	2,922	2,933	3,067	3,101
Mount Pleasant	MWP	Manufacturing	Titus	Cypress	550	550	550	550	550	550
Mount Pleasant	MWP	Municipal	Morris	Cypress	155	185	200	216	224	219
Mount Pleasant	MWP	Municipal	Titus	Cypress	1,002	1,334	1,676	2,016	2,362	2,715
Mount Pleasant	MWP	Municipal	Titus	Sulphur	570	760	953	1,148	1,345	1,546
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	7	9	10	12	13	14
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	9	10	10	11	11	12
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	25	26	27	27	27	29
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	1	1	1	2	2	2
North Texas MWD	WUG Seller	Municipal	Van Zandt	Sabine	2	2	3	3	3	3
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	84	121	156	192	218	244
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	124	139	155	169	187	207
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	349	382	411	434	467	495

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	12	14	14	16	15	18
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	263	292	398	460	475	532
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	392	343	395	402	405	449
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	1,096	938	1,047	1,037	1,008	1,078
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	39	33	35	37	35	37
North Texas MWD	WUG Seller	Municipal	Hopkins	Sabine	2	3	4	6	15	17
North Texas MWD	WUG Seller	Municipal	Hopkins	Sabine	3	4	4	5	13	14
North Texas MWD	WUG Seller	Municipal	Hopkins	Sabine	8	9	10	12	30	32
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	177	266	357	448	406	400
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	262	310	353	391	349	339
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	736	845	937	1,009	869	819
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	26	30	32	35	30	28
North Texas MWD	WUG Seller	Municipal	Rains	Sabine	8	12	17	24	67	70
North Texas MWD	WUG Seller	Municipal	Rains	Sabine	12	14	17	22	57	63
North Texas MWD	WUG Seller	Municipal	Rains	Sabine	35	38	46	57	140	150
North Texas MWD	WUG Seller	Municipal	Rains	Sabine	1	2	2	2	5	5
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	4	7	9	11	13	14

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	8	7	9	9	11	12
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	20	22	24	25	26	28
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	1	1	1	2	2	2
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	91	162	236	318	385	454
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	135	188	233	278	331	386
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	379	513	621	717	821	924
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	13	18	21	25	28	32
Northeast Texas MWD	MWP	Municipal	Cass	Cypress	0	0	0	0	0	0
Northeast Texas MWD	MWP	Municipal	Cass	Cypress	0	0	0	0	0	0
Northeast Texas MWD	MWP	Municipal	Cass	Cypress	302	302	302	302	302	302
Northeast Texas MWD	MWP	Municipal	Cass	Cypress	0	0	0	0	0	0
Northeast Texas MWD	MWP	Municipal	Marion	Cypress	828	828	828	828	828	828
Northeast Texas MWD	MWP	Municipal	Morris	Cypress	7,375	7,375	7,375	7,375	7,375	7,375
Northeast Texas MWD	MWP	Municipal	Harrison	Cypress	50	48	44	42	40	38
Northeast Texas MWD	MWP	Municipal	Marion	Cypress	60	46	36	29	22	17
Northeast Texas MWD	MWP	Municipal	Upshur	Cypress	629	645	658	668	677	684
Northeast Texas MWD	MWP	Municipal	Harrison	Cypress	256	265	273	280	286	294
Northeast Texas MWD	MWP	Municipal	Marion	Cypress	59	50	42	35	29	21
Northeast Texas MWD	MWP	Municipal	Cass	Cypress	3,058	3,058	3,058	3,058	3,058	3,058
Northeast Texas MWD	MWP	Municipal	Marion	Cypress	7,031	7,031	7,031	7,031	7,031	7,031
Northeast Texas MWD	MWP	Municipal	Morris	Cypress	3,482	3,482	3,482	3,482	3,482	3,482
Northeast Texas MWD	MWP	Municipal	Gregg	Sabine	18,994	18,916	18,891	18,778	18,673	18,595
Northeast Texas MWD	MWP	Municipal	Harrison	Sabine	1,006	1,084	1,109	1,222	1,327	1,405
Northeast Texas MWD	MWP	Manufacturing	Camp	Cypress	100	100	100	100	100	100
Northeast Texas MWD	MWP	Manufacturing	Morris	Cypress	13,037	13,037	13,037	13,037	13,037	13,037
Northeast Texas MWD	MWP	Manufacturing	Morris	Cypress	32,400	32,400	32,400	32,400	32,400	32,400
Northeast Texas MWD	MWP	Municipal	Harrison	Cypress	1,591	1,591	1,592	1,592	1,592	1,592

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Northeast Texas MWD	MWP	Municipal	Harrison	Sabine	7,409	7,409	7,408	7,408	7,408	7,408
Northeast Texas MWD	MWP	Municipal	Cass	Cypress	97	88	84	77	69	67
Northeast Texas MWD	MWP	Municipal	Marion	Cypress	799	808	812	819	827	829
Northeast Texas MWD	MWP	Municipal	Upshur	Cypress	1,869	1,869	1,869	1,869	1,869	1,869
Northeast Texas MWD	MWP	Municipal	Camp	Cypress	12,588	12,588	12,588	12,588	12,588	12,588
Northeast Texas MWD	MWP	Steam Electric Power	Harrison	Sabine	18,000	18,000	18,000	18,000	18,000	18,000
Northeast Texas MWD	MWP	Steam Electric Power	Marion	Cypress	6,668	6,668	6,668	6,668	6,668	6,668
Northeast Texas MWD	MWP	Steam Electric Power	Titus	Cypress	5,000	4,560	4,120	3,680	3,240	2,800
Northeast Texas MWD	MWP	Steam Electric Power	Titus	Cypress	14,400	14,400	14,400	14,400	14,400	14,400
Northeast Texas MWD	MWP	Steam Electric Power	Titus	Cypress	2,900	2,620	2,340	2,060	1,780	1,500
Northeast Texas MWD	MWP	Municipal	Gregg	Cypress	1,279	1,213	1,204	1,161	1,134	1,077
Northeast Texas MWD	MWP	Municipal	Gregg	Sabine	382	362	359	343	331	313
Northeast Texas MWD	MWP	Municipal	Harrison	Cypress	602	688	700	759	797	873
Paris	MWP	Municipal	Lamar	Red	9,617	9,617	9,617	9,619	9,619	9,616
Paris	MWP	Municipal	Lamar	Sulphur	3,825	3,825	3,825	3,823	3,823	3,826
Paris	MWP	Manufacturing	Lamar	Sulphur	5,340	5,580	5,787	6,183	6,386	6,386
Paris	MWP	Steam Electric Power	Lamar	Red	606	606	606	606	606	606
Paris	MWP	Steam Electric Power	Lamar	Sulphur	8,355	8,355	8,355	8,355	8,355	8,355
Point	MWP	Manufacturing	Rains	Sabine	12	12	12	12	12	12
Riverbend Water Resources District	MWP	Municipal	Bowie	Red	17	17	17	17	17	17
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	93	93	93	93	93	93
Riverbend Water Resources District	MWP	Municipal	Bowie	Red	260	271	271	271	271	271
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	260	271	271	271	271	271

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Riverbend Water Resources District	MWP	Municipal	Red River	Red	53	54	55	55	55	56
Riverbend Water Resources District	MWP	Municipal	Red River	Sulphur	53	54	55	55	55	56
Riverbend Water Resources District	MWP	Municipal	Bowie	Red	53	53	52	54	54	54
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	239	236	239	240	244	244
Riverbend Water Resources District	MWP	Municipal	Bowie	Red	278	276	271	269	269	269
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	552	552	552	552	552	552
Riverbend Water Resources District	MWP	Manufacturing	Bowie	Red	29,964	33,255	37,368	41,481	50,407	50,407
Riverbend Water Resources District	MWP	Manufacturing	Bowie	Sulphur	29,964	33,255	37,368	41,481	50,407	50,407
Riverbend Water Resources District	MWP	Manufacturing	Cass	Cypress	48	49	47	49	50	48
Riverbend Water Resources District	MWP	Manufacturing	Cass	Sulphur	122,575	122,567	122,568	122,566	122,565	122,567
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	226	241	238	237	237	237
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	368	368	368	368	368	368
Riverbend Water Resources District	MWP	Municipal	Bowie	Red	791	790	792	790	790	791
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	889	890	888	890	890	889
Riverbend Water Resources District	MWP	Municipal	Red River	Red	108	108	108	108	108	108
Riverbend Water Resources District	MWP	Municipal	Red River	Sulphur	108	108	108	108	108	108
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	55	55	55	55	55	55

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Riverbend Water Resources District	MWP	Municipal	Bowie	Red	1,276	1,308	1,350	1,407	1,470	1,470
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	6,006	6,151	6,356	6,621	6,910	6,910
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	750	802	861	932	931	931
Sabine River Authority	MWP	Municipal	Rains	Sabine	840	840	840	840	840	840
Sabine River Authority	MWP	Municipal	Hopkins	Sabine	52	55	50	58	96	49
Sabine River Authority	MWP	Municipal	Hunt	Sabine	0	0	0	0	0	2,550
Sabine River Authority	MWP	Municipal	Hunt	Sabine	4,793	4,694	4,577	4,429	3,876	1,560
Sabine River Authority	MWP	Municipal	Rains	Sabine	226	217	222	247	671	276
Sabine River Authority	MWP	Municipal	Hunt	Sabine	1,863	1,860	1,858	1,854	1,849	1,845
Sabine River Authority	MWP	Municipal	Van Zandt	Sabine	377	380	382	386	391	395
Sabine River Authority	MWP	Municipal	Hunt	Sulphur	8,396	8,396	8,396	8,396	8,396	8,396
Sabine River Authority	MWP	Municipal	Van Zandt	Sabine	840	840	840	840	840	840
Sabine River Authority	MWP	Municipal	Rains	Sabine	3,229	3,229	3,229	3,229	3,229	3,229
Sabine River Authority	MWP	Municipal	Hunt	Sabine	21,283	21,283	21,283	21,283	21,283	21,283
Sabine River Authority	MWP	Irrigation	Van Zandt	Neches	184	184	184	184	184	184
Sabine River Authority	MWP	Municipal	Gregg	Sabine	5,184	5,191	5,197	5,202	5,246	5,303
Sabine River Authority	MWP	Municipal	Gregg	Sabine	19,598	19,577	19,570	19,532	19,493	19,462
Sabine River Authority	MWP	Municipal	Harrison	Sabine	402	423	430	468	507	538
Sabine River Authority	MWP	Municipal	Hunt	Sabine	87	72	61	51	42	35
Sabine River Authority	MWP	Municipal	Van Zandt	Sabine	682	708	714	722	731	731
Sabine River Authority	MWP	Municipal	Van Zandt	Trinity	1,395	1,386	1,391	1,395	1,398	1,407
Sabine River Authority	MWP	Manufacturing	Harrison	Sabine	3,500	3,500	3,500	3,500	3,500	3,500
Sabine River Authority	MWP	Municipal	Rains	Sabine	448	448	448	448	448	448
Sabine River Authority	MWP	Municipal	Wood	Sabine	1,120	1,120	1,120	1,120	1,120	1,120
Sabine River Authority	MWP	Municipal	Van Zandt	Sabine	1,680	1,680	1,680	1,680	1,680	1,680
Sabine River Authority	MWP	Municipal	Hunt	Sabine	1,120	1,120	1,120	1,120	1,120	1,120

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Sabine River Authority	MWP	Municipal	Van Zandt	Sabine	1,044	1,046	1,048	1,049	1,050	1,051
Sabine River Authority	MWP	Municipal	Van Zandt	Trinity	1,196	1,194	1,192	1,191	1,190	1,189
Sulphur River MWD	MWP	Municipal	Delta	Sulphur	1,072	1,072	1,072	1,072	1,072	1,072
Sulphur River MWD	MWP	Municipal	Hopkins	Sulphur	13,738	13,411	13,085	12,758	12,431	12,104
Sulphur Springs	MWP	Municipal	Hopkins	Sabine	78	83	86	91	97	97
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	77	80	84	90	95	95
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	77	77	77	77	77	77
Sulphur Springs	MWP	Municipal	Hopkins	Sabine	56	53	16	0	0	0
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	27	26	8	0	0	0
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	111	115	121	128	135	135
Sulphur Springs	MWP	Livestock	Hopkins	Cypress	65	71	71	76	78	78
Sulphur Springs	MWP	Livestock	Hopkins	Sabine	323	347	349	373	383	383
Sulphur Springs	MWP	Livestock	Hopkins	Sulphur	1,163	1,302	1,310	1,465	1,535	1,535
Sulphur Springs	MWP	Manufacturing	Hopkins	Sulphur	1,561	1,592	1,611	1,701	1,802	1,802
Sulphur Springs	MWP	Manufacturing	Hopkins	Sulphur	269	323	376	425	473	473
Sulphur Springs	MWP	Manufacturing	Hunt	Sabine	50	50	50	50	50	50
Sulphur Springs	MWP	Municipal	Hopkins	Sabine	185	185	186	186	185	185
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	38	38	37	37	38	38
Sulphur Springs	MWP	Mining	Hopkins	Sabine	200	220	240	261	285	310
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	921	921	921	921	921	921
Sulphur Springs	MWP	Municipal	Hopkins	Sabine	31	33	33	35	38	38
Sulphur Springs	MWP	Municipal	Hopkins	Sabine	31	32	34	37	38	38
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	25	26	28	30	31	31
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	25	27	28	29	31	31
Tarrant Regional WD	MWP	Municipal	Van Zandt	Trinity	67	76	84	92	100	109
Terrell	WUG Seller	Municipal	Hunt	Sabine	35	50	63	75	65	67
Terrell	WUG Seller	Municipal	Hunt	Sabine	51	57	63	66	56	57
Terrell	WUG Seller	Municipal	Hunt	Sabine	145	157	166	171	138	137

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Terrell	WUG Seller	Municipal	Hunt	Sabine	5	6	5	5	5	5
Texarkana	MWP	Municipal	Bowie	Red	142,070	142,320	142,069	142,179	142,292	142,067
Texarkana	MWP	Municipal	Bowie	Sulphur	37,930	37,680	37,931	37,821	37,708	37,933
Titus County FWD 1	MWP	Municipal	Titus	Cypress	30,000	30,000	30,000	30,000	30,000	30,000
Titus County FWD 1	MWP	Steam Electric Power	Titus	Cypress	10,000	10,000	10,000	10,000	10,000	10,000
Tyler	WUG Seller	Manufacturing	Smith	Sabine	7	6	9	10	9	9
Tyler	WUG Seller	Manufacturing	Smith	Sabine	7	6	9	7	9	8
Upper Neches River Municipal Water Authority	WUG Seller	Municipal	Smith	Sabine	449	360	299	253	209	172
White Oak	MWP	Municipal	Gregg	Sabine	50	50	50	50	50	50
White Oak	MWP	Municipal	Upshur	Cypress	30	29	29	29	29	29
White Oak	MWP	Municipal	Upshur	Sabine	10	11	11	11	11	11

Table 2.20 Projected Demands by Major Water Provider in terms of Sale Amount

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Bi County WSC	MWP	Manufacturing	Camp	Cypress	2	2	2	2	2	2
Bi County WSC	MWP	Steam Electric Power	Titus	Cypress	3	3	3	3	3	3
Bright Star Salem SUD	MWP	Municipal	Rains	Sabine	90	90	90	90	90	90
Cash SUD	MWP	Municipal	Hunt	Sabine	67	67	67	67	67	67
Cash SUD	MWP	Municipal	Hunt	Sabine	123	243	396	654	1,114	1,126
Cash SUD	MWP	Municipal	Hunt	Sulphur	251	361	394	546	794	782
Cash SUD	MWP	Municipal	Hunt	Trinity	0	0	0	0	0	0
Cash SUD	MWP	Municipal	Hunt	Sabine	240	258	276	292	307	322
Cherokee Water Company	MWP	Municipal	Gregg	Sabine	15,659	15,640	15,634	15,600	15,567	15,540
Cherokee Water Company	MWP	Municipal	Harrison	Sabine	341	360	366	400	433	460
Cherokee Water Company	MWP	Steam Electric Power	Gregg	Sabine	2,000	2,000	2,000	2,000	2,000	2,094
Commerce	MWP	Municipal	Delta	Sulphur	74	74	74	74	74	74
Commerce	MWP	Municipal	Hopkins	Sulphur	3	3	3	3	3	3
Commerce	MWP	Municipal	Delta	Sulphur	11	12	10	12	12	12
Commerce	MWP	Municipal	Hunt	Sulphur	130	129	130	129	128	128
Commerce	MWP	Municipal	Hunt	Sulphur	1	1	1	1	1	1
Cooper	MWP	Municipal	Delta	Sulphur	0	0	0	0	0	0
Cooper	MWP	Municipal	Delta	Sulphur	0	0	0	0	0	0
Cooper	MWP	Municipal	Hunt	Sabine	0	0	0	0	0	0
Cooper	MWP	Municipal	Hunt	Sabine	0	0	0	0	0	0
Cooper	MWP	Municipal	Hunt	Sulphur	0	0	0	0	0	0
Cooper	MWP	Municipal	Hunt	Trinity	0	0	0	0	0	0
Cooper	MWP	Municipal	Delta	Sulphur	191	194	196	199	179	0
Cooper	MWP	Municipal	Delta	Sulphur	0	0	0	0	0	0
County-Other, Upshur	WUG Seller	Irrigation	Upshur	Cypress	350	350	350	350	350	350
Emory	MWP	Municipal	Rains	Sabine	246	247	247	248	248	248
Emory	MWP	Municipal	Rains	Sabine	192	188	187	187	188	188
Farmersville	WUG Seller	Municipal	Hunt	Sabine	25	26	31	34	30	33

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Farmersville	WUG Seller	Municipal	Hunt	Sabine	39	31	31	28	27	29
Farmersville	WUG Seller	Municipal	Hunt	Sabine	110	84	84	76	66	68
Farmersville	WUG Seller	Municipal	Hunt	Sabine	5	3	3	2	2	2
Franklin County WD	MWP	Municipal	Franklin	Cypress	1,916	1,795	1,676	1,569	1,467	1,365
Franklin County WD	MWP	Municipal	Franklin	Sulphur	1,010	948	888	834	780	729
Franklin County WD	MWP	Municipal	Hopkins	Cypress	190	188	183	175	167	159
Franklin County WD	MWP	Municipal	Hopkins	Sulphur	298	296	285	273	260	247
Franklin County WD	MWP	Municipal	Titus	Cypress	111	123	144	152	159	168
Franklin County WD	MWP	Municipal	Titus	Sulphur	81	90	102	109	116	121
Franklin County WD	MWP	Municipal	Wood	Cypress	200	200	195	193	190	184
Franklin County WD	MWP	Municipal	Franklin	Sulphur	2,538	2,426	2,315	2,204	2,093	1,982
Franklin County WD	MWP	Municipal	Franklin	Cypress	384	357	332	311	291	271
Franklin County WD	MWP	Municipal	Wood	Cypress	637	614	590	565	537	512
Franklin County WD	MWP	Municipal	Wood	Sabine	671	647	622	593	567	537
Gladewater	MWP	Municipal	Gregg	Sabine	154	154	154	154	154	54
Gladewater	MWP	Municipal	Smith	Sabine	23	23	23	23	23	23
Gladewater	MWP	Municipal	Upshur	Cypress	84	83	83	83	82	82
Gladewater	MWP	Municipal	Upshur	Sabine	28	29	29	29	30	30
Grand Saline	MWP	Manufacturing	Van Zandt	Sabine	15	15	15	15	14	14
Greenville	MWP	Municipal	Hunt	Sabine	186	201	242	309	319	319
Greenville	MWP	Municipal	Hunt	Sabine	806	806	806	806	806	734
Greenville	MWP	Manufacturing	Hunt	Sabine	103	103	103	103	103	103
Greenville	MWP	Manufacturing	Hunt	Sabine	862	1,043	1,216	1,335	1,521	1,521
Greenville	MWP	Municipal	Hunt	Sabine	164	207	263	335	428	545
Greenville	MWP	Municipal	Hunt	Sulphur	10	13	17	22	27	35
Greenville	MWP	Steam Electric Power	Hunt	Sabine	373	373	373	373	373	373
Hooks	WUG Seller	Municipal	Bowie	Red	0	0	0	0	0	0
Hughes Springs	MWP	Municipal	Cass	Cypress	54	55	57	58	60	61
Hughes Springs	MWP	Municipal	Morris	Cypress	38	37	35	34	32	31

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Kilgore	MWP	Municipal	Gregg	Cypress	25	27	30	34	36	37
Kilgore	MWP	Municipal	Gregg	Sabine	596	636	700	774	864	863
Kilgore	MWP	Municipal	Gregg	Sabine	37	39	41	45	49	48
Lamar County WSD	MWP	Municipal	Red River	Red	94	92	92	91	92	92
Lamar County WSD	MWP	Municipal	Red River	Sulphur	124	121	120	120	119	119
Lamar County WSD	MWP	Municipal	Lamar	Sulphur	230	245	245	245	245	245
Lamar County WSD	MWP	Municipal	Lamar	Red	24	25	24	24	24	24
Lamar County WSD	MWP	Municipal	Lamar	Sulphur	256	260	259	257	255	255
Lamar County WSD	MWP	Municipal	Red River	Red	76	75	75	74	70	70
Lamar County WSD	MWP	Municipal	Red River	Sulphur	174	172	172	173	177	177
Lamar County WSD	MWP	Manufacturing	Lamar	Red	900	941	976	1,042	1,077	1,077
Lamar County WSD	MWP	Municipal	Red River	Red	184	184	184	184	184	184
Lamar County WSD	MWP	Municipal	Lamar	Red	47	49	53	57	61	62
Lamar County WSD	MWP	Municipal	Lamar	Sulphur	652	705	761	816	874	873
Longview	MWP	Municipal	Gregg	Cypress	2	2	2	2	2	2
Longview	MWP	Municipal	Gregg	Sabine	48	48	48	48	48	48
Longview	MWP	Municipal	Gregg	Sabine	203	205	206	209	205	205
Longview	MWP	Municipal	Gregg	Sabine	206	208	210	212	221	222
Longview	MWP	Municipal	Harrison	Cypress	37	37	37	37	37	37
Longview	MWP	Municipal	Harrison	Cypress	144	144	144	144	144	144
Longview	MWP	Municipal	Harrison	Cypress	385	385	385	385	386	386
Longview	MWP	Municipal	Harrison	Sabine	157	157	157	157	157	157
Longview	MWP	Municipal	Harrison	Sabine	602	602	602	602	602	602
Longview	MWP	Municipal	Harrison	Sabine	1,615	1,615	1,615	1,615	1,614	1,614
Longview	MWP	Municipal	Harrison	Sabine	553	553	553	553	553	553
Longview	MWP	Municipal	Harrison	Sabine	334	334	334	334	334	334
Longview	MWP	Manufacturing	Gregg	Sabine	1,092	1,092	1,092	1,092	1,092	1,092
Longview	MWP	Manufacturing	Harrison	Sabine	5,004	5,004	5,004	5,004	5,004	5,004
Longview	MWP	Manufacturing	Harrison	Sabine	400	400	400	400	400	400
Longview	MWP	Steam Electric Power	Harrison	Sabine	6,161	6,161	6,161	6,161	6,161	6,161
Longview	MWP	Municipal	Gregg	Sabine	2,680	2,680	2,680	2,680	2,680	2,680
Manufacturing, Cass	WUG Seller	Municipal	Cass	Cypress	2,319	2,321	2,320	2,320	2,319	2,319

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Manufacturing, Cass	WUG Seller	Municipal	Cass	Sulphur	9	7	8	8	9	9
Manufacturing, Cass	WUG Seller	Municipal	Cass	Sulphur	44	44	44	44	44	44
Marshall	MWP	Municipal	Harrison	Cypress	278	280	281	283	285	284
Marshall	MWP	Municipal	Harrison	Sabine	45	43	42	40	38	39
Marshall	MWP	Municipal	Harrison	Sabine	69	71	73	73	74	75
Marshall	MWP	Manufacturing	Harrison	Sabine	2,000	2,000	2,000	2,000	2,000	2,000
Mount Pleasant	MWP	Municipal	Franklin	Sulphur	14	16	17	17	17	17
Mount Pleasant	MWP	Municipal	Titus	Cypress	344	372	388	405	424	445
Mount Pleasant	MWP	Municipal	Titus	Sulphur	344	372	388	405	424	445
Mount Pleasant	MWP	Manufacturing	Titus	Cypress	2,795	2,859	2,922	2,933	3,067	3,101
Mount Pleasant	MWP	Manufacturing	Titus	Cypress	550	550	550	550	550	550
Mount Pleasant	MWP	Municipal	Morris	Cypress	155	151	142	140	138	130
Mount Pleasant	MWP	Municipal	Titus	Cypress	1,002	1,088	1,191	1,312	1,453	1,606
Mount Pleasant	MWP	Municipal	Titus	Sulphur	570	620	677	747	827	914
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	6	7	7	8	8	8
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	8	8	7	7	7	7
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	23	20	19	17	16	16
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	1	1	1	1	1	1
North Texas MWD	WUG Seller	Municipal	Van Zandt	Sabine	2	2	2	2	2	2
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	76	96	110	124	130	139
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	112	111	109	109	112	118
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	316	304	290	280	279	282
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	11	11	10	10	9	10

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	239	233	280	297	284	304
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	356	273	278	259	243	256
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	995	747	738	668	603	615
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	35	26	25	24	21	21
North Texas MWD	WUG Seller	Municipal	Hopkins	Sabine	1	2	2	2	4	5
North Texas MWD	WUG Seller	Municipal	Hopkins	Sabine	2	2	2	1	3	4
North Texas MWD	WUG Seller	Municipal	Hopkins	Sabine	6	4	4	4	8	8
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	124	133	132	131	110	104
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	183	154	131	114	95	88
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	514	422	348	295	236	212
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	18	15	12	10	8	7
North Texas MWD	WUG Seller	Municipal	Rains	Sabine	6	6	6	7	18	18
North Texas MWD	WUG Seller	Municipal	Rains	Sabine	9	7	6	6	16	16
North Texas MWD	WUG Seller	Municipal	Rains	Sabine	24	19	17	17	38	39
North Texas MWD	WUG Seller	Municipal	Rains	Sabine	1	1	1	1	1	1
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	4	6	6	7	8	8
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	7	6	6	6	7	7

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	18	18	17	16	16	16
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	1	1	1	1	1	1
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	83	129	166	205	230	259
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	123	150	164	179	198	220
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	344	409	437	462	491	527
North Texas MWD	WUG Seller	Municipal	Hunt	Sabine	12	14	15	16	17	18
Northeast Texas MWD	MWP	Municipal	Cass	Cypress	0	0	0	0	0	0
Northeast Texas MWD	MWP	Municipal	Cass	Cypress	0	0	0	0	0	0
Northeast Texas MWD	MWP	Municipal	Cass	Cypress	302	302	302	302	302	302
Northeast Texas MWD	MWP	Municipal	Cass	Cypress	0	0	0	0	0	0
Northeast Texas MWD	MWP	Municipal	Marion	Cypress	169	169	169	169	169	169
Northeast Texas MWD	MWP	Municipal	Morris	Cypress	1,582	1,582	1,582	1,582	1,582	1,582
Northeast Texas MWD	MWP	Municipal	Harrison	Cypress	40	39	36	34	32	30
Northeast Texas MWD	MWP	Municipal	Marion	Cypress	48	37	29	23	18	14
Northeast Texas MWD	MWP	Municipal	Upshur	Cypress	507	519	530	538	545	551
Northeast Texas MWD	MWP	Municipal	Harrison	Cypress	55	57	59	60	62	63
Northeast Texas MWD	MWP	Municipal	Marion	Cypress	13	11	9	8	6	5
Northeast Texas MWD	MWP	Municipal	Cass	Cypress	656	656	656	656	656	656
Northeast Texas MWD	MWP	Municipal	Marion	Cypress	1,509	1,509	1,509	1,509	1,509	1,509
Northeast Texas MWD	MWP	Municipal	Morris	Cypress	747	747	747	747	747	747
Northeast Texas MWD	MWP	Municipal	Gregg	Sabine	18,994	18,916	18,891	18,778	18,673	18,595
Northeast Texas MWD	MWP	Municipal	Harrison	Sabine	1,006	1,084	1,109	1,222	1,327	1,405
Northeast Texas MWD	MWP	Manufacturing	Camp	Cypress	0	0	0	0	0	0
Northeast Texas MWD	MWP	Manufacturing	Morris	Cypress	13,037	13,037	13,037	13,037	13,037	13,037
Northeast Texas MWD	MWP	Manufacturing	Morris	Cypress	32,400	32,400	32,400	32,400	32,400	32,400
Northeast Texas MWD	MWP	Municipal	Harrison	Cypress	1,591	1,591	1,592	1,592	1,592	1,592
Northeast Texas MWD	MWP	Municipal	Harrison	Sabine	7,409	7,409	7,408	7,408	7,408	7,408
Northeast Texas MWD	MWP	Municipal	Cass	Cypress	97	88	84	77	69	67

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Northeast Texas MWD	MWP	Municipal	Marion	Cypress	799	808	812	819	827	829
Northeast Texas MWD	MWP	Municipal	Upshur	Cypress	1,504	1,504	1,504	1,504	1,504	1,504
Northeast Texas MWD	MWP	Municipal	Camp	Cypress	0	0	0	0	0	0
Northeast Texas MWD	MWP	Steam Electric Power	Harrison	Sabine	18,000	18,000	18,000	18,000	18,000	18,000
Northeast Texas MWD	MWP	Steam Electric Power	Marion	Cypress	6,668	6,668	6,668	6,668	6,668	6,668
Northeast Texas MWD	MWP	Steam Electric Power	Titus	Cypress	5,000	4,560	4,120	3,680	3,240	2,800
Northeast Texas MWD	MWP	Steam Electric Power	Titus	Cypress	14,400	14,400	14,400	14,400	14,400	14,400
Northeast Texas MWD	MWP	Steam Electric Power	Titus	Cypress	2,900	2,620	2,340	2,060	1,780	1,500
Northeast Texas MWD	MWP	Municipal	Gregg	Cypress	1,030	977	969	935	913	867
Northeast Texas MWD	MWP	Municipal	Gregg	Sabine	308	291	289	276	267	252
Northeast Texas MWD	MWP	Municipal	Harrison	Cypress	484	554	563	611	642	703
Paris	MWP	Municipal	Lamar	Red	9,617	9,617	9,617	9,619	9,619	9,616
Paris	MWP	Municipal	Lamar	Sulphur	3,825	3,825	3,825	3,823	3,823	3,826
Paris	MWP	Manufacturing	Lamar	Sulphur	5,340	5,580	5,762	5,780	5,797	5,815
Paris	MWP	Steam Electric Power	Lamar	Red	606	606	606	606	606	606
Paris	MWP	Steam Electric Power	Lamar	Sulphur	8,355	8,355	8,355	8,355	8,355	8,355
Point	MWP	Manufacturing	Rains	Sabine	12	12	12	12	12	12
Riverbend Water Resources District	MWP	Municipal	Bowie	Red	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Bowie	Red	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Red River	Red	0	0	0	0	0	0

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Riverbend Water Resources District	MWP	Municipal	Red River	Sulphur	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Bowie	Red	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Bowie	Red	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Manufacturing	Bowie	Red	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Manufacturing	Bowie	Sulphur	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Manufacturing	Cass	Cypress	48	49	47	49	50	48
Riverbend Water Resources District	MWP	Manufacturing	Cass	Sulphur	122,575	122,567	122,568	122,566	122,565	122,567
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Bowie	Red	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Red River	Red	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Red River	Sulphur	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Bowie	Red	0	0	0	0	0	0

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	0	0	0	0	0	0
Riverbend Water Resources District	MWP	Municipal	Bowie	Sulphur	0	0	0	0	0	0
Sabine River Authority	MWP	Municipal	Rains	Sabine	354	758	750	742	734	725
Sabine River Authority	MWP	Municipal	Hopkins	Sabine	15	17	16	23	57	48
Sabine River Authority	MWP	Municipal	Hunt	Sabine	0	0	0	0	0	2,495
Sabine River Authority	MWP	Municipal	Hunt	Sabine	1,387	1,425	1,438	1,734	2,287	1,527
Sabine River Authority	MWP	Municipal	Rains	Sabine	65	66	70	97	396	270
Sabine River Authority	MWP	Municipal	Hunt	Sabine	494	568	677	838	1,076	1,422
Sabine River Authority	MWP	Municipal	Van Zandt	Sabine	100	116	139	175	228	304
Sabine River Authority	MWP	Municipal	Hunt	Sulphur	1,629	6,025	5,975	5,531	3,917	3,884
Sabine River Authority	MWP	Municipal	Van Zandt	Sabine	272	285	295	307	318	329
Sabine River Authority	MWP	Municipal	Rains	Sabine	1,218	1,267	1,272	1,276	1,280	1,283
Sabine River Authority	MWP	Municipal	Hunt	Sabine	10,297	20,362	20,194	20,027	19,879	19,690
Sabine River Authority	MWP	Irrigation	Van Zandt	Neches	184	184	184	184	184	184
Sabine River Authority	MWP	Municipal	Gregg	Sabine	1,728	4,683	4,638	4,596	4,620	5,059
Sabine River Authority	MWP	Municipal	Gregg	Sabine	7,839	17,660	17,467	17,253	17,027	16,806
Sabine River Authority	MWP	Municipal	Harrison	Sabine	161	382	383	413	443	465
Sabine River Authority	MWP	Municipal	Hunt	Sabine	20	18	17	15	14	12
Sabine River Authority	MWP	Municipal	Van Zandt	Sabine	157	181	198	217	236	254
Sabine River Authority	MWP	Municipal	Van Zandt	Trinity	321	354	386	419	452	489
Sabine River Authority	MWP	Manufacturing	Harrison	Sabine	3,500	3,157	3,124	3,092	3,057	3,022
Sabine River Authority	MWP	Municipal	Rains	Sabine	376	391	392	393	395	395
Sabine River Authority	MWP	Municipal	Wood	Sabine	316	1,010	1,000	989	978	967
Sabine River Authority	MWP	Municipal	Van Zandt	Sabine	438	472	498	530	562	590
Sabine River Authority	MWP	Municipal	Hunt	Sabine	276	804	797	738	784	777
Sabine River Authority	MWP	Municipal	Van Zandt	Sabine	351	751	746	593	490	486
Sabine River Authority	MWP	Municipal	Van Zandt	Trinity	402	856	848	672	555	550
Sulphur River MWD	MWP	Municipal	Delta	Sulphur	767	749	731	712	694	676
Sulphur River MWD	MWP	Municipal	Hopkins	Sulphur	12,971	12,662	12,354	12,046	11,737	11,428
Sulphur Springs	MWP	Municipal	Hopkins	Sabine	78	83	86	91	97	97
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	77	80	84	90	95	95
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	77	77	77	77	77	77

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Sulphur Springs	MWP	Municipal	Hopkins	Sabine	56	53	16	0	0	0
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	27	26	8	0	0	0
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	111	115	121	128	135	135
Sulphur Springs	MWP	Livestock	Hopkins	Cypress	65	71	71	76	78	78
Sulphur Springs	MWP	Livestock	Hopkins	Sabine	323	347	349	373	383	383
Sulphur Springs	MWP	Livestock	Hopkins	Sulphur	1,163	1,302	1,310	1,465	1,535	1,535
Sulphur Springs	MWP	Manufacturing	Hopkins	Sulphur	1,561	1,592	1,611	1,701	1,802	1,802
Sulphur Springs	MWP	Manufacturing	Hopkins	Sulphur	269	323	376	425	473	473
Sulphur Springs	MWP	Manufacturing	Hunt	Sabine	50	50	50	50	50	50
Sulphur Springs	MWP	Municipal	Hopkins	Sabine	185	185	186	186	185	185
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	38	38	37	37	38	38
Sulphur Springs	MWP	Mining	Hopkins	Sabine	68	74	81	88	96	96
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	921	921	921	921	921	921
Sulphur Springs	MWP	Municipal	Hopkins	Sabine	31	33	33	35	38	38
Sulphur Springs	MWP	Municipal	Hopkins	Sabine	31	32	34	37	38	38
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	25	26	28	30	31	31
Sulphur Springs	MWP	Municipal	Hopkins	Sulphur	25	27	28	29	31	31
Tarrant Regional WD	MWP	Municipal	Van Zandt	Trinity	58	58	60	61	62	63
Terrell	WUG Seller	Municipal	Hunt	Sabine	32	40	45	48	39	38
Terrell	WUG Seller	Municipal	Hunt	Sabine	47	45	44	43	33	33
Terrell	WUG Seller	Municipal	Hunt	Sabine	131	125	117	110	83	78
Terrell	WUG Seller	Municipal	Hunt	Sabine	5	4	4	3	3	3
Texarkana	MWP	Municipal	Bowie	Red	96,789	96,954	96,777	96,852	96,929	96,775
Texarkana	MWP	Municipal	Bowie	Sulphur	25,841	25,669	25,839	25,763	25,686	25,840
Titus County FWD 1	MWP	Municipal	Titus	Cypress	18,900	18,900	18,900	18,900	18,900	18,900
Titus County FWD 1	MWP	Steam Electric Power	Titus	Cypress	7,300	6,760	6,220	5,680	5,140	4,600
Tyler	WUG Seller	Manufacturing	Smith	Sabine	7	6	9	10	9	9

Name	MWP/WUG Seller	Use Category	County	Basin	2030	2040	2050	2060	2070	2080
Tyler	WUG Seller	Manufacturing	Smith	Sabine	7	6	9	7	9	8
Upper Neches River Municipal Water Authority	WUG Seller	Municipal	Smith	Sabine	225	180	150	127	105	86
White Oak	MWP	Municipal	Gregg	Sabine	50	50	50	50	50	50
White Oak	MWP	Municipal	Upshur	Cypress	30	29	29	29	29	29
White Oak	MWP	Municipal	Upshur	Sabine	10	11	11	11	11	11

2.3.6 Regional Environmental Flow Demand Projections

An additional demand for water in the Region is that water needed for "environmental flows," as that term is defined in Senate Bill 3 of the 2007 Regular Session (SB 3). While no volumes or rates have been projected in this plan, the NETRWPG anticipates a significant amount of water will be needed for the Region's rivers, streams, and lakes to maintain the agricultural and natural resources of the North East Texas Region.

As discussed in *Section 3.4 Impact of Environmental Flow Policies on Water Rights, Water Availability, and Water Planning,* SB 3 established a process to determine the environmental flow needs for each river basin. To date, a schedule has not been established for a SB 3 process for the Red, Sulphur, or Cypress basins. However, a voluntary process is ongoing for the Cypress Basin, whereby voluntary environmental flow goals have been identified, and studies have been undertaken to evaluate and consider environmental flow needs in the Sulphur River Basin (discussed in more detail within Chapter 8 of this Plan).

CHAPTER 3 EVALUATION OF CURRENT WATER SUPPLIES IN THE REGION

A key task in the preparation of the 2026 Region D Water Plan is the determination of the amount of water that is currently available to the Region. In Chapter 4, this information will be compared to the water demand projections presented in Chapter 2 to identify water user groups and water providers with projected needs beyond their available supply.

As part of the evaluation of current water supplies in the Region, the North East Texas Regional Water Planning Group (NETRWPG) was charged with updating the water supply availability numbers from the 2021 Plan. Water supply estimates were updated using a variety of methods:

- Groundwater availability was based on the Modeled Available Groundwater (MAG) volumes that may be produced on an average annual basis to achieve a Desired Future Condition (DFC) as adopted by Groundwater Management Areas (GMAs) (per Texas Water Code 36.001). Groundwater availability is not limited by permits currently issued. MAG volumes for each aquifer were provided by TWDB through the DB27 interface and split into discrete geographic-aquifer units by: Region/Aquifer/County/Basin. In certain instances, groundwater availabilities above the identified MAG volumes were developed based on a local geologic assessment and were reviewed and approved by TWDB and the NETRWPG for inclusion in the 2026 Region D Plan.
- A detailed analysis of the source availability and supply available from Lake Wright Patman was performed at the request of the Riverbend Water Resources District, whereby information related to the present storage capacity of the reservoir and sedimentation effects was brought forward from the 2021 Region D Plan to render a more accurate depiction of supply for the purposes of the 2026 Region D Plan.
- A survey form was distributed to all municipal Water User Groups (WUGs) to identify any changes in sources or supply amounts since the 2021 plan – for example, new wells, purchase contract renewals, new contracts, mergers, or new reuse supplies. Surveyed contacts within Region D are presented in Appendix C3-1.
- In all river basins, the firm yields of various water supplies have been updated using Texas Commission on Environment Quality (TCEQ) supplied WAM model results, the implementation of which is detailed in the October 27, 2023 Water Supplies Assumption memorandum submitted to the TWDB by the NETRWPG, as approved at the October 4, 2023 NETRWPG meeting.

The analysis of currently available water supply is presented in three parts, per TWDB guidance:

- Estimates of available water by source (surface and groundwater);
- Estimates of the supplies currently available to each water user group; and
- Estimates of the supplies currently available to each designated major water provider.

The following sections of this chapter present the calculated source availabilities and supply amounts accordingly.

Table 3.1 Overall Water Availability by Source

Water Availability (ac-ft/yr)	2030	2040	2050	2060	2070	2080
SURFACE WATER IN REGION D	1,253,289	1,234,623	1,215,977	1,197,466	1,178,841	1,160,256
GROUNDWATER IN REGION D	191,021	191,020	191,042	191,397	191,876	192,580
DIRECT REUSE	72,993	67,677	68,933	77,807	71,581	71,581
TOTAL	**1,517,303**	**1,493,320**	**1,475,952**	**1,466,670**	**1,442,298**	**1,424,417**

3.1 Surface Water Sources

The North East Texas Regional Water Planning Area (RWPA) includes all or a portion of 19 counties that encompass major portions of four river basins: the Cypress Creek Basin, the Red River Basin, the Sulphur River Basin, and the Sabine River Basin. Relatively small portions of the Neches River Basin and the Trinity River Basin also extend into the RWPA. Surface water sources within the region include rivers, streams, lakes, ponds, and tanks.

Surface water in Texas is owned by the State, and its use is regulated under the legal doctrine of prior appropriation. This means that water rights that are issued by the State for the diversion and use of surface water have priority according to the date that the right was issued. The oldest issued water right has priority over all subsequently issued water rights, regardless of the type of use. Water rights issued by the State generally are one of two types, run-of-the-river rights and stored water rights.

Run-of-the-river water rights permits allow diversions of water directly from a river or stream provided there is water in the stream and that the water is not needed to meet senior downstream water rights. Run-of-the-river rights are greatly impacted by drought conditions, particularly in the upper portions of a river basin.

Stored water rights allow the impoundment of water by a permittee in a reservoir. Water can be held for storage as long as the inflow is not needed to meet a senior downstream water right or other condition, such as release requirements for maintenance of instream flows. Water stored in the reservoir can be withdrawn by the permittee at a later date to meet water demands. Stored water rights are generally based on a reservoir's firm yield and are therefore less sensitive to drought conditions.

In addition to water rights issued by the state, individual landowners are allowed to use certain surface waters without a permit. Specifically, landowners are allowed to construct impoundments with up to 200 acre-feet of storage or use water directly from a stream for domestic and livestock purposes. These types of water supplies are referred to as "local supply sources." Where permits have been identified for irrigation and/or livestock uses, water availability for local supply sources was determined utilizing the applicable official WAM. Supplies not requiring a permit for domestic irrigation and/or livestock uses, such as private supplies from individual water wells on private property, have been based on a comparative analysis of USDA reported 2022county census amounts of livestock along with estimated median water use coefficients developed and reported by the USGS (Lovelace, 2009) for various livestock categories. These estimates were then compared to reported historical agricultural water use estimates from the TWDB along with the supplies reported and adopted for previous Region D Water Plans to ensure estimated firm water supplies for the non-permitted domestic irrigation and/or livestock uses are conservative and consistent with reported county amounts.

A summary of the available surface water sources in each of the river basins within the Region is presented below. In accordance with TWDB guidelines, the estimates of source water availability and water supply are based on the following key assumptions:

- Source water availability is evaluated as the amount of water that a user can depend on obtaining during drought of record conditions. For reservoirs, this corresponds to the firm yield. For run-of-the-river sources, this corresponds to the amount of water available for diversion during the driest period of record. Detailed reporting on source water availabilities are presented in Appendix C3-2.
- The determination of water availability includes the assumption that all senior downstream water rights are being fully utilized.
- RWPGs evaluate existing supplies that are legally and physically available to WUGs and wholesale water suppliers. For example, water would not be considered available from a reservoir if a user needs to construct the water intake and pipeline required for diverting and conveying water from the reservoir to the area of need. In this case, the strategies considered could include construction of the necessary pipeline, intake, or other infrastructure necessary to fully access the source.
- A properly issued water right is no guarantee of access to water. It is possible that a water right can be held in which there is no water during some time of the year. For example, a holder of a water right that is run-of-the-river may have no access to water when there is no flow in the river. A holder of a water right that is a right to store and divert at a later date may have only limited access to water during a drought. It should be acknowledged that water rights have been issued in circumstances where the water is estimated to be available under a water right in a water supply contract. It is essential that buyers understand the limitations and qualifications of the water right that supports the water supply contract. It is not uncommon for Wholesale Water Providers (WWPs) to have water rights for a volume greater than what can be delivered during the worst drought of record. It is not uncommon for water rights to be issued in an amount greater than the dependable yield of a reservoir.

3.1.1 Water Availability Models

As required by Texas Administrative Code (TAC) §357.32, for the 2026 Regional Water Plan the most current TCEQ Water Availability Models (WAM) for reservoirs and river systems were utilized. For the 2026 cycle, the updated WAM for the Sulphur River Basin has been adopted. The TCEQ introduced a new WAM in late 2019, which was too late for the 2021 Region D Plan. The 2026 plans now integrate the most recent WAM, released in 2023.

The WAM was developed to account for water availability during drought of record conditions and considers factors such as reservoir firm yield, run-of-river diversions, and assumed full exercise of senior water rights within a system. The adopted definition for firm yield as defined in TAC §357.10(14) is the maximum water volume a reservoir can provide each year under a repeat of the drought of record using anticipated sedimentation rates and assuming that all senior water rights will be totally utilized, and all applicable permit conditions met. It also accounts for a minimum pool level for each reservoir in the system and, if applicable, maximum reservoir level at the top of the water supply storage (i.e., conservation pool) volume. Table 3.2 below presents a list of the water rights that are the basis for the surface water availability in the plan.

Table 3.2 List of Water Rights Utilized in Development of Surface Water Availability

County/Reservoir	Basin	WUG	WR Number	Water Right Owner
BIG CREEK LAKE	Sulphur	Cooper	03-4060 (App 03-4395)	City Of Cooper
BIG SANDY CREEK LAKE	Sabine	Longview	05-4759	City Of Longview
BOB SANDLIN LAKE	Cypress	Titus County FWD 1	04-4564	Titus County FWSD 1
BOWIE	Red	Irrigation	02-3976	Ethel E Musselman Et Al
BOWIE	Red	Irrigation	02-4058	J C Dodson; BJ Shipping Company, Inc.; Theodorus J and Wanda Deboer
BOWIE	Red	Irrigation	02-4952	Carol A and Eldon K Lenth; Chris and Jason Sylte
BOWIE	Red	Irrigation	02-4953	Anne R. Farris; Coleman and Melissa Ann Young
BOWIE	Red	Irrigation	02-4954	Three Sides Land Co., LTD; John Wayne Ward et al
BOWIE	Red	Irrigation	02-4955	ASCKCC, LLP
BOWIE	Red	Irrigation	02-4956	Cranfill Dairy Farms, Inc.
BOWIE	Red	Irrigation	02-4957	Joe Conner Hart
BOWIE	Red	Manufacturing	02-4958	Cranfill Dairy Farms, Inc.
BOWIE	Red	Irrigation	02-4959	Texarkana Riverbend Plantation, Inc.
BOWIE	Red	Irrigation	02-4960	W H Wommack Jr
BOWIE	Red	Irrigation	02-4961	City Of Texarkana
BOWIE	Red	Irrigation	02-4962	Steve Ledwell
BOWIE	Red	Irrigation	02-5632	B & W Land Company, LLC
BOWIE	Sulphur	Irrigation	03-4829	Estate of A D Simms; Loyd Wilson Independent Executor and Trustee et al
BOWIE	Sulphur	Irrigation	03-4830	Estate of A D Simms; Loyd Wilson Independent Executor and Trustee et al
BOWIE	Sulphur	New Boston	03-4831	City Of New Boston
BOWIE	Sulphur	New Boston	03-4832	City Of New Boston
BOWIE	Sulphur	Manufacturing	03-4833	H C Prange Jr
BOWIE	Sulphur	Irrigation	03-4834	Estate of A D Simms; Loyd Wilson Independent Executor and Trustee et al
BOWIE	Sulphur	Irrigation	03-4837	Leon S Kennedy Jr; Henry and Predetta Maddox Jr
BRANDY BRANCH LAKE	Sabine	Steam Electric	05-4647	Southwestern Electric Power Company
CAMP	Cypress	Livestock	04-4561	Loyd and Sunny Daily
CAMP	Cypress	Livestock	04-4574	Princedale Country Club, Inc.

County/Reservoir	Basin	WUG	WR Number	Water Right Owner
CAMP	Cypress	Livestock	04-5251	Ruth Ann and Steven A. Roberts
CAMP	Cypress	Mining	04-5813	Luminant Mining Company LLC
CASS	Cypress	Livestock	04-4587	Eagle Landing Homeowners Association, Inc.
CASS	Cypress	Manufacturing	04-4598	Jimmy H Wakefield
CASS	Cypress	Livestock	04-4599	Delwin Young
CASS	Sulphur	Livestock	03-5449	Texas Parks and Wildlife Department
CHAPMAN LAKE NON-SYSTEM PORTION	Sulphur	Sulphur River MWD	03-4797	City of Commerce; Sulphur River MWD
CHAPMAN LAKE NON-SYSTEM PORTION	Sulphur	North Texas MWD	03-4798	North Texas MWD
CHAPMAN LAKE NON-SYSTEM PORTION	Sulphur	Irving	03-4799	City Of Irving
CHEROKEE LAKE	Sabine	Cherokee Water Company	05-4642	Cherokee Water Company
CROOK LAKE	Red	Paris	02-4943	City Of Paris
CYPRESS SPRINGS LAKE	Cypress	Mount Pleasant	04-4560	Franklin County Water District; City Of Mount Pleasant
DELTA	Sulphur	Irrigation	03-3845 (APP 03-4148)	Five Counties Ranch, LLC
DELTA	Sulphur	Cooper	03-4800	City Of Cooper
DELTA	Sulphur	Irrigation	03-4801	Delta Country Club
EDGEWOOD CITY LAKE	Sabine	Edgewood	05-4678	City Of Edgewood
ELLISON LAKE	Cypress	Northeast Texas MWD	04-4582	U.S. Steel Tubular Products, Llc
FORK LAKE	Sabine	Sabine River Authority	05-4669	Sabine River Authority of Texas
FRANKLIN	Sulphur	Irrigation	03-4803	Christa and Helmut Hermann; Jimmie Kate Terry Brown
FRANKLIN	Sulphur	Mount Vernon	03-4816	City Of Mount Vernon
FRANKLIN	Sulphur	Irrigation	03-4817	Hans and Waltraud Weiss
FRANKLIN	Sulphur	Irrigation	03-4818	Dewitta and Robert W Campbell
FRANKLIN; TITUS	Cypress	Livestock	04-5814	T5 Holdings, L.P.; Luminant Mining Company LLC
GILMER LAKE	Cypress	Gilmer	04-5272	Gilmer Economic Development Corporation
GLADEWATER LAKE	Sabine	Gladewater	05-4762	City Of Gladewater

County/Reservoir	Basin	WUG	WR Number	Water Right Owner
GREENVILLE CITY LAKE	Sabine	Greenville	05-4665	City Of Greenville
GREGG	Cypress	Irrigation	04-4608	George D Grogan
GREGG	Cypress	Irrigation	04-5608	Hunters Creek H.A., Inc.
GREGG	Sabine	Mining	05-4623	James Madison Enterprises, Inc.
GREGG	Sabine	Longview	05-4624	City Of Longview
GREGG	Sabine	Irrigation	05-4626	M F Glover et al
GREGG	Sabine	Irrigation	05-4628	Gino Venitucci
GREGG	Sabine	Irrigation	05-4629	Carlos B Griffin Jr
GREGG	Sabine	Irrigation	05-4630	George D Grogan
GREGG	Sabine	Irrigation	05-4732	Edwin and Jimmie Lou Baggett
GREGG	Sabine	Longview	05-5090	City Of Longview
HARRISON	Cypress	Manufacturing	04-4005 (APP 04-4349)	Longhorn Army Ammunition Plant; U.S. Department of the Interior Fish and Wildlife Service
HARRISON	Cypress	Manufacturing	04-4254 (APP 04-4573)	Snider Industries, Inc.
HARRISON	Cypress	Manufacturing	04-4609	T S Murrell
HARRISON	Cypress	Irrigation	04-4610	Westover Land and Livestock Company
HARRISON	Cypress	Manufacturing	04-4611	T & P Lake, Inc. et al
HARRISON	Cypress	Mining	04-4613	Fair Oil, LC
HARRISON	Cypress	Marshall	04-4614	City Of Marshall
HARRISON	Cypress	Irrigation	04-4615	Marshall Lakeside Country Club
HARRISON	Sabine	Mining	05-12049	The Sabine Mining Company
HARRISON	Sabine	Manufacturing	05-4631	Eastman Chemical Company
HARRISON	Sabine	Irrigation	05-4632	Peppy Jean Family Limited Partnership; Pinecrest County Club
HARRISON	Sabine	Manufacturing	05-4633	Carrie S and Clarence W Young
HARRISON	Sabine	Irrigation	05-4634	E C Johnston Jr
HARRISON	Sabine	Irrigation	05-4635	Living Trust of Phyllis Cary; Anda Flowers and R Byron Roach
HARRISON	Sabine	Irrigation	05-4645	James Elvyn Utz
HARRISON	Sabine	Irrigation	05-4646	Carolyn Holloway Bicknell
HARRISON	Sabine	Mining	05-5082	The Sabine Mining Company
HARRISON	Sabine	Mining	05-5124	Sabine Mining Company
HARRISON	Sabine	Manufacturing	05-5158	Norit Americas, Inc.
HARRISON	Sabine	Mining	05-5177	The Sabine Mining Company
HARRISON	Sabine	Mining	05-5246	The Sabine Mining Company

County/Reservoir	Basin	WUG	WR Number	Water Right Owner
HARRISON	Sabine	Mining	05-5382	Sabine Mining Company
HARRISON	Sabine	Mining	05-5439	The Sabine Mining Company
HARRISON	Sabine	Mining	05-5454	The Sabine Mining Company
HARRISON	Sabine	Manufacturing	05-5468	Norit Americas, Inc.
HARRISON	Sabine	Mining	05-5607	Sabine Mining Company
HARRISON	Sabine	Mining	05-5662	The Sabine Mining Company
HARRISON	Sabine	Irrigation	05-5918	Charlotte and Larry Slone
HOPKINS	Sabine	Irrigation	05-4699	Truman L Renshaw; Gary Blake and Lindsey Huffman Johnson
HOPKINS	Sabine	Irrigation	05-4702	Dahalia V and Dewey Dickens
HOPKINS	Sabine	Irrigation	05-4703	The Estate of Richard and Anita L Tynes
HOPKINS	Sabine	County-Other	05-5217	Coy and Patsy Johnson; Claire C and Harold D Knight
HOPKINS	Sulphur	Irrigation	03-12145	Los Senderos Cattle And Ranch Company
HOPKINS	Sulphur	Sulphur Springs	03-4812	City Of Sulphur Springs
HOPKINS	Sulphur	Irrigation	03-4813	Sulphur Springs Country Club
HOPKINS	Sulphur	Irrigation	03-4814	Jill A. Jordan
HOPKINS	Sulphur	Livestock	03-5150	Larry Miles
HOPKINS	Sulphur	Livestock	03-5906	City of Sulphur Springs
HUNT	Sabine	Irrigation	05-4666	Edgar Hutchins
HUNT	Sabine	Irrigation	05-4667	E F Buehring; Dr Van G Kaden; Carol and Lowell Lawson; R R Sutherland
HUNT	Sulphur	Irrigation	03-4796	Webb Hill Country Club, Inc.
JOHNSON CREEK LAKE	Cypress	Steam Electric	04-4588	Southwestern Electric Power Company
LAKE O' THE PINES	Cypress	Northeast Texas MWD	04-4590	Northeast Texas MWD
LAMAR	Red	Irrigation	02-12132	Richard J. Perry
LAMAR	Red	Irrigation	02-3888	Duckhole Partners LLC
LAMAR	Red	Irrigation	02-3924	Crawford Family Farm, LP; John Thomas and Linda Crawford Graves
LAMAR	Red	Irrigation	02-4930	Joey Cale Sanders
LAMAR	Red	Irrigation	02-4934	A G Robinson
LAMAR	Red	Irrigation	02-4935	Jennifer and Kevin Clark Foster
LAMAR	Red	Irrigation	02-4938	2017 PG Investments, LLC
LAMAR	Red	Irrigation	02-4939	Laura and Q B Stephens
LAMAR	Red	Irrigation	02-4941	Dorothy E and Nolan Butts; Charles C and Cynthia Taylor

County/Reservoir	Basin	WUG	WR Number	Water Right Owner
LAMAR	Red	Irrigation	02-4945	James C and Terri Darnell
LAMAR	Red	Irrigation	02-5119	City Of Paris
LAMAR	Red	Irrigation	02-5233	Leroy H. and Viola E. Kautz; Vulgamore Family Farms, LLC et al
LAMAR	Red	Irrigation	02-5276	Vulgamore Family Farms, LLC
LAMAR	Red	Irrigation	02-5558	Paris Golf and Country Club, Inc.
LAMAR	Red	Irrigation	02-5617	Vulgamore Family Farms, LLC
LAMAR	Sulphur	Manufacturing	03-12810	Daisy Farms, LLC
LANGFORD LAKE	Sulphur	Clarksville	03-4809	Red River County WCID 1 Langford Creek
LOMA LAKE	Sabine	County-Other	05-4758	Institute In Basic Life Principles, Inc.
MARION	Cypress	Irrigation	04-4198 (APP 04-4525)	Jimmy D. Moore and Patricia W. Moore
MARION	Cypress	Irrigation	04-4591	Linda L Carpenter
MARION	Cypress	Irrigation	04-4592	David R and E M Key
MARION	Cypress	Irrigation	04-4593	George D Grogan
MARION	Cypress	Irrigation	04-4594	Snider Industries, L.L.P.; Kimmie and Robert Sanders; Caddo Lake Institute, Inc.; The Nature Conservancy
MARION	Cypress	Jefferson	04-4595	Jefferson Water and Sewer District
MARION	Cypress	Irrigation	04-4596	Estate of David R Key
MARION	Cypress	Irrigation	04-4600	Jarvis L Smoak
MARION	Cypress	Irrigation	04-4612	David R Key
MARION	Cypress	Irrigation	04-4618	James H. Morris
MILL CREEK LAKE	Sabine	Canton	05-4675	City Of Canton
MONTICELLO LAKE	Cypress	Steam Electric	04-4563	Luminant Generation Company LLC
MORRIS	Cypress	Irrigation	04-4577	Adron Justiss
MORRIS	Cypress	Irrigation	04-4578	Adron Justiss
MORRIS	Cypress	Irrigation	04-4579	Adron Justiss
MORRIS	Cypress	Irrigation	04-4580	Johnthan Eugene Dale
MORRIS	Cypress	Irrigation	04-4597	Lloyd Justiss Farms, Inc.
PAT MAYSE LAKE	Red	Paris	02-4940	City Of Paris
RAINS	Sabine	Irrigation	05-4681	SEBW LLC
RAINS	Sabine	Irrigation	05-4700	AM Development Company
RAINS	Sabine	Irrigation	05-4701	Larry and Paula Knecht
RED RIVER	Red	Irrigation	02-4946	Atlee M Kohl Trustee; Dianne M Siebens Trustee
RED RIVER	Red	Irrigation	02-4947	James E Waggoner

County/Reservoir	Basin	WUG	WR Number	Water Right Owner
RED RIVER	Red	Irrigation	02-4948	James E Waggoner
RED RIVER	Red	Irrigation	02-4949	Glen E and Sue Nichols
RED RIVER	Red	Irrigation	02-4950	James E Waggoner
RED RIVER	Red	Irrigation	02-4951	Clarksville Country Club
RED RIVER	Sulphur	Irrigation	03-4802	Alexander Frick ET AL
RED RIVER	Sulphur	Steam Electric	03-4804	Luminant Generation Company LLC
RED RIVER	Sulphur	Irrigation	03-4806	Laura Elizabeth Vaughan McCoin; Mary Lynn Vaughan Palmer; William Jeffery Vaughan
RED RIVER	Sulphur	Irrigation	03-4807	Mary Margaret Vaughan
RED RIVER	Sulphur	Irrigation	03-4810	Donelson Family, LTD.
RHINES LAKE	Neches	Mining	06-3222	Rhines Lake Association, Inc.
SMITH	Neches	County-Other	06-4724	Hide-A-Way Lake Club, Inc.
SMITH	Neches	Irrigation	06-4850	Archie E Reynolds
SMITH	Sabine	Irrigation	05-4248 (APP 05-4575)	Robert Thomas and Julia Lucile Wood Perry; Joe and Susan Nelson II
SMITH	Sabine	County-Other	05-4625	City Of Overton
SMITH	Sabine	County-Other	05-4693	ETX Paragon, LTD
SMITH	Sabine	Irrigation	05-4698	Oakhurst Farms, L.P.; Glenn Dean and Janice G Childres
SMITH	Sabine	Irrigation	05-4724	Hide-A-Way Lake Club, Inc.
SMITH	Sabine	Irrigation	05-4727	Oakhurst Farms, L.P.
SMITH	Sabine	Irrigation	05-4728	James R. Arthur et al
SMITH	Sabine	Irrigation	05-4739	Faye B and Robert E Smith
SMITH	Sabine	Irrigation	05-4740	Lonie Branch and William L Brady
SMITH	Sabine	Irrigation	05-4742	Kambala Land, LLC
SMITH	Sabine	Irrigation	05-4743	Jean Branch and William L Brady
SMITH	Sabine	Irrigation	05-4745	Edwin B and Laura Kidd Ashby
SMITH	Sabine	Irrigation	05-4746	Lonie Branch and William L Brady
SMITH	Sabine	Irrigation	05-4747	Lonie Branch and William L Brady
SMITH	Sabine	Irrigation	05-4748	Pinehurst Partners I, LLC
SMITH	Sabine	Manufacturing	05-4761	Donald Therneau
SMITH	Sabine	Irrigation	05-5229	Charles Breedlove
SULPHUR SPRINGS LAKE	Sulphur	Sulphur Springs	03-4811	City Of Sulphur Springs
TANKERSLEY LAKE	Cypress	Mount Pleasant	04-4565	City Of Mount Pleasant

County/Reservoir	Basin	WUG	WR Number	Water Right Owner
TAWAKONI LAKE	Sabine	Sabine River Authority	05-4670	Sabine River Authority of Texas
TITUS	Cypress	Irrigation	04-4562	G M Scott
TITUS	Cypress	Irrigation	04-4566	William Dean Priefert
TITUS	Cypress	Irrigation	04-4567	William Dean Priefert
TITUS	Cypress	Irrigation	04-4568	The Etoil Jackson Family Partnership, L.P.
TITUS	Cypress	Mount Pleasant	04-4569	City Of Mount Pleasant
TITUS	Cypress	Mount Pleasant	04-4570	City Of Mount Pleasant
TITUS	Cypress	Irrigation	04-4571	R. J. Porter Estate
TITUS	Cypress	Irrigation	04-4572	KRB Investments, LLC
TITUS	Cypress	Irrigation	04-4573	Edith A Sanders and Almie E Smith Sr.
TITUS	Cypress	Mining	04-5167	Luminant Mining Company LLC
TITUS	Cypress	Mining	04-5850	Luminant Mining Company LLC
TITUS	Cypress	Livestock	04-5914	Luminant Mining Company LLC
TITUS	Sulphur	Mining	03-12099	Luminant Mining Company LLC
TITUS	Sulphur	Irrigation	03-4805	E. P. Land and Cattle Company
TITUS	Sulphur	Irrigation	03-4820	Joe R. Menefee
TITUS	Sulphur	Manufacturing	03-4821	Anna Pearl Lewis
TITUS	Sulphur	Irrigation	03-4822	Bernice Ann Baldwin
TITUS	Sulphur	Irrigation	03-4823	Luminant Mining Company LLC
TITUS	Sulphur	Irrigation	03-4824	Walter W Lee
TITUS	Sulphur	Irrigation	03-4825	Luminant Mining Company LLC
TITUS	Sulphur	Mining	03-5562	Luminant Mining Company LLC
TURKEY CREEK LAKE	Sulphur	Wolfe City	03-4795	City Of Wolfe City
UPSHUR	Cypress	Irrigation	04-4583	JFS Timber Partners, LTD.
UPSHUR	Cypress	Irrigation	04-4584	Estate of Edwin Lacy et al
UPSHUR	Cypress	Irrigation	04-4585	Gaston W Deberry
UPSHUR	Cypress	Irrigation	04-4586	Douglas Newsom
UPSHUR	Cypress	Irrigation	04-4604	Jan Lee Jackson and Sharon Jackson
UPSHUR	Sabine	Irrigation	05-3899 (APP 05-4220)	Ralph Trimble
UPSHUR	Sabine	Mining	05-3969 (APP 05-4307)	Tyler Sand Company
UPSHUR	Sabine	Irrigation	05-4763	Investorade SFR Holdings, LLC
VAN ZANDT	Neches	Irrigation	06-3221	A C and Louise R Love

County/Reservoir	Basin	WUG	WR Number	Water Right Owner
VAN ZANDT	Neches	Irrigation	06-3223	Nipp Investments, LTD.; Baker Lucas
VAN ZANDT	Neches	Irrigation	06-3244	Charles R and Margaret Easley
VAN ZANDT	Neches	Irrigation	06-3245	Amelia Roberts Knox and Charles Stewart Roberts
VAN ZANDT	Neches	Irrigation	06-3251	W L Duncan
VAN ZANDT	Neches	Irrigation	06-3252	Ann H and Dwayne Collins
VAN ZANDT	Neches	Irrigation	06-3253	Ted L Hand
VAN ZANDT	Neches	Manufacturing	06-5232	Debbie and Robert R. Waldrop
VAN ZANDT	Neches	Livestock	06-5415	James G Wise
VAN ZANDT	Neches	Livestock	06-5613	Benton Rutledge; William W Willingham III
VAN ZANDT	Neches	Irrigation	06-5746	Andre, Bridget, Gideon C, and Lorraine Dekkers
VAN ZANDT	Neches	Livestock	06-5757	The Florida Company
VAN ZANDT	Sabine	Livestock	05-12098	Sabine River Bottom Partners LP
VAN ZANDT	Sabine	Wills Point	05-4671	City Of Wills Point
VAN ZANDT	Sabine	County-Other	05-4673	Willow Lake Estates Association
VAN ZANDT	Sabine	Canton	05-4675	City Of Canton
VAN ZANDT	Sabine	Canton	05-4676	City Of Canton
VAN ZANDT	Sabine	Grand Saline	05-4679	M4 Investment Group LLC
VAN ZANDT	Sabine	Irrigation	05-4682	Gail Hill
VAN ZANDT	Sabine	Irrigation	05-4684	Jack C Kellam
VAN ZANDT	Sabine	Irrigation	05-4688	Kay and Robert Dozier; Cindy M and J Glen Turner Jr; George A Shafer
VAN ZANDT	Sabine	Mining	05-4689	Morton Salt, Inc.
WELSH LAKE	Cypress	Steam Electric	04-4576	Southwestern Electric Power Company
WOOD	Sabine	Irrigation	05-3942 (APP 05-4267)	Peach Springs Nursery, LLC
WOOD	Sabine	Irrigation	05-4202 (APP 05-4513)	Kay H. Walker
WOOD	Sabine	Irrigation	05-4704	A C and Nell Mcafee
WOOD	Sabine	Irrigation	05-4710	Bradley D Lengel and Brian W Lengel
WOOD	Sabine	Irrigation	05-4712	Lake Lydia Incorporated
WOOD	Sabine	Irrigation	05-4714	Allen A Cooper Jr; Tom E Glover; Bill Ward
WOOD	Sabine	Irrigation	05-4716	Bank of America, National Association
WOOD	Sabine	Irrigation	05-4718	H. L. Hobbs
WOOD	Sabine	Irrigation	05-4722	Barney and Marie Holmes Jr
WOOD	Sabine	Irrigation	05-4737	Joe E Holmes

County/Reservoir	Basin	WUG	WR Number	Water Right Owner
WOOD	Sabine	Irrigation	05-4738	Barney and Marie Holmes Jr
WOOD	Sabine	County-Other	05-4749	Wood County
WOOD	Sabine	Irrigation	05-4750	Dena and Virgil Woodard
WOOD	Sabine	Irrigation	05-4752	Charlene and Comy E Bradshaw
WOOD	Sabine	Irrigation	05-4754	Mill Creek Company
WOOD	Sabine	Irrigation	05-4755	Real Estate Holdings, Inc.
WOOD	Sabine	Irrigation	05-4769	Jennifer Roseborough; BBVA USA
WOOD	Sabine	Irrigation	05-4771	Little Sandy Hunting & Fishing Club
WRIGHT PATMAN LAKE	Sulphur	Texarkana	03-4836	City Of Texarkana

Table 3.3 summarizes information regarding the WAM version, simulation date, and WRAP version used for simulations employed for the purposes of the Final 2026 Region D Plan.

Table 3.3 Summary of Characteristics of Water Availability Models Employed for the Final 2026 Region D Plan

Basin	WAM Version	WRAP Version	Simulation Date
Cypress Creek River Basin	1-Oct-2023	Jul-2022	17-Nov-2023
Red River Basin	1-Oct-2023	Jul-2022	20-Nov-2023
Neches River Basin	1-Oct-2023	Jul-2022	17-Nov-2023
Sabine River Basin	1-Oct-2023	Jul-2022	19-Jan-2023
Sulphur River Basin	1-Oct-2023	Jul-2022	19-Nov-2023

3.1.1.1 Sedimentation

Reservoir sedimentation reduces the storage capacity of a reservoir, potentially impacting the beneficial uses of reservoirs such as water supply, flood control, hydropower, navigation, and recreation. Surveys of volumetric storage in a reservoir allow for the derivation of rates and loadings of sediment to the reservoir. The annual loading can then be distributed to determine a revised elevation-area-capacity curve which models the distribution of the total volume of sediment accumulated at the end of an analysis period. The resultant area-capacity relationship is then incorporated into the applicable WAM for the given reservoir in order to calculate a modeled firm yield.

Generally, for the purposes of the 2026 Region D Plan if a reservoir is calculated to have no firm yield, that result is assumed for all decades in the 2030-2080 planning horizon. For those reservoirs lacking volumetric surveys, original area-capacity relations employed within WAM Run 3 are assumed constant. If original elevation-area-capacity relations were not available, the most recent elevation-area-capacity-relation for a reservoir will be used as a baseline for future projections. For reservoirs with available volumetric survey information, an annual sediment rate was calculated or cited from available information, and loadings calculated for year 2030 through year 2080. Sediment distribution within the reservoir was calculated using the Empirical Area Reduction Method, and resultant 2030 and 2080 area-capacity curves were developed and employed within the applicable WAM to calculate 2030 through 2080 firm yields.

Table 3.4 Summary of Sedimentation Rates, Sources, and Rating Curves Employed for Region D Reservoirs

Basin	Reservoir	Average Annual Sedimentation Rate at Conservation Pool (ac-ft/yr)	Sedimentation Data Source	Year for Rating Curve
CYPRESS	Bob Sandlin	249	TWDB	2018
CYPRESS	Caddo	N/A	No volumetric /sedimentation survey	1971
CYPRESS	Cypress Springs	168	TWDB	2007
CYPRESS	Ellison Creek	N/A	No volumetric /sedimentation survey	1943
CYPRESS	Johnson Creek	N/A	No volumetric /sedimentation survey	1961
CYPRESS	Lake Gilmer	N/A	No volumetric /sedimentation survey	1998
CYPRESS	Lake O' The Pines	260	TWDB	2009
CYPRESS	Monticello	214	TWDB	1998
CYPRESS	Peacock Site 1A Tailings Lakes	N/A	No volumetric /sedimentation survey	1983
CYPRESS	Tankersley	N/A	No volumetric /sedimentation survey	1955
CYPRESS	Welsh	129	TWDB	2001
NECHES	Rhines	N/A	No volumetric /sedimentation survey	1948
RED	Crook	28	Lake Pat Mayse Water Availability Study, HDR	2003
RED	Pat Mayse	162	Lake Pat Mayse Water Availability Study, HDR	2008
SABINE	Big Sandy Creek	N/A	No volumetric /sedimentation survey	1935
SABINE	Brandy Branch	N/A	No volumetric /sedimentation survey	1983
SABINE	Cherokee	33	TWDB	2015
SABINE	Edgewood City Lake	N/A	No volumetric /sedimentation survey	1951
SABINE	Fork	1327	Survey by TWDB, calculations by Freese and Nichols	2009
SABINE	Gladewater	46	TWDB	2000
SABINE	Greenville Lakes	N/A	No volumetric /sedimentation survey	1925
SABINE	Hawkins	N/A	No volumetric /sedimentation survey	1962
SABINE	Holbrook	N/A	No volumetric /sedimentation survey	1962
SABINE	Lake Quitman	N/A	No volumetric /sedimentation survey	1962
SABINE	Lake Winnsboro	N/A	No volumetric /sedimentation survey	1962
SABINE	Loma	N/A	No volumetric /sedimentation survey	1965
SABINE	Mill Creek	N/A	No volumetric /sedimentation survey	1970
SABINE	Tawakoni	1322	Survey by TWDB, calculations by Freese and Nichols	2009
SULPHUR	Big Creek	56	TWDB	2022
SULPHUR	Caney Creek	N/A	No volumetric /sedimentation survey	2005

Basin	Reservoir	Average Annual Sedimentation Rate at Conservation Pool (ac-ft/yr)	Sedimentation Data Source	Year for Rating Curve
SULPHUR	Elliot Creek	N/A	No volumetric /sedimentation survey	2005
SULPHUR	Jim Chapman/Cooper	830	TWDB	2022
SULPHUR	Langford	38	Material submitted by City of Clarksville produced by MTG Engineers	2008
SULPHUR	Rivercrest	N/A	No volumetric /sedimentation survey	1953
SULPHUR	Sulphur Springs	N/A	No volumetric /sedimentation survey	1974
SULPHUR	Turkey Creek	N/A	No volumetric /sedimentation survey	1957
SULPHUR	Wright Patman	824*	Material submitted by Riverbend Water Resources District, produced by Arroyo Environmental Inc., LJA Engineering, and HDR Engineering	2018

* Annual sedimentation accumulation below elevation 224.9' msl. Annual sedimentation accumulation below elevation 220.6' msl is 714 ac-ft/yr.

3.1.2 Modeled Source Water Availabilities

3.1.2.1 Sabine River Basin

The Sabine River originates in Collin County, just west of the North East Texas Region, and extends to Sabine Lake in the far southeastern portion of Texas. The total drainage area of the basin is nearly 9,800 square miles. Of this area, approximately 7,500 square miles are in Texas while the remaining 2,300 square miles of drainage are in Louisiana. Within the North East Texas Region, all or portions of Hunt, Hopkins, Franklin, Rains, Wood, Upshur, Gregg, Harrison, Smith and Van Zandt counties are in the Sabine Basin. The existing surface water sources modeled in the Sabine Basin included nine reservoirs, and combined run-of-the-river supplies from the Sabine River. Table 3.5 presents the modeled source water availability for these sources during drought of record conditions by decade.

Table 3.5 Sabine Basin Surface Water Firm Yield (ac-ft/yr)

Source Name	2030	2040	2050	2060	2070	2080
BIG SANDY CREEK LAKE / RESERVOIR	2,680	2,680	2,680	2,680	2,680	2,680
BRANDY BRANCH LAKE / RESERVOIR	19,889	19,889	19,889	19,889	19,889	19,889
EDGEWOOD CITY LAKE / RESERVOIR	160	160	160	160	160	160
LAKE FORK / RESERVOIR	168,966	167,119	165,272	163,424	161,577	159,730
GLADEWATER LAKE / RESERVOIR	4,540	3,944	3,348	2,752	2,156	1,560
GREENVILLE CITY LAKE / RESERVOIR	3,420	3,420	3,420	3,420	3,420	3,420
LOMA LAKE / RESERVOIR	880	880	880	880	880	880
MILL CREEK LAKE / RESERVOIR	1190	1190	1190	1190	1190	1190
TAWAKONI LAKE / RESERVOIR	226,239	224,543	222,847	221,152	219,456	217,760
SABINE LIVESTOCK LOCAL SUPPLY	5,980	5,980	5,980	5,980	5,980	5,980

Source Name	2030	2040	2050	2060	2070	2080
SABINE OTHER LOCAL SUPPLY	3347	3507	3670	3837	3998	4161
SABINE RIVER COMBINED RUN OF RIVER	111,202	111,202	111,202	111,202	111,202	111,202
DIRECT REUSE	6161	6161	6161	6161	6161	6161
TOTAL	**554,654**	**550,675**	**546,699**	**542,727**	**538,749**	**534,773**

3.1.2.2 Red River Basin

The Red River Basin originates in eastern New Mexico and extends eastward across north Texas and southern Oklahoma and into Louisiana. Approximately 24,297 square miles of the 93,450 square miles drainage area of the basin is within Texas. Within the North East Texas RWPA, all or part of Bowie, Red River, and Lamar Counties are in the Red River Basin.

The existing surface water sources in the Red River Basin include Lake Texoma Pat Mayse Lake and Lake Crook. Table 3.6 presents the modeled source water availability under drought of record conditions within Region D. None of the water in Lake Texoma is considered available to the North East Texas Region due to lack of infrastructure and water rights; thus, it is not listed as a supply for Region D.

Table 3.6 Red River Basin Surface Firm Yield (ac-ft/yr)

Source Name	2030	2040	2050	2060	2070	2080
CROOK LAKE / RESERVOIR	5,000	4,800	4,600	4,400	4,200	4,000
PAT MAYSE LAKE / RESERVOIR	50,490	50,252	50,014	49,776	49,538	49,300
RED RIVER COMBINED RUN OF RIVER	8,690	8,690	8,690	8,690	8,690	8,690
SABINE LIVESTOCK LOCAL SUPPLY	491	488	497	510	517	517
DIRECT REUSE	12	12	12	12	12	12
TOTAL	**64,683**	**64,242**	**63,813**	**63,388**	**62,957**	**62,519**

3.1.2.3 Sulphur River Basin

The Sulphur River Basin begins in Fannin and Hunt counties and extends eastward to southwest Arkansas where it joins the Red River. Within the North East Texas Region, all or part of Hunt, Delta, Lamar, Hopkins, Franklin, Titus, Red River, Morris, Bowie, and Cass counties are within the Sulphur Basin. The Texas portion of the Sulphur Basin covers 3,580 square miles.

Due to high average rainfall and runoff, the Sulphur Basin has an abundant supply of surface water. There are 29 impoundments in the Sulphur Basin with a normal storage capacity greater than 200 acre-feet. However, five reservoirs account for the majority of current supply in the basin. Table 3.7 presents the source water availability in the Sulphur River Basin.

Table 3.7 Sulphur River Basin Surface Firm Yield (ac-ft/yr)

Source Name	2030	2040	2050	2060	2070	2080
BIG CREEK LAKE / RESERVOIR	940	752	564	376	188	0
TURKEY CREEK LAKE	190	190	190	190	190	190
CHAPMAN/COOPER LAKE/RESERVOIR (NON-SYSTEM)	63,901	62,381	60,861	59,341	57,821	56,301
CANEY CREEK LAKE	792	792	792	792	792	792
LANGFORD LAKE / RESERVOIR	130	0	0	0	0	0
RIVER CREST LAKE / SULPHUR RUN OF THE RIVER*	5300	5300	5300	5300	5300	5300
SULPHUR SPRINGS LAKE	7,730	7,730	7,730	7,730	7,730	7,730
ELLIOT CREEK LAKE	1,318	1,318	1,318	1,318	1,318	1,318
WRIGHT PATMAN LAKE / RESERVOIR**	264,230	255,166	246,102	237,038	227,974	218,910
SULPHUR RIVER COMBINED RUN OF RIVER	13,126	13,126	13,126	13,126	13,126	13,126
SULPHUR LIVESTOCK LOCAL SUPPLY	6,130	6,053	5,819	5,715	5,456	5,343
SULPHUR OTHER LOCAL SUPPLY	25	26	26	26	26	26
TOTAL	**363,812**	**352,834**	**341,828**	**330,952**	**319,921**	**309,036**

* River Crest watershed is negligible. This yield is based on a permit for transfer of up to 10,000 ac-ft/yr from the Sulphur River.
** Firm yield of Wright Patman estimated at ultimate curve reservoir operations with sedimentation. However, only 180,000 ac-ft/yr is permitted.

3.1.2.4 Cypress Creek Basin

The Cypress Creek Basin originates in Hopkins County and extends eastward into northwest Louisiana, where it flows into the Red River. The Texas portion of the Cypress Basin covers 2,929 square miles and includes all or portions of Hopkins, Gregg, Franklin, Wood, Titus, Camp, Upshur, Cass, Marion, Morris and Harrison counties in the North East Texas Region. Table 3.8 presents source water availabilities for the Cypress Creek Basin.

Table 3.8 Cypress Creek Basin Surface Firm Yield (ac-ft/yr)

Source Name	2030	2040	2050	2060	2070	2080
BOB SANDLIN LAKE/RESERVOIR	26,200	25,660	25,120	24,580	24,040	23,500
CADDO LAKE / RESERVOIR	10,000	10,000	10,000	10,000	10,000	10,000
CYPRESS SPRINGS LAKE / RESERVOIR	10,500	10,040	9,580	9,120	8,660	8,200
ELLISON CREEK LAKE / RESERVOIR	33,640	33,640	33,640	33,640	33,640	33,640
GILMER LAKE / RESERVOIR	6,300	6,300	6,300	6,300	6,300	6,300
JOHNSON CREEK LAKE / RESERVOIR	2,280	2,280	2,280	2,280	2,280	2,280
MONTICELLO LAKE/RESERVOIR	5,000	4,560	4,120	3,680	3,240	2,800
LAKE O' THE PINES / RESERVOIR	159,000	157,500	156,000	154,500	153,000	151,500
TANKERSLEY LAKE / RESERVOIR	1,500	1,500	1,500	1,500	1,500	1,500
WELSH LAKE / RESERVOIR	2,900	2,620	2,340	2,060	1,780	1,500
DIRECT REUSE	66,820	61,504	62,760	71,634	65,408	65,408

Source Name	2030	2040	2050	2060	2070	2080
CYPRESS RIVER COMBINED RUN-OF-RIVER	11,754	11,754	11,754	11,754	11,754	11,754
CYPRESS LIVESTOCK LOCAL SUPPLY	3,261	3,288	3,354	3,448	3,544	3,570
GRAYS CREEK RUN-OF-RIVER	12	12	12	12	12	12
PEACOCK SITE 1A TAILINGS LAKE/RESERVOIR	877	874	871	867	864	861
TOTAL	**340,044**	**331,532**	**329,631**	**335,375**	**326,022**	**322,825**

* Firm yields of reservoirs presented herein do not reflect contractual agreements between entities, unless such agreements are incorporated into the TCEQ official WAM for the basin. If not within the official WAM, such agreements are reflected in the individual supplies for each WUG/WWP/MWP.

3.1.2.5 Neches River Basin

The Neches River Basin originates in Van Zandt County and extends southeast to the Gulf of Mexico, with total drainage area of 9,937 square miles. The portion within the North East Texas Region is very small, with only small parts of Van Zandt and Smith Counties in the basin. Source water availabilities for Region D sources in the Neches River Basin are presented in Table 3.9.

Table 3.9 Neches Basin Surface Firm Yield (ac-ft/yr)

Source Name	2030	2040	2050	2060	2070	2080
RHINES LAKE / RESERVOIR	1,170	1,170	1,170	1,170	1,170	1,170
NECHES COMBINED RUN OF RIVER	150	150	150	150	150	150
NECHES LIVESTOCK LOCAL SUPPLY	1,136	1,136	1,136	1,136	1,136	1,136
TOTAL	**2,456**	**2,456**	**2,456**	**2,456**	**2,456**	**2,456**

3.1.2.6 Trinity River Basin

The Trinity River Basin originates in Archer County and extends southeast to the Gulf of Mexico. The total drainage area of the basin is 17,913 square miles and contains the largest population of any basin in the state. However, within the North East Texas Region only small parts of Hunt and Van Zandt counties are located within the Trinity River Basin.

There are no major surface water supplies within the portion of the Trinity Basin in the North East Texas Region. However, some supply from Lake Lavon is available for use in the region. Source water availabilities for Region D sources in the Trinity River Basin are presented in Table 3.10.

Table 3.10 Trinity Basin Surface Firm Yield (ac-ft/yr)

Source Name	2030	2040	2050	2060	2070	2080
TRINITY OTHER LOCAL SUPPLY	633	561	483	375	317	228
TOTAL	**633**	**561**	**483**	**375**	**317**	**228**

3.2 Groundwater Availability

Groundwater availability estimates for the North East Texas Region are presented in the sections that follow. This includes a brief discussion of the methods that were used to estimate groundwater availability, including the methodology used to develop estimates for each aquifer represented in this regional water plan.

3.2.1 Background

In June 1997, the 75th Texas Legislature enacted Senate Bill 1 (SB 1) to establish a comprehensive statewide water planning process to help ensure that the water needs of all Texans are met. SB 1 mandated that representatives serve as members of RWPGs to prepare regional water plans for their respective areas. These plans map out how to conserve water supplies, meet future water supply needs and respond to future droughts in the planning areas. Additionally, SB 1 established that groundwater conservation districts (GCDs) were the preferred entities for groundwater management and contained provisions that required the GCDs to prepare management plans.

In 2001, the Texas Legislature enacted Senate Bill 2 (SB 2) to build on the planning requirements of SB 1 and to further clarify the actions necessary for GCDs to manage and conserve groundwater resources. As part of SB 2, the Legislature called for the creation of GMAs which were based largely on hydrogeologic and aquifer boundaries instead of political boundaries. The TWDB divided Texas into 16 GMAs, and most contain multiple GCDs. One of the purposes for GMAs was to manage groundwater resources on a more aquifer-wide basis. Figure 3.1 shows the regulatory boundaries of the GMAs within Region D. The North East Texas Region does not contain any GCDs.

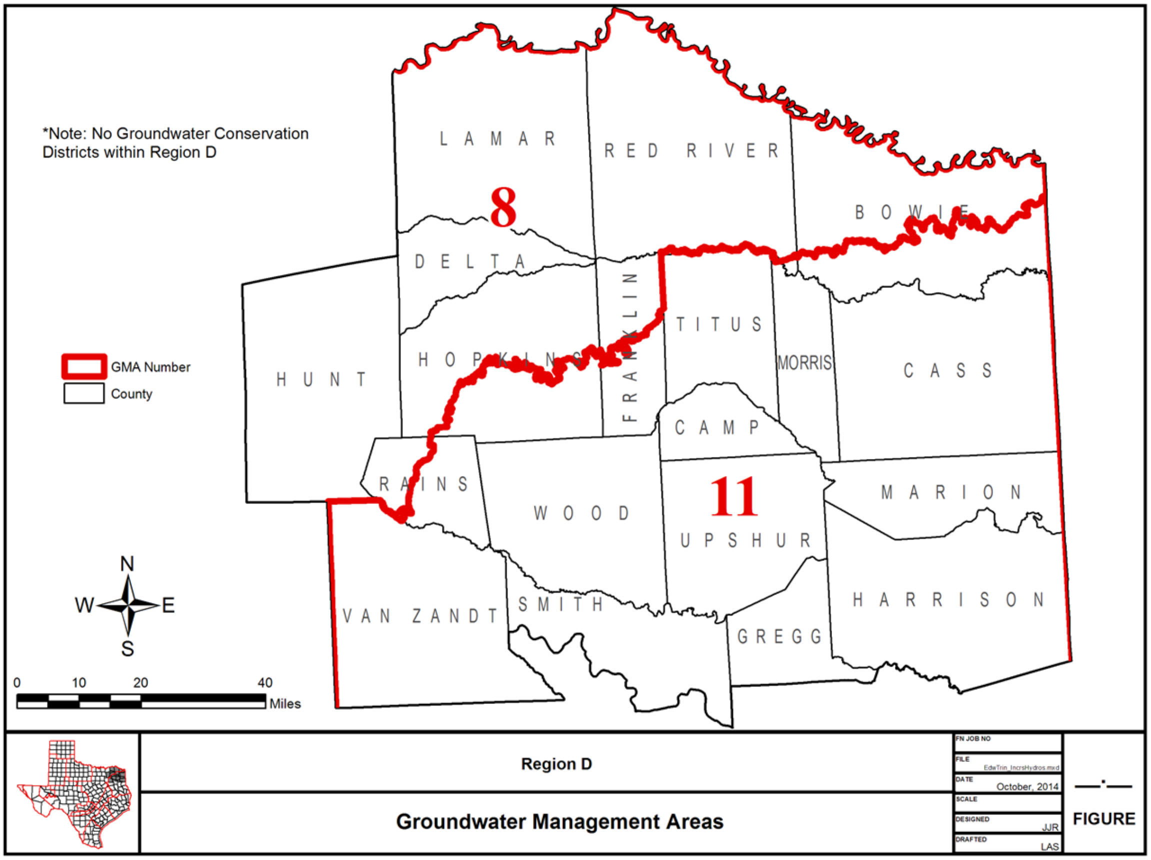


Figure 3.1 Groundwater Management Areas within Region D

The Texas Legislature enacted significant changes to the management of groundwater resources in Texas with the passage of House Bill 1763 (HB 1763) in 2005. The main goal of HB 1763 was intended to clarify the authority and conflicts between GCDs and RWPGs. The new law clarified that GCDs would be responsible for aquifer planning and developing the amount of groundwater available for use and/or development by the RWPGs. To accomplish this, the law directed that all GCDs within each GMA to meet and participate in joint groundwater planning efforts. The focus of joint groundwater planning was to determine the DFCs for the groundwater resources within the GMA boundaries (before September 1, 2010, and at least once every 5 years after that).

DFCs were defined by statute to be "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 how GCDs want to manage groundwater in their particular area and in areas that do not contain GCDs. 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 analyses 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 MAG. For aquifers without a GAM, another quantitative approach is used to estimate the MAG.

In 2011, Senate Bill 660 required that GMA representatives participate within each applicable RWPG. It also required the Regional Water Plans be consistent with the DFCs in place when the regional plans are initially developed. TWDB technical guidelines for the current round of planning generally establish that the MAG (within each county and basin) is the maximum amount of groundwater that can be used for existing uses and new strategies in Regional Water Plans. However, with the passage of Senate Bill 1101 by the 84th Texas Legislature in 2015, a RWPG is allowed to define all groundwater availability as long as there are no GCDs within the RWPA. In the State of Texas, this applies only to the Region D RWPA.

Because there are no GCDs within Region D, the NETRWPG exercised the right to refine the groundwater availability estimates to determine if the MAG volumes estimated by the TWDB were appropriate for the purposes of the 2026 Region D Plan. The NETRWPG believes that local entities that operate wells and wellfields in the region have insight and information that may be helpful in refining the groundwater availability estimates. The refined evaluation was deemed necessary to ensure that historical use and local aquifer characteristics and conditions are properly considered when estimating local groundwater availability.

Without local GCD representation and data, it is difficult for GMA 11 and GMA 8 to assess groundwater availability at the level that may be required for local groundwater sources. Refinement of the groundwater availability estimates entailed comparing the MAGs for each county-aquifer-basin and calculated municipal pumpage. The term "relevant" as applied to groundwater aquifers, determines whether they are considered critical to joint groundwater planning, and is a designation that can change from one planning cycle to the next.

Generally, the MAG amounts were used for the purposes of the 2026 Region D Plan, except in instances where it was determined that existing supplies (or possible Water Management Strategies) would exceed the MAG amount for a given county-aquifer-basin. In these instances, the following data were first reviewed:

- Public water supply well locations, well depths, well tested capacities, and public water supply system average daily consumption volumes available via the TCEQ Texas Drinking Water Watch.
- Groundwater well locations, depths and well yields available via TCEQ water well databases.
- Groundwater well locations, depths and well yields available via the TWDB.
- TWDB GAM run reports requested by GMA-8 for both the 2021 and 2026 planning cycles.
- Structure surfaces derived for either the Northern Trinity Woodbine GAM (Kelley and others, 2013) or the Nacatoch Brackish Availability Study (Laughlin and others, 2017).
- TWDB historical groundwater pumping from reported water use estimates and survey information.
- Supplemental modeling performed by TWDB identifying total groundwater availabilities that are physically compatible with desired future conditions for aquifers in GCDs not located in Region D in co-located groundwater management areas.

For municipal pumping, public water supply (PWS) locations were verified to be active and to have the correct aquifer designation based on geologic structure. River basin splits, where applicable, were noted for each public system so that pumping could be properly allocated to compare to MAG volumes split out by basin. Total test well capacities were summed for PWS wells by county-aquifer-basin, then divided by four to derive the expected average annual pumping for the system. The average daily consumption of the system, if reported, was also converted to an annual volume to represent the average annual PWS system pumping. Estimates of average annual pumping volume were then compared to the MAG volume.

For non-municipal pumping, the only non-municipal estimates that are based on annual surveys are pumping estimates reported by industrial users, which accounted for approximately four percent of Region D pumping in 2016. To verify non-municipal historical pumping estimates, existing non-municipal well locations were verified (when possible) to be active and aquifer designations were either determined (from state well reports) or verified (for TWDB historical wells) using the geologic structure sources mentioned previously. Non-surveyed estimates were then evaluated to determine if they could be substantiated by existing active wells found within the county-aquifer-basin. Since the non-surveyed volumes are county-wide estimates and are not location-specific, in some areas they can erroneously assign pumping to water users that cannot be substantiated using the publicly available state well databases and other resources. Region D considered the non-surveyed historical pumping estimates to be questionable when there were no well data to support the assumption that the demands are supplied by wells in that specific county-aquifer-basin. TWDB's non-surveyed historical estimates may not have any direct relationship to MAG volumes or regional supply estimates, but they can provide insight for water resource planning.

Noting the lack of GCDs in Region D, the region wanted to exercise the right to refine the groundwater availability estimates to determine if the MAG volumes estimated by the TWDB were appropriate for the region. Region D believes that local entities that operate wells and wellfields in the region have insight and information that may be helpful in refining the groundwater availability estimates. The refined evaluation was deemed necessary to ensure that historical use and local aquifer characteristics and conditions were properly considered when estimating local groundwater availability. Without local GCD representation and data, it is difficult for Groundwater Management Area (GMA) 11 and GMA 8 to assess groundwater availability at the level that may be required for local groundwater sources. Refinement of the groundwater availability estimates entailed comparing the MAGs for each county-aquifer-basin and calculated municipal pumpage in nine county-aquifer-basins. The term "relevant" as applied to groundwater aquifers, determines whether they are considered critical to joint groundwater planning. The 'relevant' designation can change from one planning cycle to the next.

Through the course of the development of the 2026 Region D Water Plan, the NETRWPG submitted a proposed methodology for determining groundwater availability in the region. Appendix C3-3 presents the formal communications between the NETRWPG and TWDB through this process, including the TWDB's approval of the groundwater availabilities utilized for the purposes of the 2026 Region D Water Plan. Volume adjustments for non-relevant aquifers did not require TWDB approval and were based on the local hydrogeologic assessment.

3.2.2 Characterization of Aquifers in Region D

The following discussion describes the two major aquifers (Carrizo-Wilcox and Trinity) along with the four minor aquifers (Nacatoch, Blossom, Queen City and Woodbine) found in the North East Texas Region.

Groundwater availability estimates have been extracted from GAM runs to determine the MAG for each aquifer. Table 3.11 presents the groundwater availabilities by county, aquifer and river basin for planning years 2030 through 2080. Groundwater availabilities consist of modeled available groundwater (MAG) volumes and non-MAG volumes. The MAG volumes are the largest amount of water that can be withdrawn from a given source without violating desired future conditions (DFCs) that were adopted by the local groundwater management area (GMA) and groundwater conservation district (GCD). MAGs are calculated by the TWDB based on the adopted DFCs. Non-MAG volumes are for those county/aquifer/basin splits where a DFC was not adopted.

Groundwater availability volumes for non-relevant aquifers determined by the TWDB during MAG GAM Runs for relevant aquifers are called “DFC-compatible availability volumes." Non-relevant aquifers for the most recent planning cycle include the: Brazos River Alluvium, Blossom, Nacatoch, Yegua-Jackson, Gulf Coast and Trinity aquifers. There are also some counties in GMA 11 in which the Queen City is non-relevant where the outcrop and downdip area is less than 200 square miles. These areas have aquifer characteristics, groundwater demands, and current groundwater uses that do not warrant adoption of a DFC. It is anticipated that there will be no large-scale production from non-relevant aquifers. Additionally, it is assumed that what production does occur will not affect conditions in relevant portions of the aquifer(s).

Historical pumping estimates for years 2017 through 2021 were also utilized for comparison against the MAGs (Table 3.12). The county-aquifer-basin combinations that are highlighted in red exceed the year 2030 MAG. All pumping was summed by county, basin and aquifer and divided by five to determine average annual use. This was done to determine potential needs and conflicts based on where pumping has been occurring.

The pumping estimates are based on reported pumping (from TWDB surveys) as well as non-surveyed estimates. Non-surveyed estimates can comprise a rather significant portion of the historical estimates data. Irrigation estimates are based on USDA Farm Service Administration crop acreage data and irrigation depths are based on evapotranspiration. Livestock estimates are based upon Texas Agricultural Statistics Service livestock population statistics with use per animal derived from Texas Agricultural Experiment Station research. TWDB estimates water use for non-surveyed cities with a population greater than 500.

Most of the highlighted rows in Table 3.12 apply to non-relevant aquifers. The largest difference between a DFC-compatible availability volume and average historical pumping occurs in Lamar County - Blossom Aquifer - Red River Basin. The DFC-compatible volume is 323 acre-feet/year, and the average pumpage is 4,670 acre-feet/year, which gives a difference of 4,367 acre-feet. The largest discrepancy between a MAG and average pumping is in Hunt County.

The Hunt County - Woodbine Aquifer - Sulphur Basin MAG is 165 for year 2030, and the historical pumping indicates that the average pumpage for 2017 through 2021 is 502 acre-feet. However, Hickory Creek SUD has four Woodbine wells. Two are in the Trinity Basin, one in the Sabine Basin, and two in the Sulphur Basin. All of their pumpage is reported in the Sulphur Basin. If the tested capacities of the four wells are weighted, the Sulphur Basin well only accounts for 24 percent of the SUD's pumping, or 173 acre-feet/year.

Table 3.11 details updated availability (MAG) numbers for 2026. The source(s) of data for each aquifer as well as a brief discussion of each aquifer are summarized below.

3.2.2.1 Blossom Aquifer

The Blossom Aquifer (see Figure 3.2) occupies a narrow east-west band in parts of Bowie, Red River, and Lamar counties in the northeast corner of the North East Texas Region. The TWDB has historically assumed that the annual availability for the Blossom Aquifer is equal to the effective recharge that occurs primarily through infiltration of rainfall over the outcrop. The Blossom formation consists of alternating sequences of sand and clay. In places it attains a thickness of 400 feet, although no more than 29 percent of this thickness consists of water-bearing sand. Most of the water in storage is under water-table conditions.

The Blossom Aquifer yields water in small to moderate amounts over a limited area on and south of the outcrop, with the largest well yields occurring in Red River County. The average well yields 75 gal/min in Red River County. Production decreases in the western half of the aquifer where yields less than 50 gal/min are more typical. Wells producing fresh to slightly saline water are located on the formation outcrop in northwestern Bowie and eastern Red River counties and in the City of Clarksville. The groundwater is generally soft, slightly alkaline and, in some areas, high in sodium bicarbonate, iron, and fluoride.

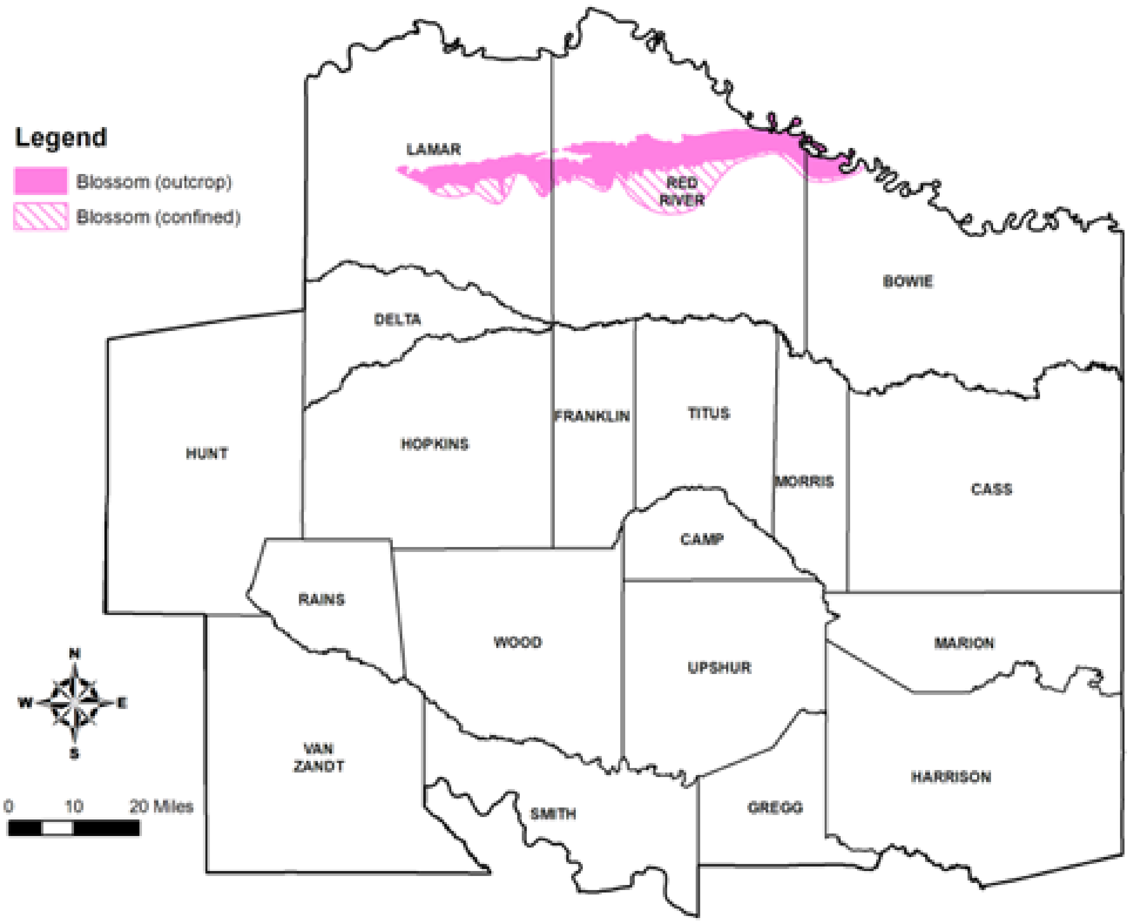


Figure 3.2 Blossom Aquifer within Region D

In 2021, the total pumpage in the Region was 9,003 ac-ft from the Blossom Aquifer. GMA 8 determined the Blossom aquifer to be non-relevant for joint planning purposes in 2017 and therefore, DFCs and MAGs were not developed for the Blossom aquifer. Previous MAG estimates (GTA Aquifer Assessment, 10-19 MAG Groundwater Management Area 8, Blossom Aquifer Modeled Available Groundwater estimates, December 9, 2011), historical use, and other local hydrogeologic information were used to help evaluate available supply from this aquifer.

3.2.2.2 Carrizo-Wilcox Aquifer

The Carrizo-Wilcox group (see Figure 3.3) is the most extensive and productive aquifer in the North East Texas Region and is a designated major aquifer by the TWDB. This aquifer extends from the Rio Grande in south Texas northeast into Arkansas and Louisiana, providing water to 60 counties in Texas. In the outcrop, wells generally yield less than 100 gpm – downdip yields greater than 500 gpm are not uncommon. The production capacity of the Carrizo-Wilcox Aquifer is variable because of the heterogeneous nature of the sediments that comprise the aquifer. Nevertheless, in general, it is a very productive aquifer and is recharged from infiltration from precipitation. The majority of municipal wells in the North East Texas Region produce from the Carrizo-Wilcox Aquifer.

Regionally, water from the Carrizo-Wilcox Aquifer is fresh to slightly saline with quality problems in localized areas. Iron and manganese are sometimes higher than drinking water standards. In the outcrop, the water is hard, yet usually low in dissolved solids. Hydrogen sulfide and methane may occur locally. Excessively corrosive water can occur in some areas of the Region.

Total estimated groundwater availability (MAGs) for the Carrizo-Wilcox Aquifer in the North East Texas Region is 105,715 ac-ft/yr for planning year 2030. Total groundwater pumpage from the Carrizo-Wilcox Aquifer in the North East Texas Region was 54,339 ac-ft during 2021.

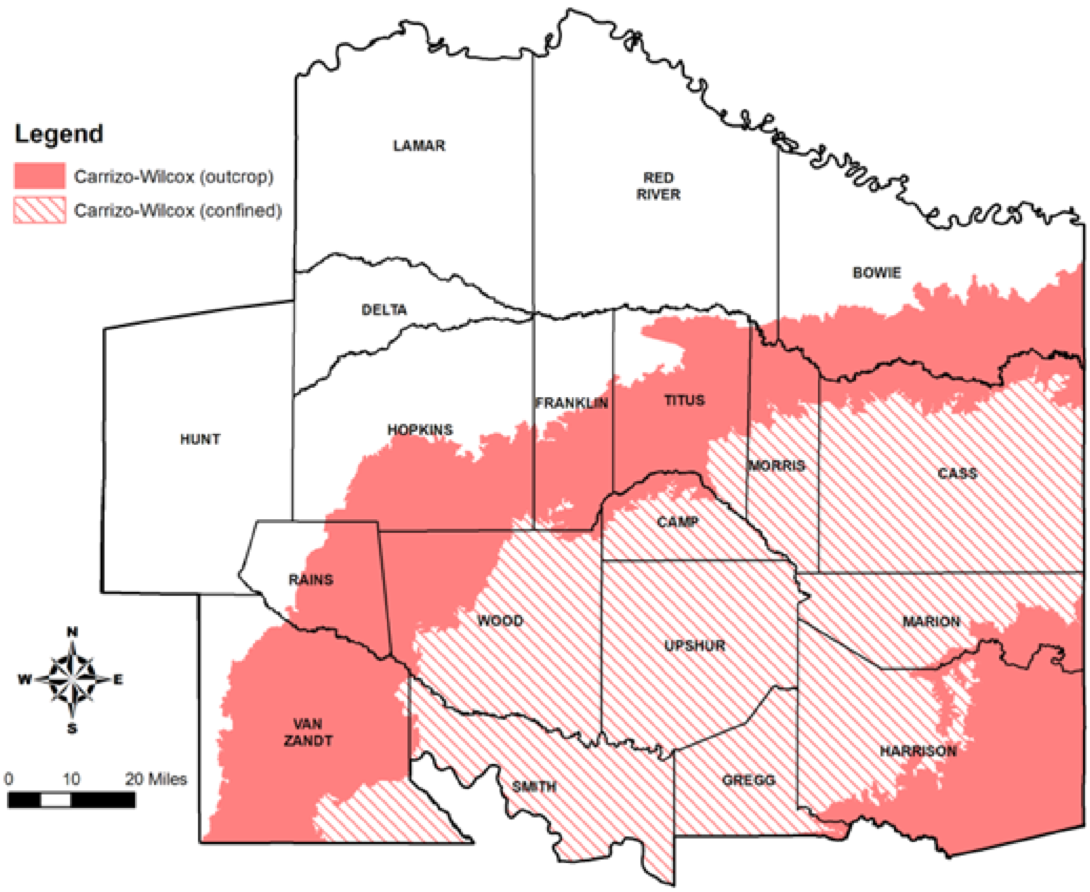


Figure 3.3 Carrizo-Wilcox Aquifer within Region D

Groundwater availability estimates for the Carrizo-Wilcox Aquifer were listed in GAM Run 21-016 MAG report, which applied to the Queen City/Sparta and Carrizo-Wilcox predictive model. The MAG within the groundwater conservation districts reflected the DFCs adopted by GMA 11. In a letter dated February 15, 2017, GMA 11 provided the TWDB with the DFC of the Carrizo-Wilcox, Queen City, and Sparta aquifers within Groundwater Management Area 11. The DFC for the aquifers are described in Attachment B of the Resolution and were adopted on January 11, 2017 by the groundwater conservation districts (GCDs) within Groundwater Management Area 11. The DFCs will allow an average drawdown of 56 feet in the Carrizo-Wilcox from the year 2000 to 2070. DFC drawdowns range from one foot in Rains County to 119 feet in Smith County.

3.2.2.3 Nacatoch Aquifer

The Nacatoch Aquifer (see Figure 3.4) is classified as a minor aquifer by the TWDB. This sandstone aquifer occurs along a narrow band in northeast and north-central Texas and extends into Arkansas and Louisiana. The Nacatoch formation is composed of one to three sequences of sands separated by impermeable layers of mudstone or clay. The aquifer also includes a hydrologically connected mantle of alluvium up to 80 feet thick where it covers the Nacatoch formation along major drainage way (such as the Red River). Groundwater in this aquifer is usually under artesian conditions except in shallow wells on the outcrop where water-table conditions exist. Well yields are generally low, less than 50 gal/min, and rarely exceed 500 gal/min. The quality of groundwater in the aquifer is generally alkaline, high in sodium bicarbonate, and soft. Dissolved-solids concentrations increase in the downdip portion of the aquifer and are significantly higher downdip of faults.

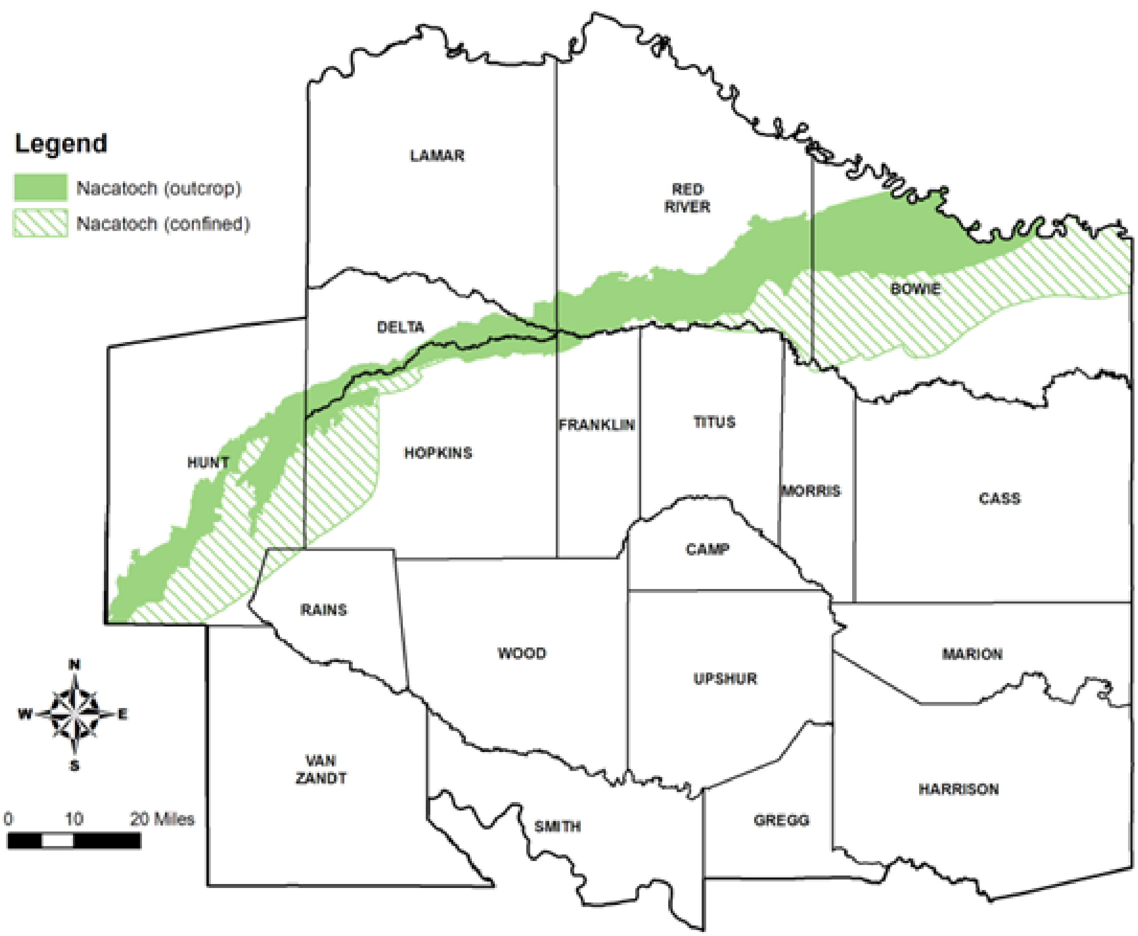


Figure 3.4 Nacatoch Aquifer within Region D

During 2021, pumpage from the aquifer totaled 4,136 ac-ft. GMA 8 determined the Nacatoch aquifer to be non-relevant for joint planning purposes in 2017 and therefore, DFCs and MAGs were not developed for this aquifer. Previous MAG estimates (GAM Run 10-006 by Mohammad Masud Hassan P.E., Texas Water Development Board, Groundwater Availability Modeling Section, July 30, 2012), historical use, and other local hydrogeologic information were used to help evaluate available supply in this aquifer.

3.2.2.4 Queen City Aquifer

The Queen City Aquifer (see Figure 3.5) is classified as a minor aquifer by the TWDB. The Queen City Aquifer extends in a band across most of Texas from the Frio River in south Texas northeast into Louisiana. The Queen City Aquifer overlies the Carrizo-Wilcox Aquifer and is shallower and more prone to potential impacts of drought and over-pumping as compared to the deeper Carrizo-Wilcox Aquifer. However, the Queen City Aquifer contains relatively large quantities of recoverable groundwater in the North East Texas Region. 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 yields are typically low. 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.

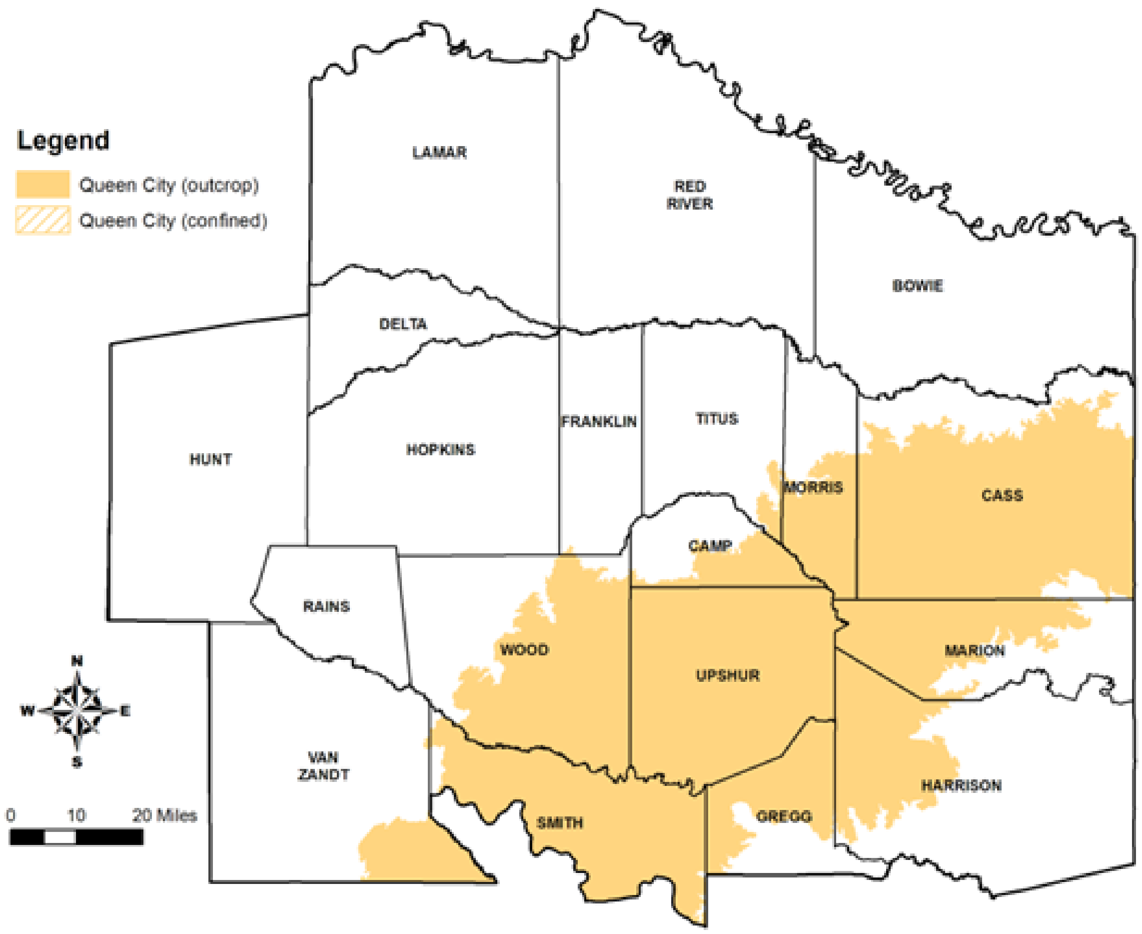


Figure 3.5 Queen City Aquifer within Region D

Groundwater availability estimates for the Queen City aquifer were listed in GAM Run 21-016 MAG report, which applied to the Queen City, Sparta, and Carrizo-Wilcox predictive model. The MAG within the groundwater conservation districts reflected the DFCs adopted by GMA 11. In a letter dated February 15, 2017, GMA 11 provided the TWDB with the DFC of the Carrizo-Wilcox, Queen City, and Sparta aquifers within GMA 11. The DFC for the aquifers are described in Attachment B of the Resolution and were adopted January 11, 2017 by the GCDs within GMA 11. The DFC allows an average drawdown of ten feet in the Queen City from the year 2000 to 2070. DFC drawdowns range from one foot in Harrison County to 24 feet in Marion County. In some counties, the Queen City was determined to be non-relevant where the combined outcrop and downdip area in the county is less than 200 square miles.

3.2.2.5 Trinity Aquifer

The Trinity Aquifer (see Figure 3.6) is composed of sand, clay, and limestone units which occur in a band from the Red River in north Texas, to the Hill Country of south-central Texas. The groundwater use from the Trinity Aquifer during 2021 in the Region was 1,236 ac-ft. This value is relatively small because only a small northwestern portion of the Region overlies the downdip portion of the Trinity Aquifer, and the groundwater from the Trinity Aquifer in the Region generally exceeds the 1,000 milligrams per liter (mg/l) TDS limits established by TCEQ for municipal supply.

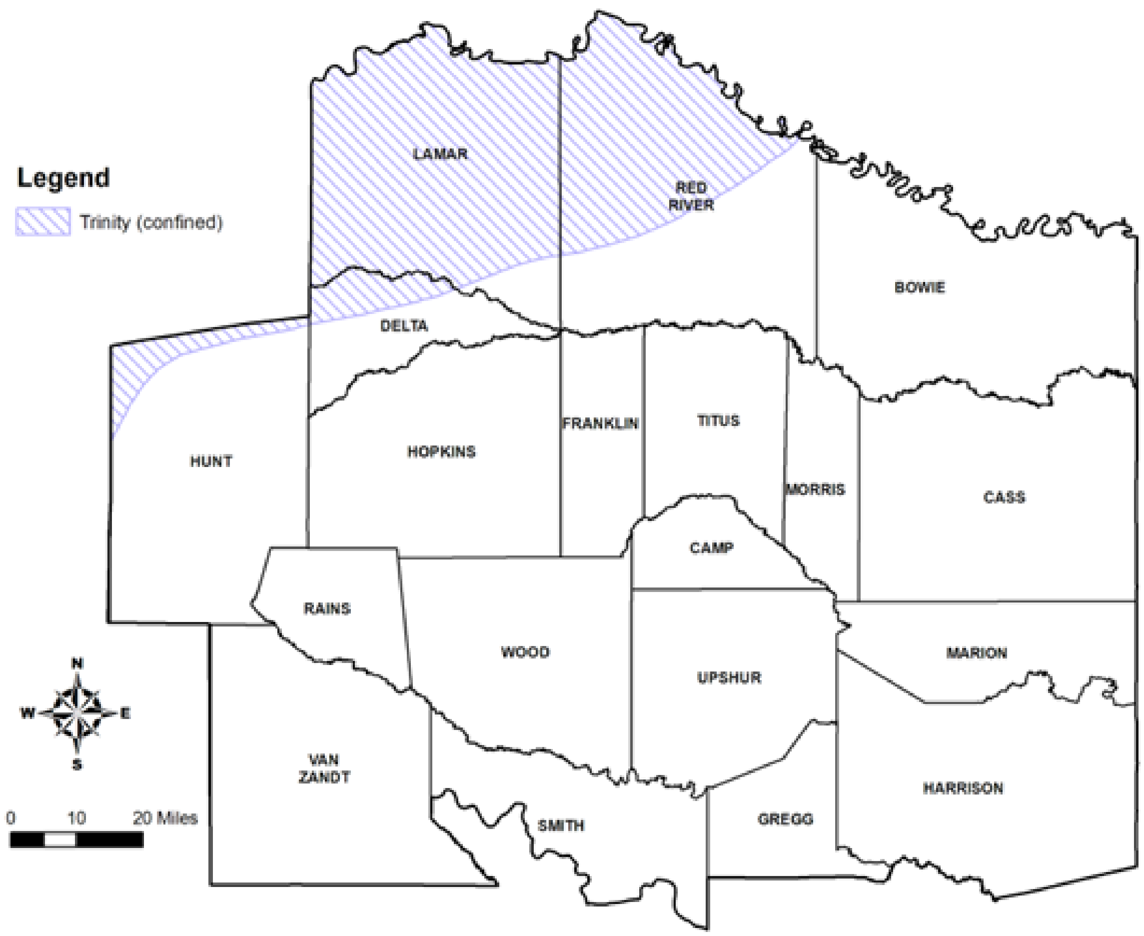


Figure 3.6 Trinity Aquifer within Region D

Groundwater availability estimates for the Trinity Aquifer were taken from GAM Run 17-029 MAG. GMA 8 provided the TWDB with the DFCs of the Trinity Aquifer adopted in a resolution dated January 31, 2017. The DFCs for the Trinity formations within Region D (hydrostratigraphic region 3 in the TWDB GAM report) average 144 feet of drawdown for the Paluxy, 116 feet for the Glen Rose, and 177 feet for the Travis Peak from 2010 to 2070.

GMA 11 determined the Trinity aquifer to be non-relevant for joint planning purposes in 2017 and therefore, DFCs and MAGs were not developed for this aquifer in GMA-11. Previous MAG estimates, historical use, and other local hydrogeologic information were used to help evaluate available supply in this aquifer.

3.2.2.6 Woodbine Aquifer

The Woodbine Aquifer (see Figure 3.7) is classified as a minor aquifer by the TWDB. The Woodbine Aquifer extends from McLennan County in north-central Texas northward to Cooke County and eastward to Red River County, paralleling the Red River. The Woodbine Aquifer is composed of water bearing sand and sandstone beds interbedded with shale and clay. The water in storage is under water-table conditions in the outcrop and under artesian conditions in the subsurface. Yields of wells in the Woodbine Aquifer in the Region are generally less than 100 gpm. Water quality in the Woodbine Aquifer in the North East Texas RWPA is typically not acceptable for public water supply because it does not meet current drinking water standards, but it may be used for domestic, irrigation, and livestock purposes.

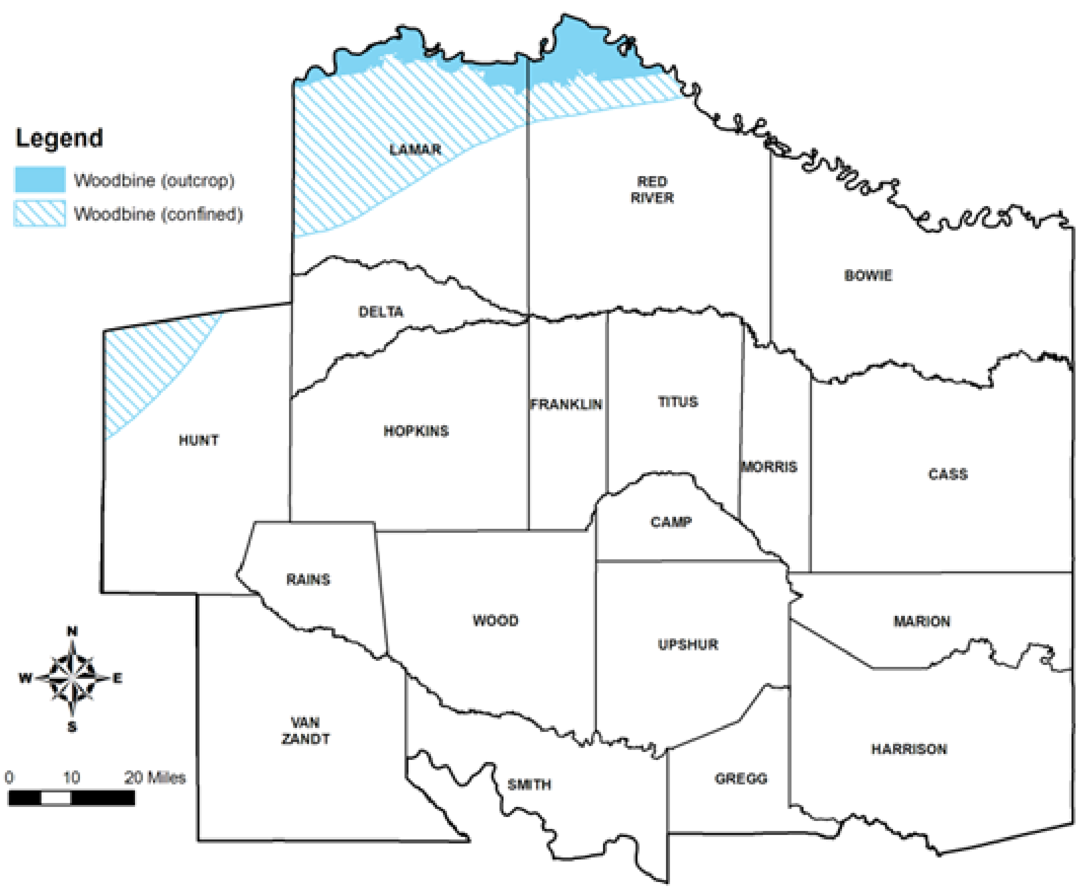


Figure 3.7 Woodbine Aquifer within Region D

Groundwater availability estimates for the Woodbine Aquifer were taken from GAM Run 17-029 MAG. GMA 8 provided the TWDB with the DFCs of the Woodbine Aquifer adopted in a resolution dated January 31, 2017. The DFC for the Woodbine aquifer allows an average drawdown of 146 feet from 2010 to 2070.

3.2.3 Existing Groundwater Supplies

Based on historic groundwater estimates for years 2017 through 2021, regional groundwater sources supplied an average of 71,920 acre feet of water annually. Approximately 67 percent of groundwater produced in the region is used for municipal purposes, and approximately 21% is used by irrigation. Groundwater is primarily found in two major and four minor aquifers in Region D, as shown in Figure 3.8. Wells in the aquifers vary in production capacity and groundwater quality.

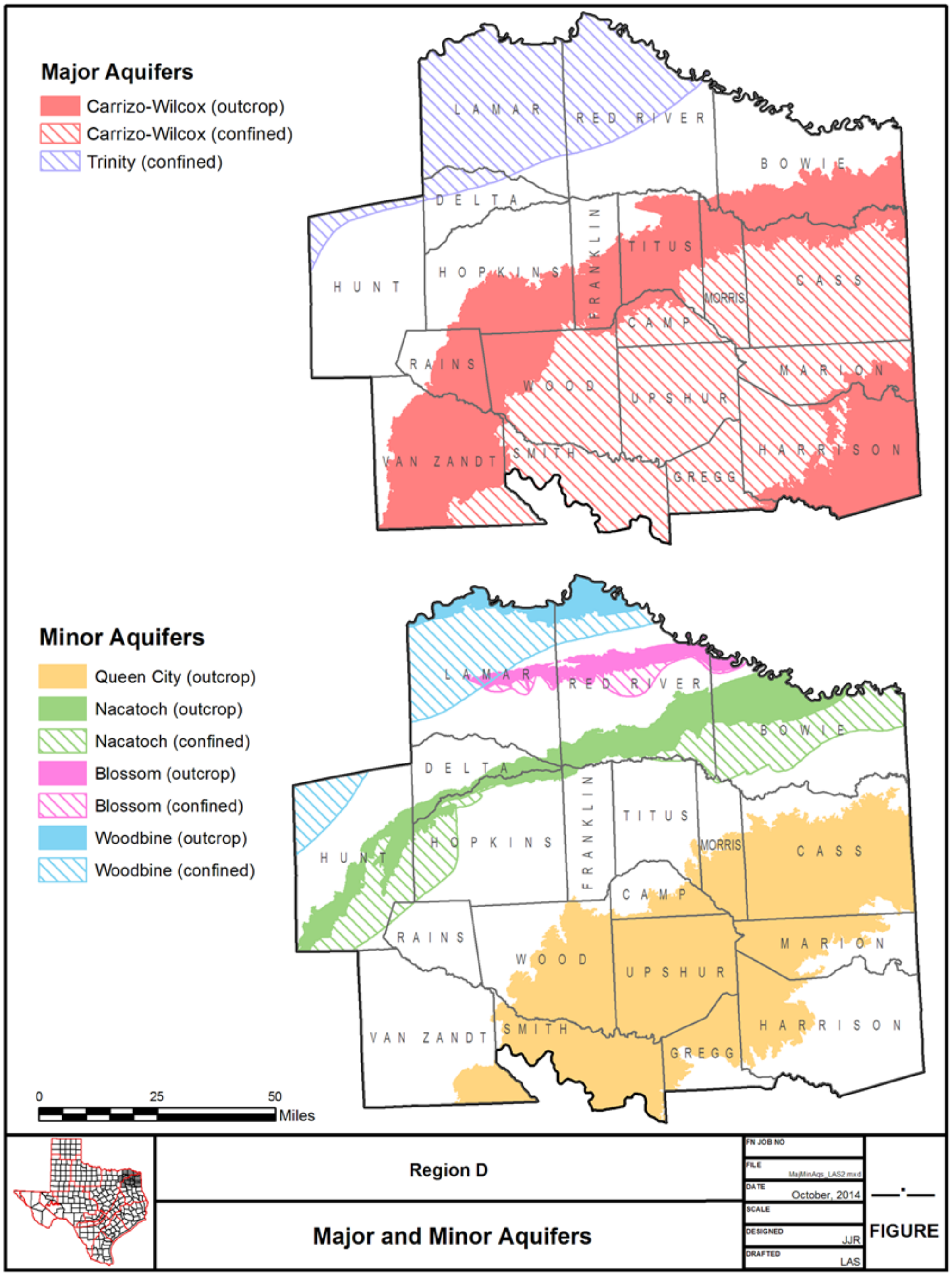


Figure 3.8 Major and Minor Aquifers in Region D

The average annual pumping in Region D by aquifer based on TWDB historical groundwater pumping estimates for 2017 through 2021 is shown in Figure 3.9. The Carrizo-Wilcox Aquifer supplied 68 percent of the region's groundwater, with the Trinity Aquifer and the minor aquifers providing the remaining groundwater production.

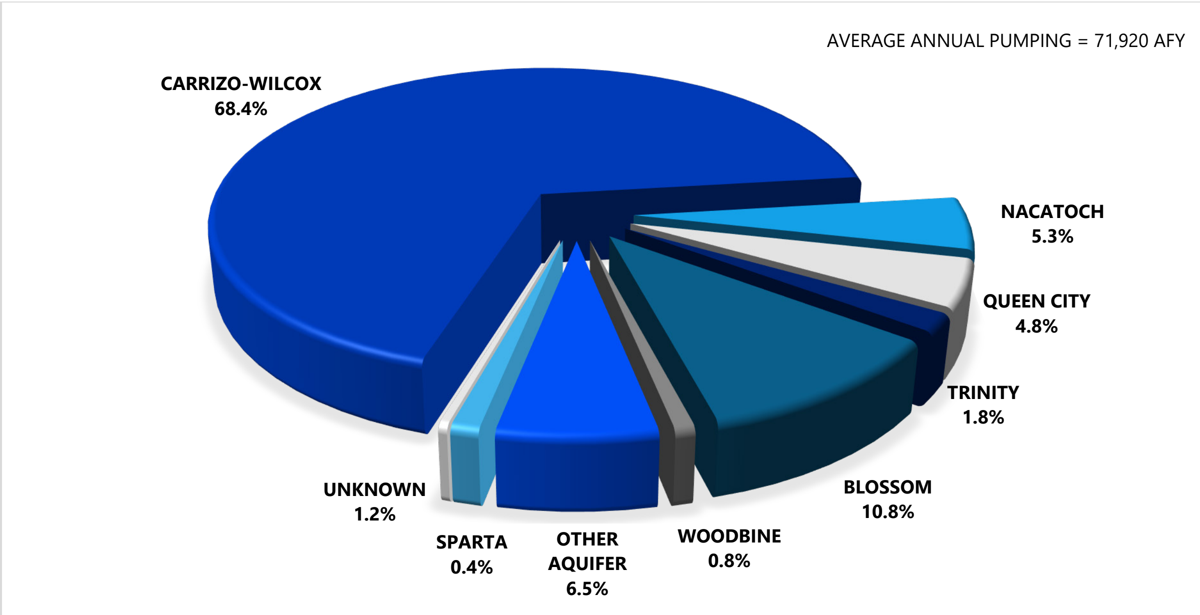


Figure 3.9 Historical Groundwater Pumping by Aquifer (2017-2021)

The same historical data is presented in Figure 3.10 by use category. Municipal accounted for 67 percent of groundwater pumped in the region. Irrigation pumping consumed approximately 21 percent of the groundwater and the remaining use categories collectively accounted for about 12 percent of total usage during the five-year period from 2017 to 2021.

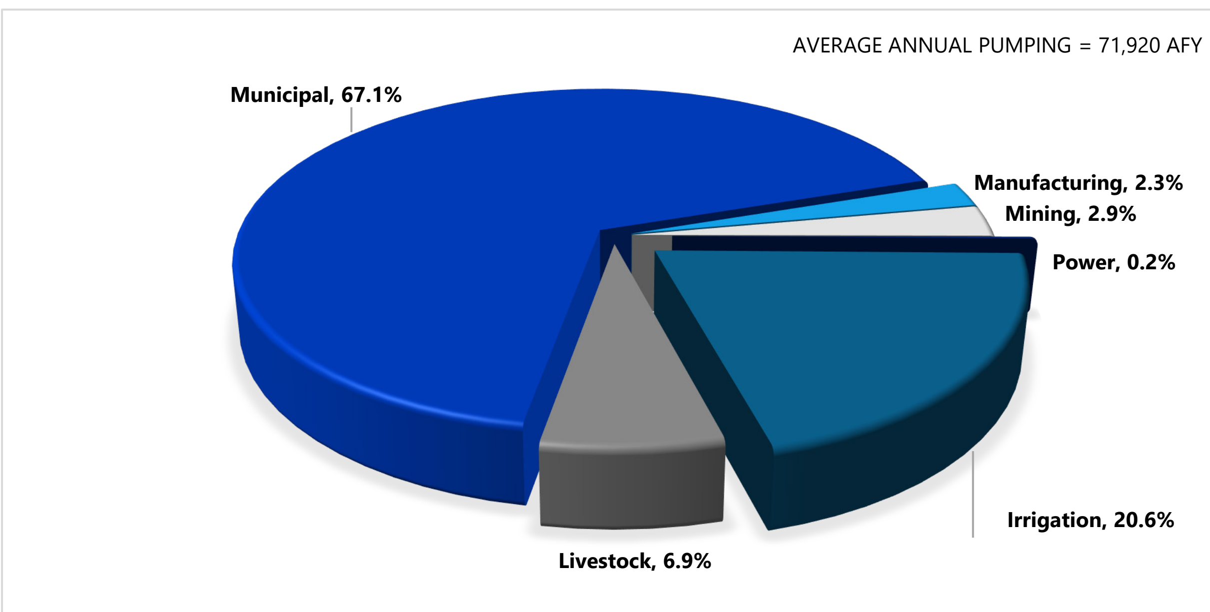


Figure 3.10 Historical Groundwater Pumping by Use (2017-2021)

Table 3.11 presents the groundwater availabilities by county, aquifer and river basin for planning years 2030 through 2080. Groundwater availabilities consist of modeled available groundwater (MAG) volumes and non-MAG volumes. The MAG volumes are the largest amount of water that can be withdrawn from a given source without violating desired future conditions (DFCs) that were adopted by the local groundwater management area (GMA) and groundwater conservation district (GCD). MAGs are calculated by the TWDB based on the adopted DFCs. Non-MAG volumes are for those county/aquifer/basin splits where a DFC was not adopted.

Non-MAG volumes were also estimated by the TWDB for aquifers without an adopted DFC. Most non-MAG volumes are for aquifers that were declared non-relevant for planning purposes by the GMA and therefore do not have an adopted DFC. Often these non-MAG volumes were determined using the MAG GAM Runs for relevant aquifers, and these non-MAG volumes are referred to as “DFC-compatible availability volumes." Non-relevant aquifers in Region D for the most recent planning cycle include the Blossom, Nacatoch, and Trinity aquifers. There are also some counties in GMA 11 in which the Queen City is non-relevant based on size, aquifer characteristics, groundwater demands, and/or current groundwater uses that did not warrant adoption of a DFC. It is anticipated that there will be no large-scale production from non-relevant aquifers.

Average TWDB historical pumping estimates for 2017 through 2021 were also compared to the total groundwater availability (Table 3.12). In most of the counties within Region D the total groundwater availability is greater than the 2017 to 2021 average historic pumping estimates. Only five counties have availabilities less than the estimated historic pumping, and only two of these- the Blossom Aquifer in Lamar County and the Trinity Aquifer in Red River County- had availabilities significantly lower than the estimated historic pumping. For both of these counties, irrigation groundwater use in the county accounts for almost all of the historic pumping.

In addition to the groundwater availability described above, which is all fresh groundwater supply, a significant amount of brackish groundwater may be available within the region. According to the Guidance Manual for Brackish Groundwater in Texas (NRS, 2008), there is more than 50 million acre-feet of brackish groundwater present beneath Region D. Brackish groundwater, which is groundwater with a total dissolved solids content between 1,000 and 10,000 mg/l, would require treatment to be acceptable for municipal supply. However, groundwater with TDS below 1,500 mg/l may be acceptable for irrigation and groundwater below 3,000 mg/l is acceptable for some livestock.

Table 3.11 Available Groundwater in Region D by County/Aquifer/Basin (ac-ft/yr)

County	Source Name	Basin	2030	2040	2050	2060	2070	2080
Bowie	Blossom Aquifer	Red	21	21	21	21	21	21
		Sulphur	180	180	180	180	180	180
	Carrizo-Wilcox Aquifer	Sulphur	9,645	9,645	9,645	9,645	9,645	9,645
	Nacatoch Aquifer	Red	3,071	3,071	3,071	3,071	3,071	3,071
		Sulphur	1,942	1,942	1,942	1,942	1,942	1,942
Camp	Carrizo-Wilcox Aquifer	Cypress	3,862	3,862	3,862	3,862	3,862	3,862
	Queen City Aquifer	Cypress	1,810	1,810	1,810	1,810	1,810	1,810
Cass	Carrizo-Wilcox Aquifer	Cypress	12,865	12,865	12,865	12,865	12,865	12,865
		Sulphur	2,190	2,190	2,190	2,190	2,190	2,190
	Queen City Aquifer	Cypress	15,855	15,855	15,855	15,855	15,855	15,855
		Sulphur	758	758	758	758	758	758
	Sparta Aquifer	Cypress	0	0	0	0	0	0
Delta	Nacatoch Aquifer	Sulphur	575	575	575	575	575	575
	Trinity Aquifer	Sulphur	56	56	56	56	56	56
Franklin	Carrizo-Wilcox Aquifer	Cypress	5,334	5,334	5,334	5,334	5,334	5,334
		Sulphur	2,594	2,594	2,594	2,594	2,594	2,594
	Nacatoch Aquifer	Sulphur	30	30	30	30	30	30
Gregg	Carrizo-Wilcox Aquifer	Cypress	726	726	726	726	726	726
		Sabine	8,841	8,841	8,841	8,841	8,841	8,841
	Queen City Aquifer	Cypress	456	456	456	456	456	456
		Sabine	2,056	2,056	2,056	2,056	2,056	2,055
Harrison	Carrizo-Wilcox Aquifer	Cypress	4,636	4,636	4,636	4,636	4,636	4,636
		Sabine	4,460	4,460	4,460	4,460	4,460	4,460
	Queen City Aquifer	Cypress	2,976	2,976	2,976	2,976	2,976	2,976
		Sabine	561	561	561	561	561	561
Hopkins	Carrizo-Wilcox Aquifer	Cypress	309	309	309	309	309	309
		Sabine	4,677	4,677	4,677	4,677	4,677	4,677

County	Source Name	Basin	2030	2040	2050	2060	2070	2080
		Sulphur	3,125	3,125	3,125	3,125	3,125	3,125
	Nacatoch Aquifer	Sabine	291	291	291	291	291	291
		Sulphur	916	916	916	916	916	916
Hunt	Nacatoch Aquifer	Sabine	3,303	3,303	3,303	3,303	3,303	3,303
		Sulphur	491	491	513	868	1,347	2,052
	Trinity Aquifer	Sabine	213	213	213	213	213	213
		Sulphur	3	3	3	3	3	3
		Trinity	0	0	0	0	0	0
	Woodbine Aquifer	Sabine	268	268	268	268	268	268
		Sulphur	165	165	165	165	165	165
		Trinity	330	330	330	330	330	330
Lamar	Blossom Aquifer	Red	323	323	323	323	323	323
		Sulphur	71	71	71	71	71	71
	Nacatoch Aquifer	Sulphur	110	110	110	110	110	110
	Trinity Aquifer	Red	0	0	0	0	0	0
		Sulphur	8	8	8	8	8	8
	Woodbine Aquifer	Red	22	22	22	22	22	22
		Sulphur	49	49	49	49	49	49
Marion	Carrizo-Wilcox Aquifer	Cypress	1,966	1,966	1,966	1,966	1,966	1,966
	Queen City Aquifer	Cypress	7,389	7,389	7,389	7,389	7,389	7,389
	Sparta Aquifer	Cypress	0	0	0	0	0	0
Morris	Carrizo-Wilcox Aquifer	Cypress	2,156	2,156	2,156	2,156	2,156	2,156
		Sulphur	769	769	769	769	769	769
	Queen City Aquifer	Cypress	3,308	3,308	3,308	3,308	3,308	3,308
Rains	Carrizo-Wilcox Aquifer	Sabine	1,411	1,411	1,411	1,411	1,411	1,411
	Nacatoch Aquifer	Sabine	1	1	1	1	1	1
Red River	Blossom Aquifer	Red	665	665	665	665	665	665
		Sulphur	1,013	1,013	1,013	1,013	1,013	1,013

County	Source Name	Basin	2030	2040	2050	2060	2070	2080
	Carrizo-Wilcox Aquifer	Sulphur	0	0	0	0	0	0
	Nacatoch Aquifer	Red	58	58	58	58	58	58
		Sulphur	2,924	2,923	2,923	2,923	2,923	2,923
	Trinity Aquifer	Red	52	52	52	52	52	52
		Sulphur	233	233	233	233	233	233
	Woodbine Aquifer	Red	2	2	2	2	2	2
Smith	Carrizo-Wilcox Aquifer	Sabine	11,743	11,743	11,743	11,743	11,743	11,743
	Queen City Aquifer	Sabine	12,457	12,457	12,457	12,457	12,457	12,457
	Sparta Aquifer	Sabine	0	0	0	0	0	0
Titus	Carrizo-Wilcox Aquifer	Cypress	7,330	7,330	7,330	7,330	7,330	7,330
		Sulphur	1,942	1,942	1,942	1,942	1,942	1,942
	Queen City Aquifer	Cypress	0	0	0	0	0	0
Upshur	Carrizo-Wilcox Aquifer	Cypress	6,918	6,918	6,918	6,918	6,918	6,918
		Sabine	1,948	1,948	1,948	1,948	1,948	1,948
	Queen City Aquifer	Cypress	6,215	6,215	6,215	6,215	6,215	6,215
		Sabine	5,949	5,949	5,949	5,949	5,949	5,949
	Sparta Aquifer	Sabine	0	0	0	0	0	0
Van Zandt	Carrizo-Wilcox Aquifer	Neches	4,136	4,136	4,136	4,136	4,136	4,136
		Sabine	5,033	5,033	5,033	5,033	5,033	5,033
		Trinity	1,651	1,651	1,651	1,651	1,651	1,651
	Queen City Aquifer	Neches	2,343	2,343	2,343	2,343	2,343	2,343
Wood	Carrizo-Wilcox Aquifer	Cypress	925	925	925	925	925	925
		Sabine	18,206	18,206	18,206	18,206	18,206	18,206
	Queen City Aquifer	Cypress	779	779	779	779	779	779
		Sabine	5,731	5,731	5,731	5,731	5,731	5,731
	Sparta Aquifer	Sabine	0	0	0	0	0	0

Table 3.12 Groundwater Supplies and Historical Pumping Estimates (2017-2021) (ac-ft/yr)

County	Aquifer	Total Availability (ac-ft/yr)	Average Historic Pumping 2017-2021 (ac-ft/yr)
BOWIE	CARRIZO-WILCOX AQUIFER	9,645	1,178
	NACATOCH AQUIFER	5,013	686
	BLOSSOM AQUIFER	201	0
	OTHER AQUIFER	NA	3,584
CAMP	CARRIZO-WILCOX AQUIFER	3,862	1,574
	QUEEN CITY AQUIFER	1,810	2
CASS	CARRIZO-WILCOX AQUIFER	15,055	1,549
	QUEEN CITY AQUIFER	16,613	54
	UNKNOWN	NA	2
DELTA	CARRIZO-WILCOX AQUIFER	0	487
	NACATOCH AQUIFER	575	193
	OTHER AQUIFER	NA	51
	TRINITY AQUIFER	56	82
FRANKLIN	CARRIZO-WILCOX AQUIFER	7,928	646
	NACATOCH AQUIFER	30	9
GREGG	CARRIZO-WILCOX AQUIFER	9,567	988
	OTHER AQUIFER	NA	15
	QUEEN CITY AQUIFER	2,512	18
	UNKNOWN	NA	40
HARRISON	CARRIZO-WILCOX AQUIFER	9,096	3,545
	OTHER AQUIFER	NA	7
	QUEEN CITY AQUIFER	3,537	31
	UNKNOWN	NA	1,773
HOPKINS	CARRIZO-WILCOX AQUIFER	4,986	3,204
	NACATOCH AQUIFER	1,207	939
HUNT	BLOSSOM AQUIFER	0	8
	CARRIZO-WILCOX AQUIFER	0	73
	NACATOCH AQUIFER	3,794	867
	OTHER AQUIFER	NA	24
	TRINITY AQUIFER	216	229
	WOODBINE AQUIFER	763	577
LAMAR	BLOSSOM AQUIFER	394	6,660
	NACATOCH AQUIFER	110	2
	OTHER AQUIFER	NA	189
	TRINITY AQUIFER	8	60
	WOODBINE AQUIFER	71	17

County	Aquifer	Total Availability (ac-ft/yr)	Average Historic Pumping 2017-2021 (ac-ft/yr)
MARION	CARRIZO-WILCOX AQUIFER	1,966	488
	OTHER AQUIFER	NA	0
	QUEEN CITY AQUIFER	7,389	1
MORRIS	CARRIZO-WILCOX AQUIFER	2,925	424
	OTHER AQUIFER	NA	2
	QUEEN CITY AQUIFER	3,308	9
	SPARTA AQUIFER	0	2
RAINS	CARRIZO-WILCOX AQUIFER	1,411	391
	OTHER AQUIFER	NA	19
RED RIVER	BLOSSOM AQUIFER	1,678	1,122
	NACATOCH AQUIFER	2,982	830
	OTHER AQUIFER	NA	294
	TRINITY AQUIFER	285	1,083
	UNKNOWN	NA	0
	WOODBINE AQUIFER	2	0
SMITH	CARRIZO-WILCOX AQUIFER	11,743	20,052*
	OTHER AQUIFER	NA	387*
	QUEEN CITY AQUIFER	12,457	1,596*
	SPARTA AQUIFER	0	238*
	UNKNOWN	NA	73*
TITUS	CARRIZO-WILCOX AQUIFER	9,272	487
UPSHUR	CARRIZO-WILCOX AQUIFER	8,866	3,882
	OTHER AQUIFER	NA	16
	QUEEN CITY AQUIFER	12,164	476
	UNKNOWN	NA	33
VAN ZANDT	CARRIZO-WILCOX AQUIFER	10,820	3,824
	OTHER AQUIFER	NA	123
	QUEEN CITY AQUIFER	2,343	153
	UNKNOWN	NA	2
WOOD	CARRIZO-WILCOX AQUIFER	19,131	5,856
	OTHER AQUIFER	NA	3
	QUEEN CITY AQUIFER	6,510	1,132
	SPARTA AQUIFER	0	25
	UNKNOWN	NA	59

*- Historic pumping for Smith County is for the entire county, not just the portion in Region D.

3.3 Reuse

As noted by the Texas Water Reuse Association, recycled water has increasingly become an effective alternative solution to a multitude of water management challenges in Texas. Water supply challenges in more arid regions have given rise to the need for drought-resilient, sustainable supplies such as recycled reuse water. However, growth is also noted to be occurring in more water-rich areas that are seeking water recycling solutions to manage stormwater and supply resiliency.

Given the availability and relative ease of accessing surface and groundwater sources in the NETRWPA, the existing extent of reuse as a supply alternative has historically been limited. However, there are existing reuse supplies that have been developed in several of the river basins in Region D, as presented in Table 3.13 below.

Table 3.13 North East Texas Reuse by River Basin (ac-ft/yr)

Source Name	2030	2040	2050	2060	2070	2080
CYPRESS CREEK BASIN DIRECT REUSE	66,820	61,504	62,760	71,634	65,408	65,408
SABINE RIVER BASIN DIRECT REUSE	6,161	6,161	6,161	6,161	6,161	6,161
RED RIVER BASIN DIRECT REUSE	12	12	12	12	12	12
TOTAL	**72,993**	**67,677**	**68,933**	**77,807**	**71,581**	**71,581**

3.4 Supplies Currently Available to Each Water User Group

The water supplies available to the individual WUGs in the North East Texas Region are presented in the following sections. Also included is a description of the methods used to determine the supplies available to each water user group for the 2026 Plan and the assumptions, if any, made in development of these data. Note that for the purposes of the 2026 regional water planning process, the term ‘supply’ differs from the volume of available water from a given source, as the supply for a given entity may be limited by existing legal or infrastructure constraints. For example, a reservoir (source) with an identified firm yield may provide a lesser amount of ‘supply’ to an entity due to permit limitations, or due to an existing infrastructure limitation such as the pumping capacity of an intake.

The first series of data presents water supply by use category. A detailed breakdown of municipal WUG supply amounts in Region D is provided in Appendix C3-4, and all existing WUG water supply amounts are presented in Appendix C3-5.

3.4.1 Methodology to Determine Water User Supply

As noted in Chapter 2, each water user group was surveyed to determine not only population and population growth patterns but also water use and water supply. Each WUG was asked to identify their water supply source and supply volume.

The WUG was asked to provide the contract period if the water supply was provided by a contract with some other source. The water supply is assumed to end with the contract, although it is understood that contract renewal may likely continue the supply to meet future needs. In those instances where the water supply contract does not specify the contract expiration date, the contract is assumed to continue through at least year 2080. If a maximum quantity is not specified in the contract, then the supply was set equal to the demand for each year of the contract.

Water supply volumes herein also reflect known infrastructure limitations. Livestock and irrigation were assumed to be from private (local) supplies, except in instances where surface water permits, wells, or contracts were identified. These private supplies may be individual water wells on private property or local surface water supplies.

3.4.2 Regional Municipal Water Supply

Table 3.14 North East Texas Regional Municipal Water Supply by County (ac-ft/yr)

County	Basin	2030	2040	2050	2060	2070	2080
BOWIE	Red	1,128	1,149	1,130	1,119	1,119	1,119
	Sulphur	2,508	2,550	2,506	2,482	2,482	2,482
	Total	**3,636**	**3,699**	**3,636**	**3,601**	**3,601**	**3,601**
CAMP	Cypress	2,014	2,023	2,031	2,039	2,048	2,048
	Total	**2,014**	**2,023**	**2,031**	**2,039**	**2,048**	**2,048**
CASS	Cypress	4,492	4,552	4,625	4,622	4,622	4,621
	Sulphur	454	454	454	454	454	455
	Total	**4,946**	**5,006**	**5,079**	**5,076**	**5,076**	**5,076**
DELTA	Sulphur	1,811	1,603	1,394	1,184	979	782
	Total	**1,811**	**1,603**	**1,394**	**1,184**	**979**	**782**
FRANKLIN	Cypress	2,476	2,334	2,190	2,063	1,942	1,820
	Sulphur	3,700	3,537	3,365	3,201	3,036	2,874
	Total	**6,176**	**5,871**	**5,555**	**5,264**	**4,978**	**4,694**
GREGG	Cypress	1,396	1,412	1,433	1,450	1,457	1,457
	Sabine	64,398	64,336	64,289	64,260	64,603	64,562
	Total	**65,794**	**65,748**	**65,722**	**65,710**	**66,060**	**66,019**
HARRISON	Cypress	6,180	6,175	6,169	6,174	6,190	6,187
	Sabine	18,160	18,202	18,241	18,341	18,428	18,470
	Total	**24,340**	**24,377**	**24,410**	**24,515**	**24,618**	**24,657**
HOPKINS	Cypress	276	272	267	260	250	240
	Sabine	2,098	2,096	2,066	2,056	2,035	2,032
	Sulphur	5,995	6,058	6,129	6,177	6,238	6,279
	Total	**8,369**	**8,426**	**8,462**	**8,493**	**8,523**	**8,551**
HUNT	Sabine	14,223	14,604	15,288	16,520	17,922	18,014
	Sulphur	2,905	2,948	2,908	2,942	2,992	3,001
	Trinity	104	119	101	111	131	134
	Total	**17,232**	**17,671**	**18,297**	**19,573**	**21,045**	**21,149**
LAMAR	Red	7,021	6,888	6,790	6,760	6,713	6,706
	Sulphur	7,080	6,967	6,880	6,891	6,896	6,885
	Total	**14,101**	**13,855**	**13,670**	**13,651**	**13,609**	**13,591**

County	Basin	2030	2040	2050	2060	2070	2080
MARION	Cypress	4,230	4,230	4,230	4,230	4,230	4,230
	Total	**4,230**	**4,230**	**4,230**	**4,230**	**4,230**	**4,230**
MORRIS	Cypress	3,282	3,278	3,270	3,268	3,266	3,258
	Sulphur	421	421	421	421	421	421
	Total	**3,703**	**3,699**	**3,691**	**3,689**	**3,687**	**3,679**
RAINS	Sabine	3,548	3,549	3,562	3,600	3,528	3,535
	Total	**3,548**	**3,549**	**3,562**	**3,600**	**3,528**	**3,535**
RED RIVER	Red	336	335	336	334	332	332
	Sulphur	1,562	1,559	1,558	1,560	1,562	1,562
	Total	**1,898**	**1,894**	**1,894**	**1,894**	**1,894**	**1,894**
SMITH	Sabine	9,483	9,531	9,493	9,464	9,454	9,421
	Total	**9,483**	**9,531**	**9,493**	**9,464**	**9,454**	**9,421**
TITUS	Cypress	18,862	18,622	18,422	18,018	17,724	17,779
	Sulphur	1,625	1,705	1,798	1,897	1,983	2,076
	Total	**20,487**	**20,327**	**20,220**	**19,915**	**19,707**	**19,855**
UPSHUR	Cypress	6,976	7,060	7,060	7,080	7,102	7,102
	Sabine	2,576	2,585	2,573	2,564	2,550	2,406
	Total	**9,552**	**9,645**	**9,633**	**9,644**	**9,652**	**9,508**
VAN ZANDT	Neches	2,468	2,471	2,475	2,477	2,483	2,487
	Sabine	5,740	5,762	5,804	5,838	5,894	5,937
	Trinity	1,939	2,077	2,152	2,261	2,380	2,357
	Total	**10,147**	**10,310**	**10,431**	**10,576**	**10,757**	**10,781**
WOOD	Cypress	1,792	1,778	1,741	1,723	1,688	1,657
	Sabine	13,145	13,110	13,081	12,924	13,004	12,975
	Total	**14,937**	**14,888**	**14,822**	**14,647**	**14,692**	**14,632**
REGION TOTAL		**226,404**	**226,352**	**226,232**	**226,765**	**228,138**	**227,703**

Table 3.15 North East Texas Regional Municipal Water Supply by Basin (ac-ft/yr)

Basin	2030	2040	2050	2060	2070	2080
CYPRESS	51,976	51,736	51,438	50,927	50,519	50,399
NECHES	2,468	2,471	2,475	2,477	2,483	2,487
RED RIVER	8,485	8,372	8,256	8,213	8,164	8,157
SABINE	133,371	133,775	134,397	135,567	137,418	137,352
SULPHUR	28,061	27,802	27,413	27,209	27,043	26,817
TRINITY	2,043	2,196	2,253	2,372	2,511	2,491
TOTAL	**226,404**	**226,352**	**226,232**	**226,765**	**228,138**	**227,703**

3.4.3 Regional Manufacturing Supply

Table 3.16 North East Texas Regional Manufacturing Water Supply by County (ac-ft/yr)

County	Basin	2030	2040	2050	2060	2070	2080
BOWIE	Red	6	6	6	6	6	6
	Sulphur	28	28	28	28	28	28
	Total	**34**	**34**	**34**	**34**	**34**	**34**
CAMP	Cypress	2	2	2	2	2	2
	Total	**2**	**2**	**2**	**2**	**2**	**2**
CASS	Cypress	245	245	245	245	245	245
	Sulphur*	32,604	32,602	32,601	32,601	32,600	32,600
	Total	32,849	32,847	32,846	32,846	32,845	32,845
DELTA	Sulphur						
	Total						
FRANKLIN	Cypress						
	Sulphur						
	Total						
GREGG	Cypress						
	Sabine	1,572	1,572	1,572	1,572	1,572	1,572
	Total	**1,572**	**1,572**	**1,572**	**1,572**	**1,572**	**1,572**
HARRISON	Cypress	2,488	2,488	2,488	2,488	2,488	2,488
	Sabine	105,475	105,442	105,410	105,375	105,340	105,340
	Total	**107,963**	**107,930**	**107,898**	**107,863**	**107,828**	**107,828**
HOPKINS	Cypress						
	Sabine						
	Sulphur	1,830	1,915	1,987	2,126	2,275	2,275
	Total	**1,830**	**1,915**	**1,987**	**2,126**	**2,275**	**2,275**
HUNT	Sabine	1100	1,281	1,454	1,573	1,759	1,759
	Sulphur						
	Trinity						
	Total	**1,100**	**1,281**	**1,454**	**1,573**	**1,759**	**1,759**
LAMAR	Red	912	953	988	1054	1,089	1,089
	Sulphur	5,091	5,340	5,580	5,780	5,797	5,815
	Total	**6,003**	**6,293**	**6,568**	**6,834**	**6,886**	**6,904**
MORRIS	Cypress	115,260	109,944	111,200	120,074	113,848	113,848
	Sulphur						
	Total	**115,260**	**109,944**	**111,200**	**120,074**	**113,848**	**113,848**
RAINS	Sabine	12	12	12	12	12	12

County	Basin	2030	2040	2050	2060	2070	2080
	Total	**12**	**12**	**12**	**12**	**12**	**12**
RED RIVER	Red	5054	5047	5047	5047	5047	5047
	Sulphur						
	Total	**5,054**	**5,047**	**5,047**	**5,047**	**5,047**	**5,047**
SMITH	Sabine						
	Total						
TITUS	Cypress	2,737	2,860	2,850	2,591	2,461	2,461
	Sulphur						
	Total	**2,737**	**2,860**	**2,850**	**2,591**	**2,461**	**2,461**
UPSHUR	Cypress	6	6	6	6	6	6
	Sabine	0	0	0	0	0	0
	Total	**6**	**6**	**6**	**6**	**6**	**6**
VAN ZANDT	Neches						
	Sabine	208	208	215	217	207	211
	Trinity						
	Total	**208**	**208**	**215**	**217**	**207**	**211**
WOOD	Cypress						
	Sabine	1,502	1,502	1,502	1,502	1,502	1,502
	Total	**1,502**	**1,502**	**1,502**	**1,502**	**1,502**	**1,502**
REGION TOTAL		**276,132**	**271,453**	**273,193**	**282,299**	**276,284**	**276,306**

Note: Supply allocated for Cass County Manufacturing is 120,000 ac-ft/yr when reflecting capability for downstream releases from storage as part of Manufacturing WUG use. The amounts shown herein reflect the supply necessary to meet all projected primary diversion demand.

Table 3.17 North East Texas Regional Manufacturing Supply by Basin (ac-ft/yr)

Basin	2030	2040	2050	2060	2070	2080
CYPRESS	120,738	115,545	116,791	125,406	119,050	119,050
NECHES	0	0	0	0	0	0
RED RIVER	5972	6006	6041	6107	6,142	6,142
SABINE	109,869	110,017	110,165	110,251	110,392	110,396
SULPHUR	39,553	39,885	40,196	40,535	40,700	40,718
TRINITY	0	0	0	0	0	0
TOTAL	**276,132**	**271,453**	**273,193**	**282,299**	**276,284**	**276,306**

3.4.4 Regional Irrigation Supply

Table 3.18 North East Texas Regional Irrigation Water Supply by County (ac-ft/yr)

County	Basin	2030	2040	2050	2060	2070	2080
BOWIE	Red	4,684	4,684	4,684	4,684	4,684	4,684
	Sulphur	167	167	167	167	167	167
	Total	**4,851**	**4,851**	**4,851**	**4,851**	**4,851**	**4,851**
CAMP	Cypress	0	0	0	0	0	0
	Total	**0**	**0**	**0**	**0**	**0**	**0**
CASS	Cypress						
	Sulphur						
	Total						
DELTA	Sulphur	5,102	5,112	5,117	5,117	5,129	5,129
	Total	**5,102**	**5,112**	**5,117**	**5,117**	**5,129**	**5,129**
FRANKLIN	Cypress	102	102	102	102	102	102
	Sabine	102	102	102	102	102	102
	Sulphur	103	103	103	103	103	103
	Total	**307**	**307**	**307**	**307**	**307**	**307**
GREGG	Sabine	187	187	187	187	187	187
	Total	**187**	**187**	**187**	**187**	**187**	**187**
HARRISON	Cypress	53	53	53	53	53	53
	Sabine	33	33	33	33	33	33
	Total	**86**	**86**	**86**	**86**	**86**	**86**
HOPKINS	Cypress	1	1	1	1	1	1
	Sabine	18	18	18	18	18	18
	Sulphur	104	104	104	104	104	104
	Total	**123**	**123**	**123**	**123**	**123**	**123**
HUNT	Sabine	113	113	113	113	113	113
	Sulphur	0	0	0	0	0	0
	Trinity	12	12	12	12	12	12
	Total	**125**	**125**	**125**	**125**	**125**	**125**
LAMAR	Red	2,116	2,116	2,116	2,116	2,116	2,116
	Sulphur	1,288	1,288	1,288	1,288	1,288	1,288
	Total	**3,404**	**3,404**	**3,404**	**3,404**	**3,404**	**3,404**
MARION	Cypress	315	315	315	315	315	315
	Total	**315**	**315**	**315**	**315**	**315**	**315**
MORRIS	Cypress	61	61	61	61	61	61
	Sulphur	8	8	8	8	8	8

County	Basin	2030	2040	2050	2060	2070	2080
	Total	**69**	**69**	**69**	**69**	**69**	**69**
RAINS	Sabine	57	57	57	57	57	57
	Total	**57**	**57**	**57**	**57**	**57**	**57**
RED RIVER	Red	1,015	1,015	1,015	1,015	1,015	1,015
	Sulphur	87	87	87	87	87	87
	Total	**1,102**	**1,102**	**1,102**	**1,102**	**1,102**	**1,102**
SMITH	Sabine						
	Total						
TITUS	Cypress	121	121	121	121	121	121
	Sulphur	1,078	1,078	1,078	1,078	1,078	1,078
	Total	**1,199**	**1,199**	**1,199**	**1,199**	**1,199**	**1,199**
UPSHUR	Cypress	711	711	711	711	711	711
	Total	**711**	**711**	**711**	**711**	**711**	**711**
VAN ZANDT	Neches	423	421	420	418	413	413
	Total	**423**	**421**	**420**	**418**	**413**	**413**
WOOD	Cypress	125	125	125	125	125	125
	Sabine	1,235	1,235	1,235	1,235	1,235	1,235
	Total	**1,360**	**1,360**	**1,360**	**1,360**	**1,360**	**1,360**
REGION TOTAL		**19,421**	**19,429**	**19,433**	**19,431**	**19,438**	**19,438**

Table 3.19 North East Texas Regional Irrigation Water Supply by Basin (ac-ft/yr)

Basin	2030	2040	2050	2060	2070	2080
CYPRESS	1,489	1,489	1,489	1,489	1,489	1,489
NECHES	423	421	420	418	413	413
RED RIVER	7,815	7,815	7,815	7,815	7,815	7,815
SABINE	1,745	1,745	1,745	1,745	1,745	1,745
SULPHUR	7,937	7,947	7,952	7,952	7,964	7,964
TRINITY	12	12	12	12	12	12
TOTAL	**19,421**	**19,429**	**19,433**	**19,431**	**19,438**	**19,438**

3.4.5 Regional Steam Electric Supply

Table 3.20 North East Texas Regional Steam Electric Water Supply by County (ac-ft/yr)

County	Basin	2030	2040	2050	2060	2070	2080
BOWIE	Red						
	Sulphur						
	Total						
CAMP	Cypress						
	Total						
CASS	Cypress						
	Sulphur						
	Total						
DELTA	Sulphur						
	Total						
FRANKLIN	Cypress						
	Sulphur						
	Total						
GREGG	Cypress						
	Sabine	2,242	2,242	2,242	2,242	2,242	2,242
	Total	**2,242**	**2,242**	**2,242**	**2,242**	**2,242**	**2,242**
HARRISON	Cypress						
	Sabine	26,508	26,508	26,508	26,508	26,508	26,508
	Total	**26,508**	**26,508**	**26,508**	**26,508**	**26,508**	**26,508**
HOPKINS	Cypress						
	Sabine						
	Sulphur						
	Total						
HUNT	Sabine	373	373	373	373	373	373
	Sulphur						
	Trinity						
	Total	**373**	**373**	**373**	**373**	**373**	**373**
LAMAR	Red	683	683	683	683	683	683
	Sulphur	8,278	8,278	8,278	8,278	8,278	8,278
	Total	**8,961**	**8,961**	**8,961**	**8,961**	**8,961**	**8,961**
MARION	Cypress	4,445	4,827	5,292	5,860	6,247	6,247
	Total	**4,445**	**4,827**	**5,292**	**5,860**	**6,247**	**6,247**
MORRIS	Cypress	820	820	820	820	820	820
	Sulphur						

County	Basin	2030	2040	2050	2060	2070	2080
	Total	**820**	**820**	**820**	**820**	**820**	**820**
RAINS	Sabine						
	Total						
RED RIVER	Red						
	Sulphur						
	Total						
SMITH	Sabine						
	Total						
TITUS	Cypress	28,465	27,045	25,725	24,957	24,068	23,248
	Sulphur						
	Total	**28,465**	**27,045**	**25,725**	**24,957**	**24,068**	**23,248**
UPSHUR	Cypress						
	Sabine						
	Total						
VAN ZANDT	Neches						
	Sabine						
	Trinity						
	Total						
WOOD	Cypress						
	Sabine						
	Total						
REGION TOTAL		**71,814**	**70,776**	**69,921**	**69,721**	**69,219**	**68,399**

Table 3.21 North East Texas Regional Steam Electric Water Supply by Basin (ac-ft/yr)

Basin	2030	2040	2050	2060	2070	2080
CYPRESS	33,730	32,692	31,837	31,637	31,135	30,315
NECHES	0	0	0	0	0	0
RED RIVER	683	683	683	683	683	683
SABINE	29,123	29,123	29,123	29,123	29,123	29,123
SULPHUR	8,278	8,278	8,278	8,278	8,278	8,278
TRINITY	0	0	0	0	0	0
TOTAL	**71,814**	**70,776**	**69,921**	**69,721**	**69,219**	**68,399**

3.4.6 Regional Mining Supply

Table 3.22 North East Texas Regional Mining Water Supply by County (ac-ft/yr)

County	Basin	2030	2040	2050	2060	2070	2080
BOWIE	Red	0	0	0	0	0	0
	Sulphur	0	0	0	0	0	0
	Total	**0**	**0**	**0**	**0**	**0**	**0**
CAMP	Cypress						
	Total						
CASS	Cypress	839	862	871	904	926	952
	Sulphur						
	Total	**839**	**862**	**871**	**904**	**926**	**952**
DELTA	Sulphur						
	Total						
FRANKLIN	Cypress						
	Sulphur						
	Total						
GREGG	Cypress	22	22	17	13	9	9
	Sabine	392	388	306	223	165	165
	Total	**414**	**410**	**323**	**236**	**174**	**174**
HARRISON	Cypress	299	307	316	323	333	333
	Sabine	540	550	559	567	576	576
	Total	**839**	**857**	**875**	**890**	**909**	**909**
HOPKINS	Cypress						
	Sabine	260	267	274	283	291	291
	Sulphur						
	Total	**260**	**267**	**274**	**283**	**291**	**291**
HUNT	Sabine						
	Sulphur						
	Trinity						
	Total						
LAMAR	Red						
	Sulphur						
	Total						
MARION	Cypress	119	122	124	126	128	128
	Total	**119**	**122**	**124**	**126**	**128**	**128**
MORRIS	Cypress						
	Sulphur						

County	Basin	2030	2040	2050	2060	2070	2080
	Total						
RAINS	Sabine						
	Total						
RED RIVER	Red						
	Sulphur						
	Total						
SMITH	Sabine						
	Total						
TITUS	Cypress						
	Sulphur						
	Total						
UPSHUR	Cypress						
	Sabine	258	268	234	200	175	175
	Total	**258**	**268**	**234**	**200**	**175**	**175**
VAN ZANDT	Neches						
	Sabine	2,009	2,182	2,393	2,582	2,693	2,731
	Trinity						
	Total	**2,009**	**2,182**	**2,393**	**2,582**	**2,693**	**2,731**
WOOD	Cypress						
	Sabine	288	289	290	292	293	293
	Total	**288**	**289**	**290**	**292**	**293**	**293**
REGION TOTAL		**5,026**	**5,257**	**5,384**	**5,513**	**5,589**	**5,653**

Table 3.23 North East Texas Regional Mining Water Supply by Basin (ac-ft/yr)

Basin	2030	2040	2050	2060	2070	2080
CYPRESS	1,279	1,313	1,328	1,366	1,396	1,422
NECHES	0	0	0	0	0	0
RED RIVER	0	0	0	0	0	0
SABINE	3,747	3,944	4,056	4,147	4,193	4,231
SULPHUR	0	0	0	0	0	0
TRINITY	0	0	0	0	0	0
TOTAL	**5,026**	**5,257**	**5,384**	**5,513**	**5,589**	**5,653**

3.4.7 Regional Livestock Supply

Table 3.24 North East Texas Regional Livestock Water Supply by County (ac-ft/yr)

County	Basin	2030	2040	2050	2060	2070	2080
BOWIE	Red	435	395	339	290	271	271
	Sulphur	721	655	561	481	449	449
	Total	**1,156**	**1,050**	**900**	**771**	**720**	**720**
CAMP	Cypress	952	952	952	952	952	952
	Total	**952**	**952**	**952**	**952**	**952**	**952**
CASS	Cypress	484	484	484	484	484	484
	Sulphur	355	355	357	357	357	357
	Total	**839**	**839**	**841**	**841**	**841**	**841**
DELTA	Sulphur	291	291	291	291	291	291
	Total	**291**	**291**	**291**	**291**	**291**	**291**
FRANKLIN	Cypress	425	425	425	425	425	425
	Sulphur	621	621	621	621	621	621
	Total	**1,046**	**1,046**	**1,046**	**1,046**	**1,046**	**1,046**
GREGG	Cypress	11	11	11	11	11	11
	Sabine	204	204	204	204	204	204
	Total	**215**	**215**	**215**	**215**	**215**	**215**
HARRISON	Cypress	571	627	686	726	756	756
	Sabine	425	447	469	492	514	514
	Total	**996**	**1,074**	**1,155**	**1,218**	**1,270**	**1,270**
HOPKINS	Cypress	180	184	184	188	190	190
	Sabine	1,877	1,923	1,926	1,976	1,998	1,998
	Sulphur	2,797	2,747	2,744	2,691	2,668	2,668
	Total	**4,854**	**4,854**	**4,854**	**4,855**	**4,856**	**4,856**
HUNT	Sabine	812	812	812	812	812	812
	Sulphur	300	300	300	300	300	300
	Trinity	34	34	34	35	35	35
	Total	**1,146**	**1,146**	**1,146**	**1,147**	**1,147**	**1,147**
LAMAR	Red	497	497	497	497	497	497
	Sulphur	1,624	1,624	1,624	1,624	1,624	1,624
	Total	**2,121**	**2,121**	**2,121**	**2,121**	**2,121**	**2,121**
MARION	Cypress	411	411	411	411	411	411
	Total	**411**	**411**	**411**	**411**	**411**	**411**
MORRIS	Cypress	310	310	310	310	310	310
	Sulphur	285	285	285	285	285	285

County	Basin	2030	2040	2050	2060	2070	2080
	Total	**595**	**595**	**595**	**595**	**595**	**595**
RAINS	Sabine	506	506	506	506	506	506
	Total	**506**	**506**	**506**	**506**	**506**	**506**
RED RIVER	Red	578	578	578	578	578	578
	Sulphur	949	949	949	949	949	949
	Total	**1,527**	**1,527**	**1,527**	**1,527**	**1,527**	**1,527**
SMITH	Sabine						
	Total						
TITUS	Cypress	433	433	433	428	428	428
	Sulphur	575	575	575	535	514	514
	Total	**1,008**	**1,008**	**1,008**	**963**	**942**	**942**
UPSHUR	Cypress	1,158	1,158	1,158	1,158	1,158	1,158
	Sabine	353	353	353	353	353	353
	Total	**1,511**	**1,511**	**1,511**	**1,511**	**1,511**	**1,511**
VAN ZANDT	Neches	1,152	1,150	1,149	1,148	1,147	1,146
	Sabine	1,101	1,101	1,103	1,104	1,100	1,102
	Trinity	565	559	528	579	512	557
	Total	**2,818**	**2,810**	**2,780**	**2,831**	**2,759**	**2,805**
WOOD	Cypress	555	555	555	555	555	555
	Sabine	1,642	1,642	1,642	1,642	1,642	1,642
	Total	**2,197**	**2,197**	**2,197**	**2,197**	**2,197**	**2,197**
REGION TOTAL		**24,189**	**24,153**	**24,056**	**23,998**	**23,907**	**23,953**

Table 3.25 North East Texas Regional Livestock Water Supply by Basin (ac-ft/yr)

Basin	2030	2040	2050	2060	2070	2080
CYPRESS	5,490	5,550	5,609	5,648	5,680	5,680
NECHES	1,152	1,150	1,149	1,148	1,147	1,146
RED RIVER	1,510	1,470	1414	1365	1346	1346
SABINE	6,920	6,988	7,015	7,089	7,129	7,131
SULPHUR	8,518	8,402	8,307	8,134	8,058	8,058
TRINITY	599	593	562	614	547	592
TOTAL	**24,189**	**24,153**	**24,056**	**23,998**	**23,907**	**23,953**

3.4.8 Major Water Providers

MWPs are defined in TAC §357.10(19) as, " 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." Table 3.26 provides a listing of MWPs supplying water to entities in the North East Texas Regional Water Planning Area. Note that Cash SUD obtains some water from Lake Lavon in Region C, Cherokee Water Company imports water from Lake Cherokee in Region I, and the Sabine River Authority is included herein as that entity is a major water provider in the North East Texas Region. Note that these supplies are the entirety of volume physically and legally accessible to the MWP.

Table 3.26 Major Water Provider Water Supplies

Major Water Provider	Source Region	Source Basin	Supply Available ac-ft/yr					
			2030	2040	2050	2060	2070	2080
BI COUNTY WSC	D	Cypress	1,829	1,829	1,829	1,829	1,829	1,829
BRIGHT STAR SALEM SUD	D	Sabine	1,535	1,527	1,519	1,511	1,502	1,502
CASH SUD	C	Trinity	1,471	1,618	1,698	1,530	1,404	1,404
	D	Sabine	1,805	1,869	2,318	3,466	4,577	4,577
CHEROKEE WATER COMPANY	I	Sabine	18,000	18,000	18,000	18,000	18,000	18,094
CITY OF COMMERCE	D	Sabine	2,100	2,100	2,100	2,100	2,100	2,100
	D	Sulphur	322	322	322	322	322	322
CITY OF COOPER	D	Sulphur	1,707	1,501	1,295	1,088	882	676
CITY OF EMORY	D	Sabine	1,267	1,272	1,276	1,280	1,283	1,283
FRANKLIN COUNTY WD	D	Cypress	8,036	7,684	7,332	6,979	6,628	6,276
CITY OF GLADEWATER	D	Sabine	1,868	1,868	1,868	1,868	1,868	1,560
CITY OF GRAND SALINE	D	Sabine	360	360	374	379	376	388
CITY OF GREENVILLE	D	Sabine	8,256	8,299	8,358	8,430	8,527	8,580
CITY OF HUGHES SPRINGS	D	Cypress	654	654	654	654	654	654
CITY OF KILGORE	D	Sabine	7,558	7,493	7,432	7,414	7,906	7,906
LAMAR COUNTY WSD	D	Red	11,557	11,584	11,616	11,680	11,690	11,690
CITY OF LONGVIEW	D	Cypress	20,000	20,000	20,000	20,000	20,000	20,000
	D	Sabine	38,354	38,387	38,419	38,454	38,489	38,489
	I	Sabine	13,669	13,669	13,669	13,669	13,669	13,669
CITY OF MARSHALL	D	Cypress	16,240	16,240	16,240	16,240	16,240	16,240
CITY OF MOUNT PLEASANT	D	Cypress	23,010	22,907	22,814	22,551	22,523	22,724
NORTHEAST TEXAS MWD	D	Cypress	131,255	130,535	129,815	129,095	128,375	127,655
CITY OF PARIS	D	Red	31,836	31,836	31,836	31,836	31,836	31,836
CITY OF POINT	D	Sabine	391	392	393	395	395	395
RIVERBEND WATER RESOURCES DISTRICT	D	Sulphur	122,623	122,616	122,615	122,615	122,615	122,615

Major Water Provider	Source Region	Source Basin	Supply Available ac-ft/yr					
			2030	2040	2050	2060	2070	2080
SABINE RIVER AUTHORITY	D	Sabine	358,219	369,055	366,002	362,714	359,240	359,154
	I	Sabine	167,721	167,721	167,721	170,133	174,417	178,860
SULPHUR RIVER MWD	D	Sulphur	13,738	13,411	13,085	12,758	12,431	12,104
CITY OF SULPHUR SPRINGS	D	Sulphur	8,621	8,952	9,097	9,485	9,804	9,860
CITY OF TEXARKANA	D	Red	0	0	0	0	0	0
	D	Sulphur	122,630	122,623	122,616	122,615	122,615	122,615
TITUS COUNTY FWD 1	D	Cypress	26,200	25,660	25,120	24,580	24,040	23,500
CITY OF WHITE OAK	D	Sabine	2,680	2,680	2,680	2,680	2,680	2,680

*While the Sabine River Authority is primarily within Region I, this WWP/MWP is included herein as it is a major provider of surface water supply in the Region. Thus, SRA supplies within the Region D planning area (Lake Fork and Lake Tawakoni) are shown herein.

Detailed tabulations of MWP and WUG Seller supplies in comparison to projected customer demands are presented in Appendix C3-5, and in comparison, to total customer contracts in Appendix C3-6. A Source Water Balance report, depicting no over-allocation of sources, is provided in Appendix C3-7.

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

The objective of this section of the 2026 Region D Plan is to provide an evaluation of the effect of environmental flow policies on water rights, water availability, and water planning in the NETRWPG area and within Region I to the extent that it affects Region D. Since the 2021 Region D Plan was adopted, no new environmental flow standards have been adopted for the river basins found within the region.

The Legislature passed Senate Bill 3 (SB 3) in the 2007 80th Regular Session. SB 3 is the third in a series of three omnibus water bills related to the State of Texas' meeting the future needs for water. SB. 3 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. SB 3 requires TCEQ to consider the recommendations of both the Basin and Bay Area Stakeholder Committee (BBASC) and Basin and Bay Expert Science Team (BBEST) for designated basins and bay systems, and go through a rulemaking process to adopt environmental flow standards for each basin. Once adopted, such 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.

Prior to SB 3, Texas law recognized the importance of balancing the biological soundness of the state's rivers, lakes, bays, and estuaries with the public's economic health and general well-being. The Texas Water Code (TWC) requires the TCEQ, while balancing all other interests, to consider and provide for the instream flows and freshwater inflows necessary to maintain a sound ecological environment in TCEQ's regular granting of permits for the use of state water. Balancing the effect of authorizing a new use of water with the need for that water to maintain a sound ecological system was done in the past on a case-by-case basis as part of the water rights permitting process.

SB 3 called for the appointment of stakeholder committees for the various watersheds contributing to bays and estuaries for the Texas coast. For that portion within Region D and I, the primary basins of interest were the Sabine and Neches Rivers, and part of the Neches-Trinity Coastal basin. These basins contribute fresh water to Sabine Lake and the upper Texas coast. Since a portion of the Trinity River basin is in Region D and I and the Trinity River forms a portion of the western boundary of Region I, another stakeholder group of the Trinity-San Jacinto-Galveston Bay area is also relevant. Stakeholder committees for both areas were appointed in 2008. Each stakeholder committee then appointed a BBEST in the fall of 2008 to address the development of environmental flow recommendations in accordance with SB 3.

BBESTs met individually over the course of 12 months to develop environmental flow recommendations for their respective areas. The recommendations and the Sabine and Neches Executive Summary (ES) are accessible from the TCEQ. It is suggested that this information be reviewed by all interested people. The ES describes, generally, the process undertaken, and the recommendations made by the BBEST.

The recommendations prepared by the BBEST were considered by the stakeholder committee but were not adopted. The stakeholder committee provided recommendations for environmental flow standards to the TCEQ, which then underwent a rulemaking process resulting in the adoption of environmental flow standards for the Sabine and Neches River basins.

Environmental flow standards will impact the procurement of water rights in the future by creating a comprehensive process of evaluating environmental flow needs whenever a new water right application is processed. The process of approving water rights is likely to become more complex under the new environmental flow policies that will be implemented by the TCEQ. However, it is intended to result in more clarity as to how diversions can be made and better ensure that sufficient water is available in the streams and rivers of the State.

As a result of the implementation of new environmental flow standards, the operation of reservoirs will become more dependent on the development of an "accounting plan," which is a feature that the TCEQ is already implementing within the State. Whether such accounting plans will have a significant impact on the availability of water is not known at this time.

Standards adopted for the Sabine and Neches River basins have been incorporated into the analysis of feasible water management strategies for the purposes of the 2026 North East Texas Regional Water Plan through their implementation in the most current official TCEQ WAM.

The implementation of environmental flow standards will require more careful consideration of environmental flow needs during the process of water planning in Region D, as well as in other areas. In future planning cycles the NETRWPG will need to continue to analyze potential new water rights and amendments to existing water rights in light of these standards to determine how the environmental flow requirements are consistent with the long-term protection of the region's water, agricultural, and natural resources. Other studies, external to the SB 3 process, will also provide the opportunity for broader consideration of potential environmental flow needs in Region D and elsewhere. Such considerations are proffered herein within Chapter 8, to provide a basis for future planning efforts.

CHAPTER 4 IDENTIFICATION OF WATER NEEDS

The objective of this chapter is to compare the water demands within the North East Texas Regional Water Planning Area (RWPA), as presented in Chapter 2, with currently available water supplies, as presented in Chapter 3. This chapter compares the demands and supplies of each Water User Group (WUG) within the region to determine which entities are projected to encounter demands greater than their projected supplies, or water supply shortages. Water shortages for all six user group categories (municipal, manufacturing, mining, steam electric power generation, irrigation, and livestock) are presented in three ways. First, shortages are presented at the county level. WUGs that span two or more counties are listed in each of the counties in which they are located. Second, shortages are shown by river basin. WUGs are listed in the river basin where the demands occur, rather than the basin where the supplies are located. If a WUG demand spans two or more river basins, it is divided proportionately between the appropriate basins. Finally, water shortages are presented for wholesale water providers. If an entity obtains water from more than one water provider, it is listed under each of its water sources.

Within the RWPA, three types of water shortages have been identified. The first is caused by expiration of a water supply contract or permit. Most water supply contracts and permits have expiration dates, and TWDB guidelines require that supplies based on contractual agreements should extend past the existing term of contract if the contract is renewable. In this chapter, an “E” will designate WUGs with shortages due to contract or permit expirations. In most cases, the recommended water supply strategy for these WUGs will be renewal of their existing contract/permit on or before its expiration date, and if supply is available from the seller. The second type of shortage is also contractual. These are instances where a contract expires or is for an insufficient volume to meet projected demand, and the simple renewal of that contract will not adequately compensate for increased demand. In this case, an increase in the contract amount, or additional water supply sources, would be required to meet demands. This type of shortage is designated by “EI”. The final type of shortage addressed in this region is the “actual” or “physical” water shortage, designated by an “A”. In this case, the entity’s current water supply will not be sufficient to meet projected demands and additional water sources will be required.

The North East Texas Regional Water Planning Group (NETRWPG; Region D) has considered the variety of actions and permit applications that may come before the Texas Commission on Environmental Quality (TCEQ) and the Texas Water Development Board (TWDB) and does not want to unduly constrain projects or applications for small amounts of water that may not be specifically included in the adopted regional water plan. “Small amounts of water” is defined as involving no more than 1,000 acre feet per year, regardless of whether the action is for a temporary or long term action. The NETRWPG provides direction to TCEQ and TWDB regarding appropriations, permit amendments, and projects involving small amounts of water that will not have a significant impact on the region’s water supply, such projects are consistent with the regional water plan, even though not specifically recommended in the Plan.

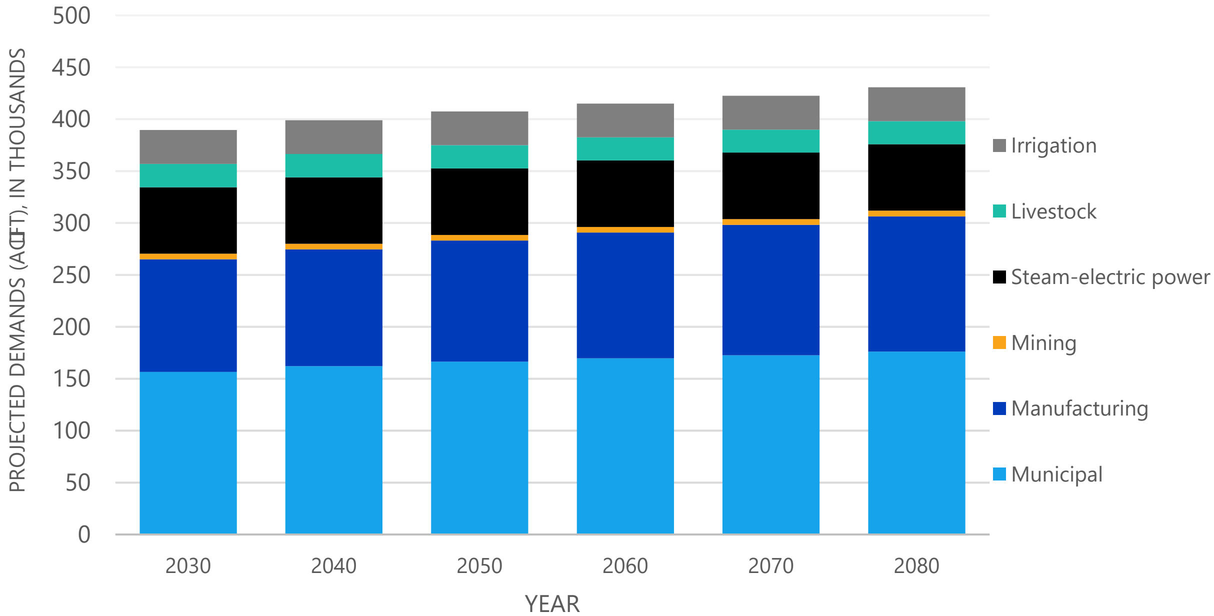


Figure 4.1 Projected Demands of the Six Water Use Categories within Region D

Required reports from DB27 on WUG Needs/Surplus are presented in Appendix C4-1. A summary of needs by WUG category is presented in Appendix C4-2. Second-tier water needs identified by the NETRWPG are presented in Appendix C4-3, and a summary of these second-tier water needs by WUG category is presented in Appendix C4-4.

4.1 County Summaries of Water Needs

The following subsections, 4.1.1 through 4.1.49, identify water supply shortages in all six categories of water use within the North East Texas Region. The tables in this section list only the entities that have been determined to have projected water demands that exceed supply at some point within the planning period. Entities that are anticipated to have a surplus have been included in Table 4.76 at the end of this chapter.

4.1.1 Bowie County

The primary source of water in Bowie County is Wright Patman Lake. A majority of the industrial and municipal user groups have either the contractual authority to use water from Wright Patman, or direct contracts with the City of Texarkana, Texas (Texarkana Water Utilities) as served through Riverbend Water Resources District for water supply from Wright Patman. A summary of the estimated water supply shortages in Bowie County is listed below in Table 4.1. Identified shortages in Bowie County are primarily related to infrastructure needs as identified in the Riverbend Regional Water Master Plan (continued functionality of the existing New Boston Road Water Treatment Plant and the associated functional elevation of the existing raw water intake), as well as contractual need to increase the existing conservation storage from an Interim operational rule curve to an Ultimate Rule Curve per contracts with the United States Army Corp of Engineers (USACE). Region D entities in the county also import and export water from/to Arkansas; however, due to legal uncertainty regarding water supply to, and use and distribution by, the City of Texarkana, Texas, for the purposes of the 2026 Region D Plan it has been assumed that existing Arkansas sources are not presently available for Texas entities and are thus excluded from this Plan.

Table 4.1 Water Supply Shortages in Bowie County

Bowie County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
BURNS REDBANK WSC	260	274	291	310	329	349	EI
CENTRAL BOWIE COUNTY WSC	769	769	776	783	790	797	EI
DE KALB	266	263	261	257	254	250	A
HOOKS	317	313	310	305	301	296	EI
IRRIGATION, BOWIE	5,216	5,216	5,216	5,216	5,216	5,216	A
LIVESTOCK, BOWIE	165	149	128	109	101	101	A
MACEDONIA EYLAU MUD 1	710	705	698	688	677	666	EI
MANUFACTURING, BOWIE	1,801	1,869	1,940	2,013	2,089	2,168	A
MAUD	164	162	161	158	156	153	A
NASH	314	309	306	302	297	292	A
NEW BOSTON	1,309	1,297	1,285	1,265	1,245	1,225	A
REDWATER	337	333	329	323	317	311	A
RIVERBEND WATER RESOURCES DISTRICT	380	375	371	365	359	353	A
TEXARKANA	6,769	6,702	6,649	6,554	6,459	6,362	A
WAKE VILLAGE	649	641	635	625	615	605	A

4.1.2 Camp County

Groundwater from the Carrizo-Wilcox Aquifer and surface water from the Northeast Texas Municipal Water District (Lake Bob Sandlin and Lake O' The Pines) supply the majority of water for Camp County, with supplies supplemented by small local run-of-river surface water rights. Livestock is projected to have shortages. A summary of the identified water supply shortages in Camp County is listed below in Table 4.2.

Table 4.2 Water Supply Shortages in Camp County

Camp County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
LIVESTOCK, CAMP	496	496	496	496	496	496	A
MANUFACTURING, CAMP	42	44	46	48	50	52	EI
PITTSBURG	408	415	417	424	431	439	A

4.1.3 Cass County

Cass County is supplied by the Carrizo-Wilcox and Queen City Aquifers and surface water from Lake O' the Pines and Wright Patman. Shortages have been identified for livestock, county-other, and the Holly Springs WSC in Cass County. A summary of the identified water supply shortages in Cass County is listed below in Table 4.3.

Table 4.3 Water Supply Shortages in Cass County

Cass County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
COUNTY-OTHER, CASS	361	291	216	148	82	25	A
HOLLY SPRINGS WSC	15	11	8	5	2	0	EI
LIVESTOCK, CASS	187	187	187	187	187	187	A
MANUFACTURING, CASS	3,534	4,873	6,261	7,698	9,190	10,737	A

4.1.4 Delta County

Delta County is primarily supplied by surface water from Big Creek Lake, Cooper Reservoir, Lake Tawakoni and run of river rights on the Sulphur River with supplemental supplies from groundwater in the Trinity, Nacatoch, and Woodbine aquifers. Water supply shortages have been identified for livestock and the North Hunt SUD in Delta County. A summary of the identified water supply shortages in Delta County is presented in Table 4.4.

Table 4.4 Water Supply Shortages in Delta County

Delta County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
DELTA COUNTY MUD	0	0	0	0	22	204	A
LIVESTOCK, DELTA	220	220	220	220	220	220	A
NORTH HUNT SUD	20	22	23	25	25	24	A

4.1.5 Franklin County

Both the Carrizo-Wilcox Aquifer and Lake Cypress Springs are important water supplies in Franklin County. The main wholesale water provider for customers in Franklin County is Franklin County Water District. The main retail suppliers are the City of Mount Vernon and Cypress Springs Special Utility District (SUD). Water supply shortages have been identified in Franklin County for livestock. A summary of the identified water supply shortages in Franklin County is presented in Table 4.5.

Table 4.5 Water Supply Shortages in Franklin County

Franklin County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
LIVESTOCK, FRANKLIN	308	308	308	308	308	308	A

4.1.6 Gregg County

The major surface water supply source in Gregg County is the Sabine River, which flows through the southern portion of the county and provides water for the cities of Kilgore and Longview. Longview also gets surface water from Lake Cherokee (Cherokee Water Company), Lake Fork (SRA), and Lake O' The Pines (NETMWD). Groundwater from the Carrizo-Wilcox is also a significant water source in the Region. The City of Gladewater is supplied by Lake Gladewater. The City of White Oak gets water from Big Sandy Creek. Mining in Gregg County is identified as having shortages throughout the planning period, whereas Starrville-Friendship WSC has identified needs in the latter portions of the planning period. A summary of the identified water supply shortages in Gregg County is presented in Table 4.6.

Table 4.6 Water Supply Shortages in Gregg County

Gregg County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
LIVESTOCK, GREGG	16	16	16	16	16	16	A
MANUFACTURING, GREGG	0	38	98	160	224	291	EIA
MINING, GREGG	0	0	0	0	1	1	A
WHITE OAK	66	88	69	26	0	0	A

4.1.7 Harrison County

Harrison County uses groundwater from the Carrizo-Wilcox and Queen City Aquifers and surface water from Lake O' the Pines, Cherokee Lake, Lake Fork and the Sabine and Cypress Rivers. Significant water shortages in Harrison County have been identified during this planning effort. These shortages are related to well production capacity, insufficient contract amounts, and limitations in the representation of surface water availability in the current round of planning. The following table, Table 4.7, is a summary of identified water supply shortages in Harrison County.

Table 4.7 Water Supply Shortages in Harrison County

Harrison County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
CYPRESS VALLEY WSC	11	14	15	17	18	19	A
HALLSVILLE	0	0	0	0	0	23	A
HARLETON WSC	0	0	0	0	4	8	A
IRRIGATION, HARRISON	474	474	474	474	474	474	A
LEIGH WSC	42	0	0	0	0	0	A
MINING, HARRISON	1,852	1,834	1,816	1,801	1,782	1,782	A
NORTH HARRISON WSC	2	9	10	14	19	23	A
SCOTTSVILLE	122	158	163	200	236	270	A
TRYON ROAD SUD	173	243	252	321	385	461	A

4.1.8 Hopkins County

The Carrizo Wilcox and the Nacatoch aquifers are the main source of groundwater supply for the County while Cooper Lake, Sulphur Springs Lake, and Lake Tawakoni are the major sources of surface water. Contracts in Hopkins County are mostly with the City of Sulphur Springs. The City of Sulphur Springs has a contract with the Sulphur River MWD for water from Cooper Reservoir, and also has rights to Lake Sulphur Springs. The following table, Table 4.8, is a summary of identified water supply shortages in Hopkins County.

Table 4.8 Water Supply Shortages in Hopkins County

Hopkins County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
BRASHEAR WSC	55	62	58	55	53	61	EI
BRINKER WSC	97	122	130	143	157	171	EI
CASH SUD	4	8	10	9	29	38	EI
IRRIGATION, HOPKINS	3,787	3,787	3,787	3,787	3,787	3,787	A
LIVESTOCK, HOPKINS	128	124	124	120	118	118	A
MILLER GROVE WSC	30	40	44	51	58	64	A
NORTH HOPKINS WSC	231	271	297	325	354	383	EI
SHADY GROVE NO 2 WSC	14	15	14	13	12	15	EI

4.1.9 Hunt County

Water shortages in Hunt County are both contractual and actual in nature. The Sabine River Authority (SRA) is the leading wholesale water provider for consumers in Hunt County. The majority of SRA water from Lake Tawakoni and Lake Fork has been contracted; thus, there is limited water available from these lakes to meet projected shortages. Several entities also obtain supply from the North Texas Municipal Water District (NTMWD). Water from Lake Lavon and the Greenville City Lakes are also used by some systems in the county. Groundwater is mainly from the Nacatoch, Woodbine and the Trinity aquifers. The following table, Table 4.9, is a summary of identified water supply shortages in Hunt County.

Table 4.9 Water Supply Shortages in Hunt County

Hunt County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
ABLES SPRINGS SUD	4	8	14	17	20	23	EI
B H P WSC	41	133	216	287	356	413	EI
CADDO BASIN SUD	1,056	662	732	490	19	211	EI
CASH SUD	307	700	814	687	519	784	EI
CELESTE	14	19	24	28	32	35	A
COUNTY-OTHER, HUNT	230	209	259	217	146	103	A
GREENVILLE	13,658	16,254	17,865	19,224	20,604	21,801	A
HICKORY CREEK SUD	224	302	395	502	624	766	A
IRRIGATION, HUNT	193	193	193	193	193	193	A
JOSEPHINE	3	7	13	17	20	24	EI
LIVESTOCK, HUNT	76	76	76	75	75	75	A
MACBEE SUD	8	1	0	0	0	0	EI
NORTH HUNT SUD	172	160	150	137	124	115	A
POETRY WSC	0	0	0	0	0	0	EI
ROYSE CITY	57	179	329	475	629	771	EI
TEXAS A&M UNIVERSITY COMMERCE	276	275	275	275	275	275	EI

4.1.10 Lamar County

Lamar County utilizes surface water from Crook Lake and Pat Mayse Reservoir and utilizes ground water from Trinity and Woodbine Aquifers. The City of Paris is the major supplier of surface water in the county. Irrigation in the county utilizes run-of-river supplies in the Red River and groundwater. A summary of the identified water supply shortages in Lamar County is presented below in Table 4.10.

Table 4.10 Water Supply Shortages in Lamar County

Lamar County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
BOIS D ARC MUD	0	0	1	1	1	1	A
COUNTY-OTHER, LAMAR	121	114	114	114	115	113	EI
IRRIGATION, LAMAR	4,691	4,691	4,691	4,691	4,691	4,691	A
LIVESTOCK, LAMAR	82	82	82	82	82	82	A
MANUFACTURING, LAMAR	319	324	336	319	336	388	EI

4.1.11 Marion County

The Carrizo-Wilcox Aquifer and Lake O' The Pines supply most of the water demand in Marion County. No water supply shortages were identified in Marion County.

4.1.12 Morris County

Morris County is supplied by surface water from Lake O' the Pines and Ellison Lakes and groundwater from the Carrizo-Wilcox and Queen City Aquifers. Direct reuse is also a supply for manufacturing in the county. The following table, Table 4.11, is a summary of identified water supply shortages in Morris County.

Table 4.11 Water Supply Shortages in Morris County

Morris County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
HOLLY SPRINGS WSC	20	15	8	4	0	0	EI
LIVESTOCK, MORRIS	61	61	61	61	61	61	A
TRI SUD	45	47	41	35	26	17	EI

4.1.13 Rains County

The Sabine River Authority, via Lakes Tawakoni and Fork, is the main wholesale water provider for Rains County. Groundwater is predominantly from the Carrizo-Wilcox. Shortages in water supply have been identified for the Cash SUD and Miller Grove WSC. Table 4.12 is a summary of identified water supply shortages in Rains County.

Table 4.12 Water Supply Shortages in Rains County

Rains County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
CASH SUD	14	32	40	39	141	173	EI
GOLDEN WSC	0	1	1	1	1	1	A
IRRIGATION, RAINS	3	3	3	3	3	3	A
MILLER GROVE WSC	6	8	10	11	14	16	A
SOUTH RAINS SUD	0	12	28	49	70	92	EI

4.1.14 Red River County

Water supplies for Red River County are met by surface water from run-of-river rights, Pat Mayse Reservoir, and Lake Wright Patman, while groundwater is provided from the Blossom, Nacatoch, Trinity and Woodbine aquifers. Irrigation supplies are from run-of-river water rights for which available supplies can be limited. Water supply shortages have been identified for the City of Clarksville, as well as for irrigation and livestock in the county. Table 4.13 presents a summary of identified water supply shortages in Red River County.

Table 4.13 Water Supply Shortages in Red River County

Red River County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
410 WSC	135	122	106	94	81	68	EI
CLARKSVILLE	252	179	106	49	0	0	A
COUNTY-OTHER, RED RIVER	30	12	0	0	0	0	A
IRRIGATION, RED RIVER	2,681	2,681	2,681	2,681	2,681	2,681	A
LIVESTOCK, RED RIVER	145	145	145	145	145	145	A

4.1.15 Smith County

The portion of Smith County that is in the North East Texas Region is almost entirely supplied by the Carrizo-Wilcox Aquifer, although a relatively smaller amount of supply is from the Queen City Aquifer. Most projected shortages in this county are due to insufficient well capacity to withdraw water from the aquifer. The City of Tyler's supply comes from sources in Region I. A summary of the identified water supply shortages in Smith County is listed below as Table 4.14.

Table 4.14 Water Supply Shortages in Smith County

Smith County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
CRYSTAL SYSTEMS TEXAS	204	296	363	393	417	443	A
EAST TEXAS MUD	172	385	537	678	820	962	A
IRRIGATION, SMITH	156	156	156	156	156	156	A
LIBERTY CITY WSC	1	3	5	7	9	11	A
LINDALE	86	116	153	154	150	158	A
LINDALE RURAL WSC	291	419	514	594	675	756	A
MANUFACTURING, SMITH	0	0	7	8	7	9	EI
PINE RIDGE WSC	0	0	0	0	0	11	A
SOUTHERN UTILITIES	0	0	64	116	170	223	A
STAR MOUNTAIN WSC	31	42	52	57	63	69	A
WINONA	11	30	43	55	66	77	A

4.1.16 Titus County

Water supply in Titus County is predominately from Lake Monticello, Lake Bob Sandlin, Welsh Reservoir, Lake O' the Pines, and Tankersley Lake, and from the Carrizo-Wilcox Aquifer. Titus County FWD #1 and Franklin County Water District supply water to the City of Mount Pleasant. Mount Pleasant supplies county-other, manufacturing, and a portion to Tri SUD in addition to its internal demands. Steam electric power generation is primarily self-supplied and supplemented with wholesale water from the Northeast Texas Municipal Water District. A summary of the identified water supply shortages in Titus County is listed below in Table 4.15.

Table 4.15 Water Supply Shortages in Titus County

Titus County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
BI COUNTY WSC	0	0	0	7	20	35	A
LIVESTOCK, TITUS	242	242	242	247	247	247	A
MANUFACTURING, TITUS	1,718	1,761	1,943	2,380	2,695	2,887	EI
STEAM-ELECTRIC POWER, TITUS	1,076	2,496	3,816	4,584	5,473	6,293	EI
TRI SUD	452	533	531	506	439	338	EI

4.1.17 Upshur County

Water supplies for Upshur County are met by surface water from Lake O' the Pines, Gilmer, and Gladewater Lakes and groundwater from the Carrizo-Wilcox aquifer. A summary of the identified water supply shortages in Upshur County is listed below in Table 4.16.

Table 4.16 Water Supply Shortages in Upshur County

Upshur County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
BIG SANDY	19	20	20	16	12	8	A
EAST MOUNTAIN WATER SYSTEM	175	177	176	172	167	163	A
GLADEWATER	0	0	0	0	0	98	A
MANUFACTURING, UPSHUR	27	28	30	31	32	33	A
PRITCHETT WSC	46	49	46	37	28	19	A

4.1.18 Van Zandt County

Water supplies for Van Zandt County are met by surface water from Tawakoni, Fork, and Mill Creek Lakes, the Sabine River, and groundwater from the Carrizo-Wilcox aquifer. The following table, Table 4.17, is a summary of identified water supply shortages in Van Zandt County.

Table 4.17 Water Supply Shortages in Van Zandt County

Van Zandt County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
ABLES SPRINGS SUD	1	1	2	2	2	2	EI
BEN WHEELER WSC	0	36	82	132	183	227	A
CANTON	0	0	0	0	197	400	A
COUNTY-OTHER, VAN ZANDT	54	149	270	350	330	371	A
EDOM WSC	46	51	56	59	60	60	A
FRUITVALE WSC	0	3	18	43	76	95	A
GOLDEN WSC	0	9	19	29	39	49	A
GRAND SALINE	121	128	122	117	120	109	A
LITTLE HOPE MOORE WSC	12	20	28	36	44	48	A
MABANK	9	16	22	30	37	44	A
MACBEE SUD	389	593	843	1,167	1,582	2,123	EI
MANUFACTURING, VAN ZANDT	348	369	383	403	436	456	EI
MYRTLE SPRINGS WSC	130	192	245	314	384	449	A
PINE RIDGE WSC	31	44	55	68	82	95	A
R P M WSC	35	34	34	30	24	19	A
VAN	114	111	110	106	117	118	A

4.1.19 Wood County

Water supplies for Wood County are met by surface water from Cypress Springs Lake and Lake Fork, as well as groundwater from the Carrizo-Wilcox and Queen City aquifers. Water supply shortages have been identified in Wood County for the City of Quitman, livestock, and manufacturing. A summary of identified projected shortages in water supply is presented in Table 4.18.

Table 4.18 Water Supply Shortages in Wood County

Wood County	Total Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
BRIGHT STAR SALEM SUD	0	0	5	46	87	128	A
GOLDEN WSC	1	12	19	30	42	53	A
LIBERTY UTILITIES SILVERLEAF WATER	331	355	370	391	412	434	A
MANUFACTURING, WOOD	1,410	1,518	1,630	1,746	1,866	1,991	A
MINING, WOOD	59	60	61	60	60	60	A
NEW HOPE SUD	167	162	160	141	122	105	A
RAMEY WSC	0	73	172	285	415	564	A
SHARON WSC	1	11	17	29	42	54	A

4.2 River Basin Summaries of Water Needs

The NETRWPA is primarily divided among four main river basins including the Red River Basin, the Sulphur River Basin, the Cypress Creek Basin, and the Sabine River Basin. There is a small area of the Neches Basin in Van Zandt County and a smaller portion of the Trinity Basin in Hunt and Van Zandt Counties.

4.2.1 Red River Basin

The Red River Basin includes portions of Bowie, Lamar, and Red River Counties. Water shortages in the Red River Basin are both contractual and actual shortages. The largest volume of shortages is associated with irrigation use, which utilizes groundwater and run-of-river water from the Red River. Table 4.19 and Table 4.20 detail the contractual and projected shortages in the basin.

Table 4.19 Water Shortages due to Expirations and Insufficient Contract Amounts – Red River Basin

Insufficient Contract	Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
410 WSC	87	81	74	69	64	58	EI
BURNS REDBANK WSC	260	274	291	310	329	349	EI
CENTRAL BOWIE COUNTY WSC	118	118	119	120	121	122	EI
COUNTY-OTHER, LAMAR	29	29	28	28	28	28	EI
HOOKS	317	313	310	305	301	296	EI
MANUFACTURING, LAMAR	319	324	336	319	336	388	EI

Table 4.20 Actual Water Shortages – Red River Basin

Actual Shortage	Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
BOIS D ARC MUD	0	0	1	1	1	1	A
DE KALB	48	48	47	47	46	45	A
IRRIGATION, BOWIE	2,184	2,184	2,184	2,184	2,184	2,184	A
IRRIGATION, LAMAR	3,883	3,883	3,883	3,883	3,883	3,883	A
IRRIGATION, RED RIVER	212	212	212	212	212	212	A
LIVESTOCK, BOWIE	52	47	40	35	32	32	A
LIVESTOCK, LAMAR	82	82	82	82	82	82	A
MANUFACTURING, BOWIE	289	300	311	323	335	348	A
MANUFACTURING, LAMAR	319	324	336	319	336	388	A
NEW BOSTON	403	399	396	389	383	377	A
RIVERBEND WATER RESOURCES DISTRICT	211	209	206	203	200	196	A
TEXARKANA	840	832	825	813	802	790	A

4.2.2 Sulphur River Basin

The Sulphur River Basin includes portions of Bowie, Cass, Franklin, Hopkins, Hunt, Lamar, Morris, Red River, and Titus Counties. It also includes all of Delta County. Water shortages in the Sulphur Basin are primarily due to actual water needs, though there are several entities with needs to renew and/or increase existing contracts. Most of the actual needs are caused by the need for new infrastructure and insufficient supplies from groundwater sources. Table 4.21 and Table 4.22 detail contractual and actual shortages based on projected demand.

Table 4.21 Water Shortages due to Expiration and Insufficient Contract Amounts – Sulphur River Basin

Insufficient Contract	Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
410 WSC	48	41	32	25	17	10	EI
BRASHEAR WSC	19	22	20	18	16	20	EI
BRINKER WSC	97	122	130	143	157	171	EI
CENTRAL BOWIE COUNTY WSC	651	651	657	663	669	675	EI
COUNTY-OTHER, CASS	76	56	34	15	0	0	EI
COUNTY-OTHER, LAMAR	92	85	86	86	87	85	EI
MACEDONIA EYLAU MUD 1	710	705	698	688	677	666	EI
NORTH HOPKINS WSC	231	271	297	325	354	383	EI
SHADY GROVE NO 2 WSC	0	0	0	0	0	0	EI
TEXAS A&M UNIVERSITY COMMERCE	276	275	275	275	275	275	EI
TRI SUD	164	193	193	184	160	123	EI

Table 4.22 Actual Water Shortages – Sulphur River Basin

Actual Shortage	Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
BRINKER WSC	97	122	130	143	157	171	A
CLARKSVILLE	252	179	106	49	0	0	A
COUNTY-OTHER, CASS	76	56	34	15	0	0	A
COUNTY-OTHER, HUNT	230	209	259	217	146	103	A
COUNTY-OTHER, LAMAR	92	85	86	86	87	85	A
COUNTY-OTHER, RED RIVER	30	12	0	0	0	0	A
DE KALB	218	215	214	210	208	205	A
DELTA COUNTY MUD	0	0	0	0	22	204	A
HICKORY CREEK SUD	75	101	129	164	204	249	A
IRRIGATION, BOWIE	3,032	3,032	3,032	3,032	3,032	3,032	A
IRRIGATION, HOPKINS	3,673	3,673	3,673	3,673	3,673	3,673	A
IRRIGATION, HUNT	69	69	69	69	69	69	A
IRRIGATION, LAMAR	808	808	808	808	808	808	A
IRRIGATION, RED RIVER	2,469	2,469	2,469	2,469	2,469	2,469	A
LIVESTOCK, BOWIE	113	102	88	74	69	69	A
LIVESTOCK, DELTA	220	220	220	220	220	220	A
LIVESTOCK, FRANKLIN	118	118	118	118	118	118	A
LIVESTOCK, HUNT	39	39	39	39	39	39	A
LIVESTOCK, RED RIVER	145	145	145	145	145	145	A
MANUFACTURING, BOWIE	1,512	1,569	1,629	1,690	1,754	1,820	A
MANUFACTURING, CASS	3,534	4,873	6,261	7,698	9,190	10,737	A
MAUD	164	162	161	158	156	153	A
NASH	314	309	306	302	297	292	A
NEW BOSTON	906	898	889	876	862	848	A
NORTH HUNT SUD	192	182	173	162	149	139	A
REDWATER	337	333	329	323	317	311	A
RIVERBEND WATER RESOURCES DISTRICT	169	166	165	162	159	157	A
TEXARKANA	5,929	5,870	5,824	5,741	5,657	5,572	A
TEXAS A&M UNIVERSITY COMMERCE	276	275	275	275	275	275	A
WAKE VILLAGE	649	641	635	625	615	605	A

4.2.3 Cypress Creek Basin

The Cypress Creek Basin includes portions of Cass, Franklin, Gregg, Harrison, Hopkins, Morris, Titus, Upshur, and Wood Counties, as well as all of Camp and Marion Counties. There are significant projected shortages in water supply in the Cypress Creek Basin.

Table 4.23 and Table 4.24 detail contractual and projected shortages in the basin.

Table 4.23 Water Shortages due to Expiration and Insufficient Contract Amounts – Cypress Creek Basin

Insufficient Contract	Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
HOLLY SPRINGS WSC	35	26	16	9	2	0	EI
MANUFACTURING, CAMP	42	44	46	48	50	52	EI
MANUFACTURING, TITUS	1,718	1,761	1,943	2,380	2,695	2,887	EI
STEAM-ELECTRIC POWER, TITUS	1,076	2,496	3,816	4,584	5,473	6,293	EI
TRI SUD	333	387	379	357	305	232	EI

Table 4.24 Actual Water Shortages – Cypress Creek Basin

Actual Shortage	Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
BI COUNTY WSC	0	0	0	7	20	35	A
COUNTY-OTHER, CASS	285	235	182	133	82	25	A
CYPRESS VALLEY WSC	11	14	15	17	18	19	A
HARLETON WSC	0	0	0	0	4	8	A
IRRIGATION, HARRISON	283	283	283	283	283	283	A
IRRIGATION, HOPKINS	8	8	8	8	8	8	A
LEIGH WSC	42	0	0	0	0	0	A
LIVESTOCK, CAMP	496	496	496	496	496	496	A
LIVESTOCK, CASS	187	187	187	187	187	187	A
LIVESTOCK, FRANKLIN	190	190	190	190	190	190	A
LIVESTOCK, GREGG	16	16	16	16	16	16	A
LIVESTOCK, HOPKINS	128	124	124	120	118	118	A
LIVESTOCK, MORRIS	61	61	61	61	61	61	A
LIVESTOCK, TITUS	242	242	242	247	247	247	A
MANUFACTURING, TITUS	1,718	1,761	1,943	2,380	2,695	2,887	A
MANUFACTURING, UPSHUR	27	28	30	31	32	33	A
MINING, GREGG	0	0	0	0	1	1	A
MINING, HARRISON	433	425	416	409	399	399	A
NORTH HARRISON WSC	2	9	10	14	19	23	A
PITTSBURG	408	415	417	424	431	439	A
SCOTTSVILLE	31	42	45	56	66	76	A
SHARON WSC	5	15	21	33	46	58	A
STEAM-ELECTRIC POWER, TITUS	1,076	2,496	3,816	4,584	5,473	6,293	A
TRYON ROAD SUD	173	243	252	321	385	461	A

4.2.4 Neches River Basin

The Neches Basin includes portions of Van Zandt and Smith Counties. The Smith County portion is not located within the NETRWPA and is not included. Supply shortages in the Neches River Basin are primarily related to groundwater sources from the Carrizo-Wilcox Aquifer. Table 4.25 details the projected shortages in the basin.

Table 4.25 Actual Water Shortages – Neches River Basin

Actual Shortage	Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
BEN WHEELER WSC	0	36	82	132	183	227	A
EDOM WSC	46	51	56	59	60	60	A
LITTLE HOPE MOORE WSC	4	6	9	11	14	15	A
R P M WSC	35	34	34	30	24	19	A
VAN	0	0	0	0	16	17	A

4.2.5 Sabine River Basin

The Sabine Basin includes portions of Gregg, Harrison, Hunt, Smith, Upshur, Van Zandt, and Wood Counties as well as all of Rains County. The Sabine Basin has both contractual and actual shortages, and many of the actual shortages are due to deficits in groundwater supply or production. Increasing growth in population and limited WTP capacity also results in projected shortages for the City of Greenville.

Table 4.26 and Table 4.27 detail contractual and projected shortages in the basin.

Table 4.26 Water Shortages due to Expiration and Insufficient Contract Amounts – Sabine River Basin

Insufficient Contract	Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
ABLES SPRINGS SUD	5	9	16	19	22	25	EI
B H P WSC	41	133	216	287	356	413	EI
BRASHEAR WSC	36	40	38	37	37	41	EI
CADDO BASIN SUD	1,056	662	732	490	19	211	EI
CASH SUD	325	740	864	735	689	995	EI
JOSEPHINE	3	7	13	17	20	24	EI
MACBEE SUD	129	207	304	432	597	809	EI
MANUFACTURING, GREGG	0	38	98	160	224	291	EI
MANUFACTURING, SMITH	0	0	7	8	7	9	EI
MANUFACTURING, VAN ZANDT	348	369	383	403	436	456	EI
POETRY WSC	0	0	0	0	0	0	EI
ROYSE CITY	57	179	329	475	629	771	EI
SHADY GROVE NO 2 WSC	14	15	14	13	12	15	EI
SOUTH RAINS SUD	0	12	28	49	70	92	EI

Table 4.27 Actual Water Shortages – Sabine River Basin

Actual Shortage	Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
ABLES SPRINGS SUD	5	9	16	19	22	25	A
B H P WSC	41	133	216	287	356	413	A
BIG SANDY	19	20	20	16	12	8	A
BRIGHT STAR SALEM SUD	0	0	5	46	87	128	A
CANTON	0	0	0	0	197	400	A
CASH SUD	325	740	864	735	689	995	A
CELESTE	14	19	24	28	32	35	A
COUNTY-OTHER, VAN ZANDT	54	149	270	350	330	371	A
CRYSTAL SYSTEMS TEXAS	204	296	363	393	417	443	A
EAST MOUNTAIN WATER SYSTEM	215	218	217	212	206	202	A
EAST TEXAS MUD	172	385	537	678	820	962	A
FRUITVALE WSC	0	3	18	43	76	95	A
GLADEWATER	0	0	0	0	0	98	A
GOLDEN WSC	1	22	39	60	82	103	A
GRAND SALINE	121	128	122	117	120	109	A
GREENVILLE	13,658	16,254	17,865	19,224	20,604	21,801	A
HALLSVILLE	0	0	0	0	0	23	A
HICKORY CREEK SUD	90	125	170	220	276	343	A
IRRIGATION, HARRISON	191	191	191	191	191	191	A
IRRIGATION, HOPKINS	106	106	106	106	106	106	A
IRRIGATION, HUNT	124	124	124	124	124	124	A
IRRIGATION, RAINS	3	3	3	3	3	3	A
IRRIGATION, SMITH	156	156	156	156	156	156	A
LIBERTY CITY WSC	1	3	5	7	9	11	A
LIBERTY UTILITIES SILVERLEAF WATER	331	355	370	391	412	434	A
LINDALE	86	116	153	154	150	158	A
LINDALE RURAL WSC	291	419	514	594	675	756	A
LITTLE HOPE MOORE WSC	8	14	19	25	30	33	A
LIVESTOCK, HUNT	23	23	23	23	23	23	A
MACBEE SUD	129	207	304	432	597	809	A
MANUFACTURING, GREGG	0	38	98	160	224	291	A
MANUFACTURING, SMITH	0	0	7	8	7	9	A
MANUFACTURING, VAN ZANDT	348	369	383	403	436	456	A
MANUFACTURING, WOOD	1,410	1,518	1,630	1,746	1,866	1,991	A
MILLER GROVE WSC	36	48	54	62	72	80	A
MINING, HARRISON	1,419	1,409	1,400	1,392	1,383	1,383	A
MINING, WOOD	59	60	61	60	60	60	A
MYRTLE SPRINGS WSC	37	55	70	90	110	129	A
NEW HOPE SUD	167	162	160	141	122	105	A
PINE RIDGE WSC	31	44	55	68	82	106	A

Actual Shortage	Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
PRITCHETT WSC	46	49	46	37	28	19	A
RAMEY WSC	0	73	172	285	415	564	A
SCOTTSVILLE	91	116	118	144	170	194	A
SOUTHERN UTILITIES	0	0	64	116	170	223	A
STAR MOUNTAIN WSC	31	42	52	57	63	69	A
VAN	114	111	110	106	101	101	A
WEST GREGG SUD	0	0	0	0	0	0	A
WHITE OAK	66	88	69	26	0	0	A
WINONA	11	30	43	55	66	77	A

4.2.6 Trinity River Basin

The Trinity Basin includes portions of Hunt and Van Zandt Counties. Table 4.28 and Table 4.29 detail the contractual and projected shortages in this basin.

Table 4.28 Water Shortages due to Expiration and Insufficient Contract Amounts – Trinity River Basin

Insufficient Contract	Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
MACBEE SUD	268	387	539	735	985	1,314	EI

Table 4.29 Actual Water Shortages – Trinity River Basin

Actual Shortage	Water Shortage ac-ft/yr						Shortage Type
	2030	2040	2050	2060	2070	2080	
HICKORY CREEK SUD	59	76	96	118	144	174	A
LIVESTOCK, HUNT	14	14	14	13	13	13	A
MABANK	9	16	22	30	37	44	A
MYRTLE SPRINGS WSC	93	137	175	224	274	320	A

4.3 Summary of Needs – Major Water Providers

The following section presents the supply/demand analysis for the 29 Major Water Providers and additional WUG Sellers in the North East Texas Region that sell more than 1,000 acre-feet in any one year (which thus also represents Wholesale Water Providers for the purposes of the 2026 Region D Plan). Table 4.30 presents the summary of contractual needs by Major Water Provider, which considers the potential full legal demand of WWP/WUG Sellers' customers. Subsequent tables present a perspective based on the total water supply for each major water provider assuming that current contracts, permits, and water rights are held constant, and need is assessed by comparison of supply to projected demands, as shown in Tables 4.31 – 4.59.

The sales/transfer amounts presented in these tables are comprised of current customers' *projected demands up to their current contractual maximums. If (1) an individual customer's projected demand is lower than their contractual maximum, these tables display a sale/transfer amount equivalent to the projected demand. For those instances (2) where an individual customer's projected demand exceeds that customer's current contractual maximum, the sale/transfer amount presented is equivalent to the current contractual maximum*. For either (1) or (2), if supply is the limiting factor then the resultant sale/transfer amount is equivalent to the available supply, whichever is most restrictive. Self-supplied amounts are identified for those WUGs who have not only wholesale water customers, but also their own projected WUG demand.

While this presentation in Tables 4.31 – 4.59 alone does not portray the total current contracted amounts as the full legal demand on supply such as that shown in Table 4.30, it gives wholesale water providers a good approximation of what future demands will be if all current users continue with existing supplies and contracts at projected TWDB demands. Also included in Tables 4.31 – 4.59 is a breakdown of customers with projected needs for each WWP. This additional depiction provides a supplemental perspective to WWPs regarding their existing customers' identified projected needs in the Region D Plan. This represents an indication of potential customer need that could be relevant to an existing WWP. A characterization of the projected demands on supply, by WWP and WUG seller, is presented in Appendix C3-5, while a characterization of the full legal contractual demand on supply, by WWP and WUG seller, is presented in Appendix C3-6.

Table 4.30 Contractual Needs by Major Water Provider

Name	WWP/WUG Seller	Use	2020	2030	2040	2050	2060	2070
BI COUNTY WSC	WUG Seller	MAN	0	0	0	0	0	0
		POWER	0	0	0	0	0	0
BRIGHT STAR SALEM SUD	WUG Seller	MUN	0	0	0	0	0	0
CASH SUD	WUG Seller	MUN	541	632	699	875	1136	1121
CHEROKEE WATER COMPANY	MWP	MUN	0	0	0	0	0	0
		POWER	0	0	0	0	0	0
COMMERCE	WUG Seller	MAN	0	0	0	0	0	0
		MUN	516	516	516	516	516	516
COOPER	WUG Seller	MUN	86	89	90	92	118	309
EMORY	WUG Seller	MUN	527	526	526	525	525	525
FRANKLIN COUNTY WD	MWP	MUN	1464	1816	2168	2521	2872	3224
GLADEWATER	WUG Seller	MUN	0	0	0	0	0	0
GRAND SALINE	WUG Seller	MAN	0	0	0	0	0	0
GREENVILLE	WUG Seller	MAN	0	0	0	0	0	0
		MUN	1898	1837	1736	1592	1484	1431
		POWER	0	0	0	0	0	0
HUGHES SPRINGS	WUG Seller	MUN	0	0	0	0	0	0
KILGORE	WUG Seller	MUN	0	0	0	0	0	0
LAMAR COUNTY WSD	WUG Seller	MAN	0	0	0	0	0	0
		MUN	139	139	139	139	139	139

Name	WWP/WUG Seller	Use	2020	2030	2040	2050	2060	2070
LONGVIEW	WUG Seller	MAN	2940	2942	2942	2942	2942	2942
		MUN	4045	4045	4045	4045	4045	4045
		POWER	0	0	0	0	0	0
MARSHALL	WUG Seller	MAN	0	0	0	0	0	0
		MUN	0	0	0	0	0	0
MOUNT PLEASANT	WUG Seller	MAN	0	0	0	0	0	0
		MUN	1	420	818	1180	1513	1831
NORTHEAST TEXAS MWD	MWP	MAN	100	100	100	100	100	100
		MUN	32302	32302	32302	32302	32302	32302
		POWER	0	0	0	0	0	0
PARIS	WUG Seller	MAN	0	0	25	403	589	571
		MUN	0	0	0	0	0	0
		POWER	0	0	0	0	0	0
POINT	WUG Seller	MAN	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MAN	59928	66509	74735	82961	100813	100813
		MUN	12434	12697	12998	13391	13746	13748
SABINE RIVER AUTHORITY	MWP	IRR	0	0	0	0	0	0
		MAN	0	343	376	408	443	478
		MIN	0	0	0	0	0	0
		MUN	49769	38663	41593	44759	48118	48067
		POWER	0	0	0	0	0	0
		WWP	619	546	636	726	806	908
SULPHUR RIVER MWD	MWP	MUN	1072	1072	1072	1072	1072	1072
SULPHUR SPRINGS	WUG Seller	LIV	0	0	0	0	0	0
		MAN	0	0	0	0	0	0
		MIN	132	146	159	173	189	214
		MUN	0	0	0	0	0	0
TEXARKANA	WUG Seller	MUN	57370	57377	57384	57385	57385	57385
TITUS COUNTY FWD 1	MWP	MUN	11100	11100	11100	11100	11100	11100
		POWER	2700	3240	3780	4320	4860	5400
WHITE OAK	WUG Seller	MUN	0	0	0	0	0	0
GRAND TOTAL			**239683**	**237057**	**249939**	**263527**	**286813**	**288241**

4.3.1 Bi County Water Supply Corporation

Bi County Water Supply Corporation (WSC) gets its water supplies directly from the Carrizo-Wilcox Aquifer. The water district supplies water to Camp and Titus counties for their manufacturing and power needs, respectively, as well as its own municipal needs. As shown in Table 4.31, Bi County WSC has a small surplus of 17 ac-ft/yr.

Table 4.31 Water Supplies and Demands for Bright Star Salem Water Supply Corporation

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CARRIZO-WILCOX AQUIFER	1,846	1,846	1,846	1,846	1,846	1,846
TOTAL	**1,846**	**1,846**	**1,846**	**1,846**	**1,846**	**1,846**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
MANUFACTURING, CAMP	2	2	2	2	2	2
STEAM-ELECTRIC POWER, TITUS	3	3	3	3	3	3
SELF-SUPPLIED:						
BI COUNTY WSC	1,824	1,824	1,824	1,824	1,824	1,824
TOTAL	**1,829**	**1,829**	**1,829**	**1,829**	**1,829**	**1,829**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**17**	**17**	**17**	**17**	**17**	**17**

Customers of Bi County WSC are projected to have shortages beginning in 2030. Table 4.32 presents the Bi County WSC customer WUGs with projected shortages.

Table 4.32 Bi County Water Supply Corporation Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
MANUFACTURING, CAMP	42	44	46	48	50	52
STEAM-ELECTRIC POWER, TITUS	0	0	0	1	1	1
TOTAL	**42**	**44**	**46**	**49**	**51**	**53**

4.3.2 Bright Star Salem Special Utility District

Bright Star Salem Special Utility District (SUD) buys supplies from the Sabine River Authority, which come from Fork Lake, and gets additional direct supply from the Carrizo-Wilcox Aquifer. The water district supplies water to South Rains SUD, as well as its own municipal needs. As shown in Table 4.33, Bright Star Salem has a surplus.

Table 4.33 Water Supplies and Demands for Bright Star Salem Special Utility District

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CARRIZO-WILCOX AQUIFER	777	777	777	777	777	777
FORK LAKE/RESERVOIR	354	758	750	742	734	725
TOTAL	**1,131**	**1,535**	**1,527**	**1,519**	**1,511**	**1,502**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
SOUTH RAINS SUD	90	90	90	90	90	90
SELF-SUPPLIED:						
BRIGHT STAR SALEM SUD	1,445	1,437	1,429	1,421	1,412	1,412
TOTAL	**1,535**	**1,527**	**1,519**	**1,511**	**1,502**	**1,502**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**-404**	**8**	**8**	**8**	**9**	**0**

Bright Star Salem SUD's customer, South Rains SUD, is projected to have shortages beginning in 2040. Table 4.34 presents these projected shortages.

Table 4.34 Bright Star Salem Special Utility District Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
SOUTH RAINS SUD	0	4	9	16	23	30
TOTAL	**0**	**4**	**9**	**16**	**23**	**30**

4.3.3 Cash SUD

Cash SUD is a public water supply located primarily in Hunt County. The special utility district sells water to Caddo Mills, Hunt County, and the City of Quinlan. Current water supply is from the Sabine River Authority (SRA) and North Texas Municipal Water District (NTMWD). Cash SUD is projected to have water supply deficits in the current planning period, as shown in Table 4.35.

Table 4.35 Water Supplies and Demands for Cash SUD

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
FORK LAKE/RESERVOIR	0	0	0	0	0	3,325
INDIRECT REUSE	372	355	334	322	307	298
NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	624	521	441	387	352	330
TAWAKONI LAKE/RESERVOIR	1,701	1,780	1,839	2,285	3,437	2,364
TOTAL	**2,697**	**2,656**	**2,614**	**2,994**	**4,096**	**6,317**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
CADDO MILLS	67	67	67	67	67	67
COUNTY-OTHER, HUNT	374	604	790	1,200	1,908	1,908
QUINLAN	240	258	276	292	307	322
SELF-SUPPLIED:						
CASH SUD	2,595	2,558	2,883	3,437	3,699	3,684
TOTAL	**3,276**	**3,487**	**4,016**	**4,996**	**5,981**	**5,981**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**-579**	**-831**	**-1,402**	**-2,002**	**-1,885**	**336**

Hunt County-Other, which obtains supply from Cash SUD, is projected to have increasing shortages starting in 2030, as presented in Table 4.36.

Table 4.36 Cash SUD Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
COUNTY-OTHER, HUNT	193	185	204	184	131	93
TOTAL	**193**	**185**	**204**	**184**	**131**	**93**

4.3.4 Cherokee Water Company

This provider supplies the City of Longview and industry with surface water supply from Lake Cherokee in Gregg and Rusk Counties, Region I. Longview obtains water from three major water providers, Cherokee Water, Sabine River Authority, and Northeast Texas Municipal Water District, as well as owning water rights from the Sabine River. At projected sale/transfer Cherokee Water Company will have adequate supply, as shown in Table 4.37.

Table 4.37 Water Supplies and Demands for Cherokee Water Company

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CHEROKEE LAKE/RESERVOIR	31,456	31,309	31,162	31,015	30,867	30,720
TOTAL	**31,456**	**31,309**	**31,162**	**31,015**	**30,867**	**30,720**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
LONGVIEW	16,000	16,000	16,000	16,000	16,000	16,000
STEAM-ELECTRIC POWER, GREGG	2,000	2,000	2,000	2,000	2,000	2,094
TOTAL	**18,000**	**18,000**	**18,000**	**18,000**	**18,000**	**18,094**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**13,456**	**13,309**	**13,162**	**13,015**	**12,867**	**12,626**

4.3.5 City of Commerce (Commerce Water District)

The City of Commerce is served by the Commerce Water District, located in Hunt County, which buys most of its water from the Sabine River Authority, with additional supply from five wells into the Nacatoch Aquifer. Commerce supplies North Hunt SUD, Texas A&M University Commerce, Gafford Chapel WSC, rural areas in Delta County, and Manufacturing in Hunt County. In addition, Commerce Water District serves its own municipal needs. Available supplies, demands, and needs are shown in Table 4.38.

Table 4.38 Water Supplies and Demands for Commerce

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
NACATOCH AQUIFER	322	322	322	322	322	322
TAWAKONI LAKE/RESERVOIR	1,629	6,025	5,975	5,531	3,917	3,884
TOTAL	**1,951**	**6,347**	**6,297**	**5,853**	**4,239**	**4,206**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
COUNTY-OTHER, DELTA	74	74	74	74	74	74
GAFFORD CHAPEL WSC	3	3	3	3	3	3
MANUFACTURING, HUNT	67	67	67	67	67	67
NORTH HUNT SUD	147	147	147	147	147	147
TEXAS A&M UNIVERSITY COMMERCE	1	1	1	1	1	1
SELF-SUPPLIED:						
COMMERCE	2,130	2,130	2,130	2,130	2,130	2,130
TOTAL	**2,422**	**2,422**	**2,422**	**2,422**	**2,422**	**2,422**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**-471**	**3,925**	**3,875**	**3,431**	**1,817**	**1,784**

Customers of the City of Commerce are projected to have shortages beginning in 2030. Table 4.39 presents the City of Commerce customer WUGs with projected shortages.

Table 4.39 City of Commerce Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
NORTH HUNT SUD	135	131	126	121	114	107
TEXAS A&M UNIVERSITY COMMERCE	2	2	2	2	2	2
TOTAL	**137**	**133**	**128**	**123**	**116**	**109**

4.3.6 City of Cooper

The City of Cooper supplies Delta County MUD, as well as rural portions of Delta and Hunt counties. The city also supplies its own municipal needs. The City of Cooper buys water from Sulphur River MWD, coming from the Chapman/Cooper Lake Non-System Portion, and supplies its own additional water from Big Creek Lake. Available supplies and demands are shown in Table 4.40.

Table 4.40 Water Supplies and Demands for City of Cooper

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
BIG CREEK LAKE/RESERVOIR	940	752	564	376	188	0
CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	767	749	731	712	694	676
SULPHUR RUN-OF-RIVER	60	60	60	60	60	60
TOTAL	**1,767**	**1,561**	**1,355**	**1,148**	**942**	**736**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
COUNTY-OTHER, DELTA	0	0	0	0	0	0
COUNTY-OTHER, HUNT	0	0	0	0	0	0
DELTA COUNTY MUD	198	202	205	209	188	0
SELF-SUPPLIED:						
COOPER	1,509	1,299	1,090	879	694	676
TOTAL	**1,707**	**1,501**	**1,295**	**1,088**	**882**	**676**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**60**	**60**	**60**	**60**	**60**	**60**

Customers of the City of Cooper are projected to have shortages beginning in 2070. Table 4.41 presents City of Cooper customer WUGs with projected shortages.

Table 4.41 City of Cooper Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
COUNTY-OTHER, HUNT	0	0	0	0	0	0
DELTA COUNTY MUD	0	0	0	0	23	215
TOTAL	**0**	**0**	**0**	**0**	**23**	**215**

4.3.7 City of Emory

The City of Emory supplies East Tawakoni and South Rains SUD. In addition, the city serves its own municipal needs. The City of Emory buys water from the Sabine River Authority. The current contract with the authority is for 3,229 ac-ft/yr. Available supplies and demands are shown in Table 4.42.

Table 4.42 Water Supplies and Demands for City of Emory

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TAWAKONI LAKE/RESERVOIR	1,218	1,267	1,272	1,276	1,280	1,283
TOTAL	**1,218**	**1,267**	**1,272**	**1,276**	**1,280**	**1,283**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
EAST TAWAKONI	246	247	247	248	248	248
SOUTH RAINS SUD	192	188	187	187	188	188
SELF-SUPPLIED:						
EMORY	829	837	842	845	847	847
TOTAL	**1,267**	**1,272**	**1,276**	**1,280**	**1,283**	**1,283**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**-49**	**-5**	**-4**	**-4**	**-3**	**0**

South Rains SUD, a customer of the City of Emory, is projected to have shortages beginning in 2040. Table 4.43 presents these projected shortages.

Table 4.43 City of Emory Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
SOUTH RAINS SUD	0	8	19	33	47	62
TOTAL	**0**	**8**	**19**	**33**	**47**	**62**

4.3.8 Franklin County Water District

The Franklin County Water District (FCWD) holds water rights in Lake Cypress Springs of 15,300 ac-ft, which exceeds the firm yield calculated for the reservoir using the Cypress Basin WAM. FCWD serves wholesale customers only, which include Cypress Springs SUD, the City of Mount Vernon, and the City of Winnsboro. Available supplies and demands are shown in Table 4.44.

Table 4.44 Water Supplies and Demands for Franklin County Water District

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CYPRESS SPRINGS LAKE/RESERVOIR	8,036	7,684	7,332	6,980	6,628	6,276
TOTAL	**8,036**	**7,684**	**7,332**	**6,980**	**6,628**	**6,276**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
CYPRESS SPRINGS SUD	3,806	3,640	3,473	3,306	3,140	2,973
MOUNT VERNON	2,538	2,426	2,315	2,204	2,093	1,982
WINNSBORO	1,692	1,618	1,544	1,469	1,395	1,321
TOTAL	**8,036**	**7,684**	**7,332**	**6,979**	**6,628**	**6,276**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**0**	**0**	**0**	**1**	**0**	**0**

4.3.9 City of Gladewater

The City of Gladewater gets its water supplies directly from Gladewater Lake. The city supplies water to rural areas of Gregg, Smith, and Upshur counties, as well as its own municipal needs. Available supplies and demands are shown in Table 4.45.

Table 4.45 Water Supplies and Demands for the City of Gladewater

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
GLADEWATER LAKE/RESERVOIR	1,868	1,868	1,868	1,868	1,868	1,560
TOTAL	**1,868**	**1,868**	**1,868**	**1,868**	**1,868**	**1,560**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
COUNTY-OTHER, GREGG	154	154	154	154	154	54
COUNTY-OTHER, SMITH	23	23	23	23	23	23
COUNTY-OTHER, UPSHUR	112	112	112	112	112	112
SELF-SUPPLIED:						
GLADEWATER	1,579	1,579	1,579	1,579	1,579	1,371
TOTAL	**1,868**	**1,868**	**1,868**	**1,868**	**1,868**	**1,560**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

4.3.10 Golden Water Supply Corporation

Golden Water Supply Corporation (WSC) gets its water supplies directly from the Carrizo-Wilcox Aquifer. The company currently does not supply any other WUGs, but does provide its own municipal water supplies. Table 4.46 provides available supplies and demands for this company.

Table 4.46 Water Supplies and Demands for Golden Water Supply Corporation

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CARRIZO-WILCOX AQUIFER	565	565	565	565	565	565
TOTAL	**565**	**565**	**565**	**565**	**565**	**565**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
SELF-SUPPLIED:						
GOLDEN WSC	392	392	392	392	392	392
TOTAL	**392**	**392**	**392**	**392**	**392**	**392**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**173**	**173**	**173**	**173**	**173**	**173**

4.3.11 City of Greenville

The City of Greenville owns several small city lakes, which have a combined firm yield of 3,421 ac-ft/yr. In addition, Greenville has a contract with the Sabine River Authority for supply from Lake Tawakoni. Greenville supplies water to its own municipal, mining, and industrial customers as well as Jacobia WSC, Shady Grove WSC, and the City of Caddo Mills. The City currently owns and operates a 13 MGD WTP (approx. 8,090 ac-ft/yr with 1.8 peaking factor), and supplies 373 ac-ft/yr of raw water supply to steam-electric power generation in Hunt County. Available supplies and demands are shown in Table 4.47.

Table 4.47 Water Supplies and Demands for the City of Greenville

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
GREENVILLE CITY LAKE/RESERVOIR	3,318	3,318	3,318	3,318	3,318	3,318
TAWAKONI LAKE/RESERVOIR	10,297	20,362	20,194	20,027	19,879	19,690
TOTAL	**13,615**	**23,680**	**23,512**	**23,345**	**23,197**	**23,008**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
CADDO MILLS	186	201	242	309	319	319
COUNTY-OTHER, HUNT	806	806	806	806	806	734
MANUFACTURING, HUNT	965	1,146	1,319	1,438	1,624	1,624
SHADY GROVE SUD	174	220	280	357	455	580
STEAM-ELECTRIC POWER, HUNT	373	373	373	373	373	373
SELF-SUPPLIED:						
GREENVILLE	5,752	5,553	5,338	5,147	4,950	4,950
TOTAL	**8,256**	**8,299**	**8,358**	**8,430**	**8,527**	**8,580**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**5,359**	**15,381**	**15,154**	**14,915**	**14,670**	**14,428**

4.3.12 City of Grand Saline

The City of Grand Saline supplies manufacturing in Van Zandt county, as well as its own municipal needs. The city supplies its own water from the Carrizo-Wilcox Aquifer. Available supplies and demands are shown in Table 4.48.

Table 4.48 Water Supplies and Demands for the City of Grand Saline

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CARRIZO-WILCOX AQUIFER	360	360	374	379	376	388
SABINE RUN-OF-RIVER	112	112	112	112	112	112
TOTAL	**472**	**472**	**486**	**491**	**488**	**500**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
MANUFACTURING, VAN ZANDT	15	15	15	15	14	14
SELF-SUPPLIED:						
GRAND SALINE	345	345	359	364	362	374
TOTAL	**360**	**360**	**374**	**379**	**376**	**388**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**112**	**112**	**112**	**112**	**112**	**112**

Manufacturing in Van Zandt, a customer of the City of Grand Saline, is projected to have shortages beginning in 2030. Table 4.49 presents these projected shortages.

Table 4.49 City of Grand Saline Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
MANUFACTURING, VAN ZANDT	18	20	21	22	23	24
TOTAL	**18**	**20**	**21**	**22**	**23**	**24**

4.3.13 City of Hughes Springs

The City of Hughes Springs supplies Holly Springs WSC, as well as its own municipal needs. The city buys water from Northeast Texas MWD, coming from Lake O' the Pines. Available supplies and demands are shown in Table 4.50.

Table 4.50 Water Supplies and Demands for the City of Hughes Springs

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
O' THE PINES LAKE/RESERVOIR	656	656	656	656	656	656
TOTAL	**656**	**656**	**656**	**656**	**656**	**656**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
HOLLY SPRINGS WSC	92	92	92	92	92	92
SELF-SUPPLIED:						
HUGHES SPRINGS	562	562	562	562	562	562
TOTAL	**654**	**654**	**654**	**654**	**654**	**654**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**2**	**2**	**2**	**2**	**2**	**2**

Holly Springs WSC, a customer of the City of Hughes Springs, is projected to have shortages beginning in 2030. Table 4.51 presents these projected shortages.

Table 4.51 City of Grand Saline Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
HOLLY SPRINGS WSC	35	26	16	9	2	0
TOTAL	**35**	**26**	**16**	**9**	**2**	**0**

4.3.14 City of Kilgore

The City of Kilgore supplies Cross Roads SUD, rural areas of Gregg county, and its own municipal needs. The city buys water from the Sabine River Authority, coming from Fork Lake, and provides additional supplies itself from the Carrizo-Wilcox Aquifer. Available supplies and demands are shown in Table 4.52.

Table 4.52 Water Supplies and Demands for the City of Hughes Springs

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CARRIZO-WILCOX AQUIFER	1,554	1,554	1,554	1,554	1,554	1,554
FORK LAKE/RESERVOIR	2,240	6,063	5,998	5,937	5,919	6,411
TOTAL	**3,794**	**7,617**	**7,552**	**7,491**	**7,473**	**7,965**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
COUNTY-OTHER, GREGG	621	663	730	808	900	900
CROSS ROADS SUD	307	324	349	380	413	413
SELF-SUPPLIED:						
KILGORE	6,630	6,506	6,353	6,226	6,593	6,593
TOTAL	**7,558**	**7,493**	**7,432**	**7,414**	**7,906**	**7,906**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**-3,764**	**124**	**120**	**77**	**-433**	**59**

4.3.15 Lamar County Water Supply District

Lamar County Water Supply District (LCWSD) buys water from the City of Paris, the source being Pat Mayse Lake. The water district supplies water to several other water supply companies and cities, manufacturing, and its own retail needs. As shown in Table 4.53, LCWSD has a water supply surplus.

Table 4.53 Water Supplies and Demands for Lamar County Water Supply District

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
PAT MAYSE LAKE/RESERVOIR	13,442	13,442	13,442	13,442	13,442	13,442
TOTAL	**13,442**	**13,442**	**13,442**	**13,442**	**13,442**	**13,442**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
410 WSC	218	213	212	211	211	211
BLOSSOM	230	245	245	245	245	245
COUNTY-OTHER, LAMAR	280	285	283	281	279	279
COUNTY-OTHER, RED RIVER	250	247	247	247	247	247
MANUFACTURING, LAMAR	900	941	976	1,042	1,077	1,077
RED RIVER COUNTY WSC	184	184	184	184	184	184
RENO (LAMAR)	699	754	814	873	935	935
SELF-SUPPLIED:						
LAMAR COUNTY WSD	8,796	8,715	8,655	8,597	8,512	8,512
TOTAL	**11,557**	**11,584**	**11,616**	**11,680**	**11,690**	**11,690**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**1,885**	**1,858**	**1,826**	**1,762**	**1,752**	**1,752**

While LCWSD does not have any projected water supply shortages, several of their customers are projected to have shortages beginning in 2030, as shown in Table 4.54.

Table 4.54 LCWSD Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
410 WSC	135	122	106	94	81	68
COUNTY-OTHER, LAMAR	121	114	114	114	115	113
COUNTY-OTHER, RED RIVER	14	6	0	0	0	0
MANUFACTURING, LAMAR	315	320	332	315	332	384
TOTAL	**584**	**561**	**547**	**507**	**497**	**514**

4.3.16 City of Longview

The City of Longview purchases water supplies from the Northeast Texas Municipal Water District (NETMWD), Cherokee Water Co., SRA, and owns water rights on Big Sandy Creek and the Sabine River. Table 4.55 shows Longview is projected to have a supply surplus starting in 2040.

Table 4.55 Water Supplies and Demands for the City of Longview

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
BIG SANDY CREEK LAKE/RESERVOIR	2,680	2,680	2,680	2,680	2,680	2,680
CHEROKEE LAKE/RESERVOIR	16,000	16,000	16,000	16,000	16,000	16,000
DIRECT REUSE	6,161	6,161	6,161	6,161	6,161	6,161
FORK LAKE/RESERVOIR	8,000	18,042	17,850	17,666	17,470	17,271
O' THE PINES LAKE/RESERVOIR	20,000	20,000	20,000	20,000	20,000	20,000
SABINE RUN-OF-RIVER	12,670	12,670	12,670	12,670	12,670	12,670
TOTAL	**65,511**	**75,553**	**75,361**	**75,177**	**74,981**	**74,782**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
COUNTY-OTHER, GREGG	50	50	50	50	50	50
ELDERVILLE WSC	566	566	566	566	566	566
GUM SPRINGS WSC	2,940	2,940	2,940	2,940	2,940	2,940
HALLSVILLE	887	887	887	887	887	887
MANUFACTURING, GREGG	1,092	1,092	1,092	1,092	1,092	1,092
MANUFACTURING, HARRISON	5,404	5,404	5,404	5,404	5,404	5,404
STEAM-ELECTRIC POWER, HARRISON	6,161	6,161	6,161	6,161	6,161	6,161
WHITE OAK	2,680	2,680	2,680	2,680	2,680	2,680
SELF-SUPPLIED:						
LONGVIEW	52,243	52,276	52,308	52,343	52,378	52,378
TOTAL	**72,023**	**72,056**	**72,088**	**72,123**	**72,158**	**72,158**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**-6,512**	**3,497**	**3,273**	**3,054**	**2,823**	**2,624**

The City of Longview's identified projected customer shortages are presented in Table 4.56.

Table 4.56 City of Longview Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
HALLSVILLE	0	0	0	0	0	21
MANUFACTURING, GREGG	0	26	68	111	156	202
WHITE OAK	66	88	69	26	0	0
TOTAL	**0**	**12**	**41**	**82**	**121**	**162**

4.3.17 City of Marshall

This water provider, located in Harrison County, supplies water to Gill WSC and Harrison County, with water from the Big Cypress Bayou and Lake O' the Pines. It also supplies its own water needs. Marshall is projected to have sufficient supplies, as shown in Table 4.57.

Table 4.57 Water Supplies and Demands for the City of Marshall

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CYPRESS RUN-OF-RIVER	7,240	7,240	7,240	7,240	7,240	7,240
O' THE PINES LAKE/RESERVOIR	9,000	9,000	9,000	9,000	9,000	9,000
TOTAL	**16,240**	**16,240**	**16,240**	**16,240**	**16,240**	**16,240**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
COUNTY-OTHER, HARRISON	323	323	323	323	323	323
GILL WSC	100	100	100	100	100	100
MANUFACTURING, HARRISON	2,000	2,000	2,000	2,000	2,000	2,000
SELF-SUPPLIED:						
MARSHALL	13,817	13,817	13,817	13,817	13,817	13,817
TOTAL	**16,240**	**16,240**	**16,240**	**16,240**	**16,240**	**16,240**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

Customers of the City of Marshall are not projected to have shortages during the planning period.

4.3.18 City of Mount Pleasant

The City of Mount Pleasant has water rights in Lake Cypress Springs and Lake Tankersley. The city also has a contract with Titus County Freshwater Supply District for 30,000 ac-ft from Lake Bob Sandlin. Mount Pleasant provides water to its own municipal customers as well as some of the manufacturing users in Titus County. Mount Pleasant's wholesale customers include Tri SUD and the City of Winfield. Lake Bob Sandlin State Park is a separate entity from Mount Pleasant, but is treated as a retail customer. As shown in Table 4.58, the city is projected to have surpluses throughout the planning period.

Table 4.58 Water Supplies and Demands for the City of Mount Pleasant

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
BOB SANDLIN LAKE/RESERVOIR	18,900	18,900	18,900	18,900	18,900	18,900
CYPRESS RUN-OF-RIVER	400	400	400	400	400	400
CYPRESS SPRINGS LAKE/RESERVOIR	2,464	2,356	2,248	2,140	2,032	1,924
TANKERSLEY LAKE/RESERVOIR	1,500	1,500	1,500	1,500	1,500	1,500
TOTAL	**23,264**	**23,156**	**23,048**	**22,940**	**22,832**	**22,724**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
COUNTY-OTHER, FRANKLIN	14	16	17	17	17	17
COUNTY-OTHER, TITUS	687	743	776	810	848	890
MANUFACTURING, TITUS	3,345	3,409	3,472	3,483	3,617	3,651
TRI SUD	1,727	1,859	2,011	2,200	2,417	2,650
SELF-SUPPLIED:						
MOUNT PLEASANT	17,237	16,880	16,538	16,041	15,624	15,516
TOTAL	**23,010**	**22,907**	**22,814**	**22,551**	**22,523**	**22,724**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**254**	**249**	**234**	**389**	**309**	**0**

Table 4.59 presents the City of Mount Pleasant customer WUGs with projected shortages.

Table 4.59 City of Mount Pleasant Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
MANUFACTURING, TITUS	345	339	375	505	602	645
TRI SUD	497	580	572	541	465	355
TOTAL	**842**	**919**	**947**	**1,046**	**1,067**	**1,000**

4.3.19 Northeast Texas Municipal Water District

The Northeast Texas Municipal Water District (NETMWD) obtains water from numerous sources, listed below, and supplies the cities of Avinger, Daingerfield, Hughes Springs, Jefferson, Lone Star, Longview, Marshall, Ore City, and Pittsburg. Also supplied are Diana SUD, Harleton WSC, Tryon Road SUD, and Mims WSC. The NETMWD has existing contracts to supply an aggregate of 46,668 ac-ft to three power plants owned by AEP-SWEPCO and one power plant operated by Luminant. U.S. Steel has a contractual right to 32,400 ac-ft of water in Lake O' the Pines. The NETMWD is projected to maintain a supply surplus throughout the planning period, which is shown in Table 4.60.

Table 4.60 Water Supplies and Demands for Northeast Texas Municipal Water District

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
BOB SANDLIN LAKE/RESERVOIR	0	0	0	0	0	0
ELLISON CREEK LAKE/RESERVOIR	22,180	22,180	22,180	22,180	22,180	22,180
MONTICELLO LAKE/RESERVOIR	5,000	4,560	4,120	3,680	3,240	2,800
O' THE PINES LAKE/RESERVOIR	159,000	157,500	156,000	154,500	153,000	151,500
WELSH LAKE/RESERVOIR	2,900	2,620	2,340	2,060	1,780	1,500
TOTAL	**189,080**	**186,860**	**184,640**	**182,420**	**180,200**	**177,980**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
AVINGER	302	302	302	302	302	302
COUNTY-OTHER, CASS	0	0	0	0	0	0
COUNTY-OTHER, MARION	169	169	169	169	169	169
DAINGERFIELD	1,582	1,582	1,582	1,582	1,582	1,582
DIANA SUD	595	595	595	595	595	595
HARLETON WSC	68	68	68	68	68	68
HUGHES SPRINGS	656	656	656	656	656	656
JEFFERSON	1,509	1,509	1,509	1,509	1,509	1,509
LONE STAR	747	747	747	747	747	747
LONGVIEW	20,000	20,000	20,000	20,000	20,000	20,000
MANUFACTURING, CAMP	0	0	0	0	0	0
MANUFACTURING, MORRIS	45,437	45,437	45,437	45,437	45,437	45,437
MARSHALL	9,000	9,000	9,000	9,000	9,000	9,000
MIMS WSC	896	896	896	896	896	896
ORE CITY	1,504	1,504	1,504	1,504	1,504	1,504
PITTSBURG	0	0	0	0	0	0
STEAM-ELECTRIC POWER, HARRISON	18,000	18,000	18,000	18,000	18,000	18,000

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
STEAM-ELECTRIC POWER, TITUS	22,300	21,580	20,860	20,140	19,420	18,700
STEAM-ELECTRIC POWER, MARION	6,668	6,668	6,668	6,668	6,668	6,668
TRYON ROAD SUD	1,822	1,822	1,822	1,822	1,822	1,822
TOTAL	**131,255**	**130,535**	**129,815**	**129,095**	**128,375**	**127,655**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**57,825**	**56,325**	**54,825**	**53,325**	**51,825**	**50,325**

While NETMWD does not have any projected water supply shortages, several NETMWD customers are projected to have shortages beginning in 2030, predominantly from currently projected needs for steam electric power generation as shown in Table 4.61.

Table 4.61 NETMWD Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
HARLETON WSC	0	0	0	0	1	1
MANUFACTURING, CAMP	0	0	0	0	0	0
PITTSBURG	0	0	0	0	0	0
STEAM-ELECTRIC POWER, TITUS	800	1,872	2,893	3,435	4,180	4,899
TRYON ROAD SUD	151	211	218	259	287	343
TOTAL	**948**	**2,082**	**3,110**	**3,694**	**4,467**	**5,244**

4.3.20 City of Paris

The City of Paris, located within Lamar County, has water rights in Lake Crook and in Pat Mayse Lake. Paris serves its own municipal, steam electric and manufacturing needs. In addition, the city has wholesale contracts with Lamar County Water Supply District and MJC WSC. The city is projected to have sufficient supplies throughout the planning period, as shown in Table 4.62.

Table 4.62 Water Supplies and Demands for the City of Paris

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CROOK LAKE/RESERVOIR	1,592	1,592	1,592	1,592	1,592	1,592
PAT MAYSE LAKE/RESERVOIR	30,244	30,244	30,244	30,244	30,244	30,244
TOTAL	**31,836**	**31,836**	**31,836**	**31,836**	**31,836**	**31,836**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
MANUFACTURING, LAMAR	5,340	5,580	5,762	5,780	5,797	5,815
LAMAR COUNTY WSD	13,442	13,442	13,442	13,442	13,442	13,442
STEAM-ELECTRIC POWER, LAMAR	8,961	8,961	8,961	8,961	8,961	8,961
SELF-SUPPLIED:						
PARIS	4,093	3,853	3,671	3,653	3,636	3,618
TOTAL	**31,836**	**31,836**	**31,836**	**31,836**	**31,836**	**31,836**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

4.3.21 City of Point

The City of Point supplies manufacturing in Rains county, as well as its own municipal needs. The city buys water from the Sabine River Authority, coming from Tawakoni Lake. Available supplies and demands are shown in Table 4.63.

Table 4.63 Water Supplies and Demands for the City of Point

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TAWAKONI LAKE/RESERVOIR	376	391	392	393	395	395
TOTAL	**376**	**391**	**392**	**393**	**395**	**395**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
MANUFACTURING, RAINS	12	12	12	12	12	12
SELF-SUPPLIED:						
POINT	379	380	381	383	383	383
TOTAL	**391**	**392**	**393**	**395**	**395**	**395**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**-15**	**-1**	**-1**	**-2**	**0**	**0**

4.3.22 Sabine River Authority

The Sabine River Authority (SRA) holds water rights in Lake Fork (Wood and Rains Counties) and Lake Tawakoni (Hunt, Rains, and Van Zandt Counties). The SRA supplies the cities of Commerce, Edgewood, Emory, Greenville, Quitman, Kilgore, Longview, Point, West Tawakoni, Wills Point, the Ables Springs WSC, Cash SUD, Combined Consumers SUD, MacBee SUD and South Tawakoni, as well as industry. SRA also serves customers in other regions, but only Region D customers are identified in Table 4.64.

Table 4.64 Water Supplies and Demands for the Sabine River Authority

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
FORK LAKE/RESERVOIR	168,966	167,119	165,272	163,424	161,577	159,730
SABINE RUN-OF-RIVER	129,961	129,961	129,961	129,961	129,961	129,961
TAWAKONI LAKE/RESERVOIR	226,239	224,543	222,847	221,152	219,456	217,760
TOLEDO BEND LAKE/RESERVOIR	941,900	941,583	941,230	940,949	940,632	940,315
TOTAL	**1,467,066**	**1,463,206**	**1,459,310**	**1,455,486**	**1,451,626**	**1,447,766**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
BRIGHT STAR SALEM SUD	354	758	750	742	734	725
COMMERCE	1,629	6,025	5,975	5,531	3,917	3,884
GREENVILLE	10,297	20,362	20,194	20,027	19,879	19,690
KILGORE	2,240	6,063	5,998	5,937	5,919	6,411
LONGVIEW	8,000	18,042	17,850	17,666	17,470	17,271
MANUFACTURING, HARRISON	3,500	3,157	3,124	3,092	3,057	3,022
CASH SUD	1,679	1,762	1,824	2,272	3,425	5,678
COMBINED CONSUMERS SUD	594	684	816	1,013	1,304	1,726
COUNTY-OTHER, ORANGE	228	228	228	228	228	228

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
COUNTY-OTHER, SABINE	37	37	37	37	37	37
DALLAS	310,480	290,490	287,837	285,237	282,553	279,846
EDGEWOOD	272	285	295	307	318	329
EMORY	1,218	1,267	1,272	1,276	1,280	1,283
G M WSC	560	560	560	560	560	560
HEMPHILL	476	476	476	476	476	476
HENDERSON	4,515	4,465	4,416	4,367	4,317	4,268
HUXLEY	280	280	280	280	280	280
IRRIGATION, ORANGE	2,402	2,402	2,402	2,402	2,402	2,402
IRRIGATION, VAN ZANDT	184	184	184	184	184	184
MACBEE SUD	516	572	621	673	724	779
MANUFACTURING, JEFFERSON	1,120	1,120	1,120	1,120	1,120	1,120
MANUFACTURING, ORANGE	107,512	107,512	107,512	109,924	114,208	118,651
MINING, PANOLA	3,756	3,756	3,756	3,756	3,756	3,756
MINING, SABINE	334	334	334	334	334	334
MINING, SHELBY	3410	3410	3410	3410	3410	3410
NORTH TEXAS MWD	10582	10655	10565	10475	10395	10293
POINT	376	391	392	393	395	395
QUITMAN	316	1010	1000	989	978	967
TOTAL	**476,867**	**486,287**	**483,228**	**482,708**	**483,660**	**488,005**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**990,199**	**976,919**	**976,082**	**972,778**	**967,966**	**959,761**

The SRA's Region D customers with projected water shortages are presented in Table 4.65. Shortages presented for Greenville are not due to supply limitations, but rather WTP capacity limitations.

Table 4.65 Sabine River Authority Region D Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CASH SUD	165	325	433	507	445	686
DALLAS	10,491	32,339	39,480	41,894	45,559	51,440
GREENVILLE	6,024	6,843	7,105	7,216	7,222	7,641
MACBEE SUD	377	562	786	1,074	1,443	1,951
MANUFACTURING, JEFFERSON	34	230	450	668	883	1,097
TOTAL	**17,090**	**40,300**	**48,254**	**51,359**	**55,552**	**62,815**

4.3.23 Sulphur River Municipal Water District

The Sulphur River Municipal Water District (SRMWD) holds water rights in Cooper Lake. The City of Commerce, City of Cooper, and City of Sulphur Springs are the three member cities constituting the SRMWD. Water supplies and demands for the SRMWD are presented in Table 4.66.

Table 4.66 Water Supplies and Demands for the SRMWD

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	13,738	13,411	13,085	12,758	12,431	12,104
TOTAL	**13,738**	**13,411**	**13,085**	**12,758**	**12,431**	**12,104**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
COOPER	767	749	731	712	694	676
SULPHUR SPRINGS	12,971	12,662	12,354	12,046	11,737	11,428
TOTAL	**13,738**	**13,411**	**13,085**	**12,758**	**12,431**	**12,104**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

4.3.24 City of Sulphur Springs

The City of Sulphur Springs, located in Hopkins County, has three sources of water supply. The city has a contract with the Sulphur River Municipal Water District (SRMWD) for supply from Cooper Reservoir, available for the life of the reservoir. Sulphur Springs currently has a surplus of 5,252 ac-ft/yr in 2030. By 2080, the surplus decreases to 2,855 ac-ft/yr. Available supplies and demands are shown in Table 4.67.

Table 4.67 Water Supplies and Demands for the City of Sulphur Springs

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	12,971	12,662	12,354	12,046	11,737	11,428
SULPHUR RUN-OF-RIVER	0	0	0	0	0	0
SULPHUR SPRINGS LAKE/RESERVOIR	902	980	1,057	1,133	1,210	1,287
TOTAL	**13,873**	**13,642**	**13,411**	**13,179**	**12,947**	**12,715**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
GAFFORD CHAPEL WSC	111	115	121	128	135	135
MANUFACTURING, HUNT	50	50	50	50	50	50
BRASHEAR WSC	155	163	170	181	192	192
BRINKER WSC	77	77	77	77	77	77
COUNTY-OTHER, HOPKINS	83	79	24	0	0	0
LIVESTOCK, HOPKINS	1,551	1,720	1,730	1,914	1,996	1,996
MANUFACTURING, HOPKINS	1,830	1,915	1,987	2,126	2,275	2,275
MARTIN SPRINGS WSC	223	223	223	223	223	223
MINING, HOPKINS	68	74	81	88	96	96
NORTH HOPKINS WSC	921	921	921	921	921	921
SHADY GROVE NO 2 WSC	112	118	123	131	138	138
SELF-SUPPLIED:						
SULPHUR SPRINGS	3,440	3,497	3,590	3,646	3,701	3,757
TOTAL	**8,621**	**8,952**	**9,097**	**9,485**	**9,804**	**9,860**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**5,252**	**4,690**	**4,314**	**3,694**	**3,143**	**2,855**

Customers of the City of Sulphur Springs are projected to have shortages beginning in 2030. Table 4.68 presents the City of Sulphur Springs customer WUGs with projected shortages.

Table 4.68 City of Sulphur Springs Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
BRASHEAR WSC	55	62	58	55	53	61
BRINKER WSC	23	29	31	33	37	40
LIVESTOCK, HOPKINS	24	26	26	27	27	27
NORTH HOPKINS WSC	231	271	297	325	354	383
SHADY GROVE NO 2 WSC	14	15	14	13	12	15
TOTAL	**347**	**402**	**425**	**453**	**483**	**526**

4.3.25 Titus County Fresh Water Supply District (TCFWSD) No. 1

TCFWSD No. 1 currently supplies the City of Mount Pleasant and Luminant with water from Lake Bob Sandlin. TCFWSD No. 1 has no uncommitted water supply in Lake Bob Sandlin. No shortages are projected for this system as shown in Table 4.69.

Table 4.69 Water Supplies and Demands for Titus County Fresh Water Supply District

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
BOB SANDLIN LAKE/RESERVOIR	26,200	25,660	25,120	24,580	24,040	23,500
TOTAL	**26,200**	**25,660**	**25,120**	**24,580**	**24,040**	**23,500**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
MOUNT PLEASANT	18,900	18,900	18,900	18,900	18,900	18,900
STEAM-ELECTRIC POWER, TITUS	7,300	6,760	6,220	5,680	5,140	4,600
TOTAL	**26,200**	**25,660**	**25,120**	**24,580**	**24,040**	**23,500**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

TCFWSD's identified projected customer shortage is presented in Table 4.70.

Table 4.70 TCFWSD Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
STEAM-ELECTRIC POWER, TITUS	276	624	923	1,043	1,169	1,245
TOTAL	**276**	**624**	**923**	**1,043**	**1,169**	**1,245**

4.3.26 Tri Special Utility District

Tri Special Utility District (SUD) buys water from the City of Mount Pleasant, coming from Bob Sandlin Lak. The water district currently does not supply any other WUGs, but does provide its own municipal water supplies. Table 4.71provides available supplies and demands for this company.

Table 4.71 Water Supplies and Demands for Tri Special Utility District

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
BOB SANDLIN LAKE/RESERVOIR	1,727	1,859	2,011	2,200	2,417	2,650
TOTAL	**1,727**	**1,859**	**2,011**	**2,200**	**2,417**	**2,650**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
SELF-SUPPLIED:						
TRI SUD	1,727	1,859	2,011	2,200	2,417	2,650
TOTAL	**1,727**	**1,859**	**2,011**	**2,200**	**2,417**	**2,650**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

4.3.27 City of White Oak

The City of White Oak supplies rural portions of Gregg and Upshur counties, as well as its own municipal needs. The city buys water from the City of Longview, coming from Big Sandy Creek Lake. Available supplies and demands are shown in Table 4.72.

Table 4.72 Water Supplies and Demands for the City of White Oak

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
BIG SANDY CREEK LAKE/RESERVOIR	2,680	2,680	2,680	2,680	2,680	2,680
TOTAL	**2,680**	**2,680**	**2,680**	**2,680**	**2,680**	**2,680**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
COUNTY-OTHER, GREGG	50	50	50	50	50	50
COUNTY-OTHER, UPSHUR	40	40	40	40	40	40
SELF-SUPPLIED:						
WHITE OAK	2,590	2,590	2,590	2,590	2,590	2,590
TOTAL	**2,680**	**2,680**	**2,680**	**2,680**	**2,680**	**2,680**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

4.3.28 Riverbend Water Resources District/City of Texarkana (Texarkana Water Utilities)

Texarkana Water Utilities supplies the Cities of Texarkana, Texas, and Texarkana, Arkansas. There is supply and demand in both states. As noted previously, given present legal uncertainties regarding Arkansas water supply potentially available for Texas entities' use, it has been assumed for the purposes of the 2026 Region D Plan that only Texas sources and supplies are available for use by entities within Region D. Therefore, supply and demands in Table 4.73 only reflect Texas' Region D water use.

Through interlocal agreements with a number of local WUGs, Riverbend Water Resources District (Riverbend WRD) formally represents the water supply interests for most of the water suppliers in Bowie County. Riverbend WRD sells and/or supplies surface water to: City of Annona, City of Atlanta, City of Avery, City of De Kalb, City of Hooks, City of Leary, City of Maud, City of Nash, City of New Boston, City of Queen City, City of Redwater, City of Texarkana (Texas), City of Wake Village, and TexAmericas Center. Central Bowie County WSC and the City of Red Lick hold MOUs (Memorandum of Understanding) with Riverbend WRD for the collaboration and partnership of developing the region's water resource needs. Retail customers of the City of Texarkana (Texas) include the Macedonia-Eylau MUD #1, Red River County WSC, County-Other portions of Bowie, Cass and Red River Counties, and Manufacturing in Bowie and Cass Counties. Burns Redbank WSC has connected water supply via the City of Hooks.

Water supply comes from Lake Wright Patman through contracts with the U.S. Army Corps of Engineers. The permitted surface water right in Lake Wright Patman totals 180,000 ac-fy/yr, of supply, but is limited by contractual and infrastructure constraints on reservoir operations, as well as sedimentation. Demands come from three counties and are as follows: City of Texarkana, Texas, City of DeKalb, City of Hooks, City of Maud, City of Nash, City of New Boston, City of Redwater, City of Wake Village, City of Atlanta, City of Queen City, City of Domino, City of Annona, City of Avery, Central Bowie WSC, Macedonia-Eylau MUD #1, Oak Grove WSC, Red River County WSC, Burns Redbank WSC, Park Terrace MHP and manufacturing in Bowie and Cass Counties. Riverbend WRD, its member entities, and customers are projected to have a deficit of contractual supplies beginning in 2020. The deficit is primarily due to the functional treatment capacity of Texarkana's New Boston Road WTP limiting available supply, the elevation of the City of Texarkana's existing intake, outstanding full contractual implementation of the Ultimate Rule Curve increasing conservation storage in the reservoir, and sedimentation effects.

Table 4.73 Water Supplies and Demands for the Riverbend WRD/City of Texarkana

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CANEY CREEK LAKE/RESERVOIR	0	0	0	0	0	0
ELLIOT CREEK LAKE/RESERVOIR	0	0	0	0	0	0
RED RUN-OF-RIVER	0	0	0	0	0	0
WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
SALE/TRANSFER (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CONTRACTUAL:						
COUNTY-OTHER, RED RIVER	0	0	0	0	0	0
RED RIVER COUNTY WSC	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	122,630	122,623	122,616	122,615	122,615	122,615
CENTRAL BOWIE COUNTY WSC	0	0	0	0	0	0
COUNTY-OTHER, BOWIE	0	0	0	0	0	0
DE KALB	0	0	0	0	0	0
HOOKS	0	0	0	0	0	0
MACEDONIA EYLAU MUD 1	0	0	0	0	0	0
MANUFACTURING, BOWIE	0	0	0	0	0	0
MANUFACTURING, CASS	122,623	122,616	122,615	122,615	122,615	122,615
MAUD	0	0	0	0	0	0
NASH	0	0	0	0	0	0
NEW BOSTON	0	0	0	0	0	0

SUPPLIES (ac-ft/yr)	2030	2040	2050	2060	2070	2080
REDWATER	0	0	0	0	0	0
TEXARKANA	0	0	0	0	0	0
WAKE VILLAGE	0	0	0	0	0	0
SELF-SUPPLIED:						
RIVERBEND WATER RESOURCES DISTRICT	0	0	0	0	0	0
TEXARKANA	0	0	0	0	0	0
TOTAL	**122,630**	**122,623**	**122,616**	**122,615**	**122,615**	**122,615**
SURPLUS/NEEDS (ac-ft/yr)	2030	2040	2050	2060	2070	2080
TOTAL	**122,630**	**122,623**	**122,616**	**122,615**	**122,615**	**122,615**

Member entities and customers of Riverbend WRD/City of Texarkana are projected to have shortages beginning in 2030. Table 4.74 presents the WUGs with projected shortages.

Table 4.74 Riverbend Water Resources District/City of Texarkana Customer Entity Shortages

Needs (ac-ft/yr)	2030	2040	2050	2060	2070	2080
CENTRAL BOWIE COUNTY WSC	769	769	776	783	790	797
COUNTY-OTHER, RED RIVER	0	0	0	0	0	0
DE KALB	266	263	261	257	254	250
HOOKS	317	313	310	305	301	296
MACEDONIA EYLAU MUD 1	710	705	698	688	677	666
MANUFACTURING, BOWIE	0	0	0	0	0	0
MANUFACTURING, CASS	3,529	4,866	6,252	7,687	9,177	10,722
MAUD	164	162	161	158	156	153
NASH	314	309	306	302	297	292
NEW BOSTON	856	848	841	827	814	801
REDWATER	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	267	264	261	257	253	248
TEXARKANA	2,396	2,373	2,354	2,320	2,287	2,252
WAKE VILLAGE	649	641	635	625	615	605
TOTAL	**10,237**	**11,513**	**12,854**	**14,209**	**15,621**	**17,083**

4.4 Secondary Needs for Major Water Providers in the North East Texas Region

Secondary needs (after accounting for potential conservation savings) have been calculated for all customers and aggregated by Major Water Provider, as shown in Table 4.75.

Table 4.75 Secondary Needs for Major Water Providers in the North East Texas Region

MWP	Total Secondary Water Need in ac-ft/yr					
	2030	2040	2050	2060	2070	2080
BI COUNTY WSC	0	0	0	7	20	35
BRIGHT STAR SALEM SUD	0	0	0	21	61	100
CASH SUD	372	865	1,035	902	840	1,256
COMMERCE	0	0	0	0	0	0
COOPER	0	0	0	0	0	0
EMORY	0	0	0	0	0	0
GLADEWATER	0	0	0	0	0	0
GOLDEN WSC	1	22	39	60	82	103
GRAND SALINE	121	128	122	117	120	109
GREENVILLE	13,658	16,254	17,865	19,224	20,604	21,801
HUGHES SPRINGS	0	0	0	0	0	0
KILGORE	0	0	0	0	0	0
LAMAR COUNTY WSD	0	0	0	0	0	0
LONGVIEW	0	0	0	0	0	0
MARSHALL	0	0	0	0	0	0
MOUNT PLEASANT	0	0	0	0	0	0
PARIS	0	0	0	0	0	0
POINT	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	380	375	371	365	359	353
SULPHUR SPRINGS	0	0	0	0	0	0
TEXARKANA	6,769	6,702	6,649	6,554	6,459	6,362
TRI SUD	497	580	572	541	465	355
WHITE OAK	0	0	0	0	0	0

4.5 Water Surpluses in the North East Texas Region

Table 4.76 lists the entities within the North East Texas Region that have a supply surplus during the planning period. TWDB designated WUGs and County Other WUGs surpluses are listed in the table. Several WUGs are split and require multiple entries in the following tables. For some WUGs split into multiple counties or basins, there may be a surplus in one area, and a shortage in another. Only those splits with surpluses are shown below.

Table 4.76 Water Surpluses in the North East Texas Region by County

COUNTY	WUG	Total Water Supply Surplus in ac-ft/yr					
		2030	2040	2050	2060	2070	2080
BOWIE	COUNTY-OTHER, BOWIE	1973	2080	2056	2083	2147	2213
BOWIE TOTAL		**1973**	**2080**	**2056**	**2083**	**2147**	**2213**
CAMP	BI COUNTY WSC	505	503	501	496	490	485
CAMP	COUNTY-OTHER, CAMP	348	356	364	371	379	378
CAMP TOTAL		**853**	**859**	**865**	**867**	**869**	**863**
CASS	ATLANTA	94	201	324	359	398	437
CASS	AVINGER	202	207	212	216	220	225
CASS	COUNTY-OTHER, CASS	0	0	0	0	6	29
CASS	E M C WSC	26	27	29	31	32	34
CASS	EASTERN CASS WSC	314	305	290	272	249	222
CASS	HOLLY SPRINGS WSC	0	0	0	0	0	1
CASS	HUGHES SPRINGS	184	202	221	236	251	266
CASS	LINDEN	97	113	129	142	155	168
CASS	LIVESTOCK, CASS	234	234	236	236	236	236
CASS	MANUFACTURING, CASS	231	230	230	229	228	228
CASS	MIMS WSC	118	119	119	120	121	121
CASS	MINING, CASS	804	827	836	869	891	917
CASS	QUEEN CITY	29	39	46	51	55	56
CASS	WESTERN CASS WSC	800	815	830	842	854	865
CASS TOTAL		**3133**	**3319**	**3502**	**3603**	**3696**	**3805**
COLLIN	CADDO BASIN SUD	1	0	0	0	0	0
COLLIN TOTAL		**1**	**0**	**0**	**0**	**0**	**0**
DELTA	COOPER	1045	838	632	427	248	236
DELTA	COUNTY-OTHER, DELTA	27	31	34	39	43	48
DELTA	IRRIGATION, DELTA	2053	2063	2068	2068	2080	2080
DELTA TOTAL		**3125**	**2932**	**2734**	**2534**	**2371**	**2364**
FANNIN	NORTH HUNT SUD	6	2	0	0	0	0
FANNIN	WOLFE CITY	7	8	8	9	9	9
FANNIN TOTAL		**13**	**10**	**8**	**9**	**9**	**9**
FRANKLIN	COUNTY-OTHER, FRANKLIN	138	155	156	156	156	157
FRANKLIN	CYPRESS SPRINGS SUD	1903	1734	1569	1402	1239	1077
FRANKLIN	IRRIGATION, FRANKLIN	169	169	169	169	169	169
FRANKLIN	MOUNT VERNON	2103	1997	1892	1778	1663	1549

COUNTY	WUG	Total Water Supply Surplus in ac-ft/yr					
		2030	2040	2050	2060	2070	2080
FRANKLIN	WINNSBORO	234	208	185	163	142	122
FRANKLIN TOTAL		**4547**	**4263**	**3971**	**3668**	**3369**	**3074**
GREGG	CLARKSVILLE CITY	119	119	119	121	123	125
GREGG	COUNTY-OTHER, GREGG	1282	1417	1609	1857	2029	2115
GREGG	ELDERVILLE WSC	110	107	113	120	83	113
GREGG	GLADEWATER	131	131	149	177	207	157
GREGG	GLENWOOD WSC	10	11	11	11	12	12
GREGG	IRRIGATION, GREGG	154	154	154	154	154	154
GREGG	KILGORE	2305	2094	1887	1730	2066	2117
GREGG	LIBERTY CITY WSC	315	314	318	327	335	344
GREGG	LIVESTOCK, GREGG	52	52	52	52	52	52
GREGG	LONGVIEW	27667	27403	27169	27140	27112	27043
GREGG	MANUFACTURING, GREGG	20	0	0	0	0	0
GREGG	MINING, GREGG	332	328	241	154	93	93
GREGG	STARRVILLE-FRIENDSHIP WSC	34	34	34	35	36	37
GREGG	STEAM-ELECTRIC POWER, GREGG	1302	1302	1302	1302	1302	1302
GREGG	TRYON ROAD SUD	1059	1053	1058	1063	1064	1079
GREGG	WEST GREGG SUD	171	158	141	122	98	77
GREGG	WHITE OAK	0	0	0	0	18	61
GREGG TOTAL		**35063**	**34677**	**34357**	**34365**	**34784**	**34881**
HARRISON	BLOCKER CROSSROADS WSC	60	58	57	56	55	54
HARRISON	COUNTY-OTHER, HARRISON	620	706	742	891	1027	1121
HARRISON	DIANA SUD	56	55	55	54	53	52
HARRISON	GILL WSC	115	117	117	124	131	137
HARRISON	GUM SPRINGS WSC	1690	1558	1537	1411	1289	1171
HARRISON	HALLSVILLE	161	113	106	61	18	0
HARRISON	HARLETON WSC	14	6	5	0	0	0
HARRISON	LEIGH WSC	0	0	5	68	129	188
HARRISON	LIVESTOCK, HARRISON	369	416	465	493	506	506
HARRISON	LONGVIEW	1020	959	932	858	786	728
HARRISON	MANUFACTURING, HARRISON	81977	80978	79944	78870	77757	76639
HARRISON	MARSHALL	9161	9273	9281	9539	9789	10032
HARRISON	STEAM-ELECTRIC POWER, HARRISON	3363	3363	3363	3363	3363	3363
HARRISON	TALLEY WSC	69	68	67	68	69	70
HARRISON	WASKOM	51	71	74	107	139	170
HARRISON	WEST HARRISON WSC	165	141	137	110	84	59
HARRISON TOTAL		**98891**	**97882**	**96887**	**96073**	**95195**	**94290**

COUNTY	WUG	Total Water Supply Surplus in ac-ft/yr					
		2030	2040	2050	2060	2070	2080
HOPKINS	COMO	12	13	13	13	13	13
HOPKINS	CORNERSVILLE WSC	91	86	82	78	73	69
HOPKINS	COUNTY-OTHER, HOPKINS	839	828	761	724	716	710
HOPKINS	CUMBY	22	25	21	21	22	23
HOPKINS	CYPRESS SPRINGS SUD	299	286	268	243	217	190
HOPKINS	GAFFORD CHAPEL WSC	36	37	40	44	49	46
HOPKINS	JONES WSC	7	6	5	2	3	3
HOPKINS	LAKE FORK WSC	26	25	25	24	24	23
HOPKINS	LIVESTOCK, HOPKINS	729	725	725	722	721	721
HOPKINS	MANUFACTURING, HOPKINS	788	834	866	963	1069	1024
HOPKINS	MARTIN SPRINGS WSC	187	173	163	154	143	133
HOPKINS	MINING, HOPKINS	258	265	272	281	289	289
HOPKINS	SHADY GROVE NO 2 WSC	9	8	11	13	15	13
HOPKINS	SHIRLEY WSC	91	78	69	57	44	33
HOPKINS TOTAL		**3394**	**3389**	**3321**	**3339**	**3398**	**3290**
HUNT	CADDO MILLS	33	46	84	148	155	152
HUNT	COMMERCE	540	593	633	694	755	816
HUNT	COUNTY-OTHER, HUNT	919	1087	1318	1738	2466	2487
HUNT	IRRIGATION, HUNT	2	2	2	2	2	2
HUNT	MACBEE SUD	0	0	7	21	42	41
HUNT	MANUFACTURING, HUNT	465	622	770	864	1024	997
HUNT	POETRY WSC	25	30	48	99	250	248
HUNT	WEST TAWAKONI	481	443	355	376	344	318
HUNT	WOLFE CITY	88	87	84	84	82	81
HUNT TOTAL		**2553**	**2910**	**3301**	**4026**	**5120**	**5142**
LAMAR	BLOSSOM	93	109	109	110	111	111
LAMAR	LAMAR COUNTY WSD	5890	5812	5766	5721	5650	5663
LAMAR	LIVESTOCK, LAMAR	575	575	575	575	575	575
LAMAR	MANUFACTURING, LAMAR	812	902	976	1005	845	678
LAMAR	PARIS	395	166	0	0	0	0
LAMAR	RENO (LAMAR)	297	353	415	476	539	541
LAMAR	STEAM-ELECTRIC POWER, LAMAR	3255	3255	3255	3255	3255	3255
LAMAR TOTAL		**11317**	**11172**	**11096**	**11142**	**10975**	**10823**
MARION	COUNTY-OTHER, MARION	550	564	582	593	605	619
MARION	DIANA SUD	2	11	17	22	27	31
MARION	E M C WSC	113	127	142	152	163	174
MARION	HARLETON WSC	33	43	54	61	68	76
MARION	IRRIGATION, MARION	310	310	310	310	310	310
MARION	JEFFERSON	1829	1860	1892	1914	1936	1957
MARION	KELLYVILLE-BEREA WSC	23	26	29	31	32	33

COUNTY	WUG	Total Water Supply Surplus in ac-ft/yr					
		2030	2040	2050	2060	2070	2080
MARION	LIVESTOCK, MARION	242	242	242	242	242	242
MARION	MIMS WSC	640	635	628	624	620	614
MARION	MINING, MARION	95	98	100	102	104	104
MARION	STEAM-ELECTRIC POWER, MARION	188	570	1035	1603	1990	1990
MARION TOTAL		**4025**	**4486**	**5031**	**5654**	**6097**	**6150**
MORRIS	BI COUNTY WSC	10	22	35	43	51	60
MORRIS	COUNTY-OTHER, MORRIS	276	281	285	287	290	292
MORRIS	DAINGERFIELD	1130	1119	1103	1095	1086	1077
MORRIS	HOLLY SPRINGS WSC	0	0	0	0	0	3
MORRIS	IRRIGATION, MORRIS	59	59	59	59	59	59
MORRIS	LIVESTOCK, MORRIS	70	70	70	70	70	70
MORRIS	LONE STAR	541	557	575	587	598	611
MORRIS	MANUFACTURING, MORRIS	87699	81358	81551	89323	81954	80768
MORRIS	NAPLES	43	45	46	47	48	49
MORRIS	OMAHA	135	139	143	146	149	152
MORRIS	STEAM-ELECTRIC POWER, MORRIS	770	770	770	770	770	770
MORRIS TOTAL		**90733**	**84420**	**84637**	**92427**	**85075**	**83911**
PANOLA	GILL WSC	68	75	82	88	93	98
PANOLA TOTAL		**68**	**75**	**82**	**88**	**93**	**98**
RAINS	BRIGHT STAR SALEM SUD	695	659	628	589	548	515
RAINS	COUNTY-OTHER, RAINS	158	146	130	107	88	69
RAINS	EAST TAWAKONI	63	62	58	60	61	62
RAINS	EMORY	97	92	76	73	70	66
RAINS	LIVESTOCK, RAINS	3	3	3	3	3	3
RAINS	MANUFACTURING, RAINS	11	11	11	11	11	11
RAINS	POINT	150	147	142	143	142	142
RAINS	SHIRLEY WSC	43	38	35	31	26	19
RAINS	SOUTH RAINS SUD	11	0	0	0	0	0
RAINS TOTAL		**1231**	**1158**	**1083**	**1017**	**949**	**887**
RED RIVER	BOGATA	340	350	359	367	374	381
RED RIVER	CLARKSVILLE	0	0	0	0	10	69
RED RIVER	COUNTY-OTHER, RED RIVER	11	18	37	67	105	157
RED RIVER	LIVESTOCK, RED RIVER	80	80	80	80	80	80
RED RIVER	MANUFACTURING, RED RIVER	5051	5044	5044	5044	5044	5044
RED RIVER	RED RIVER COUNTY WSC	122	151	170	181	184	176
RED RIVER	TALCO	12	11	11	11	10	10
RED RIVER TOTAL		**5616**	**5654**	**5701**	**5750**	**5807**	**5917**
RUSK	ELDERVILLE WSC	101	104	110	115	136	143

COUNTY	WUG	Total Water Supply Surplus in ac-ft/yr					
		2030	2040	2050	2060	2070	2080
RUSK	KILGORE	50	150	276	415	554	612
RUSK	WEST GREGG SUD	13	11	9	5	2	0
RUSK TOTAL		**164**	**265**	**395**	**535**	**692**	**755**
SMITH	CARROLL WSC	23	25	32	43	56	50
SMITH	CRYSTAL SYSTEMS TEXAS	494	500	504	495	478	464
SMITH	LIBERTY UTILITIES SILVERLEAF WATER	29	0	0	0	0	0
SMITH	LINDALE	86	81	88	79	64	60
SMITH	LINDALE RURAL WSC	414	385	364	348	332	316
SMITH	PINE RIDGE WSC	72	50	32	18	3	0
SMITH	R P M WSC	14	15	15	16	17	18
SMITH	SAND FLAT WSC	227	215	207	203	200	196
SMITH	STARRVILLE-FRIENDSHIP WSC	81	83	83	86	89	92
SMITH	WEST GREGG SUD	28	23	18	16	16	13
SMITH TOTAL		**1468**	**1377**	**1343**	**1304**	**1255**	**1209**
TITUS	BI COUNTY WSC	31	21	6	0	0	0
TITUS	COUNTY-OTHER, TITUS	755	814	887	900	905	937
TITUS	CYPRESS SPRINGS SUD	118	126	141	141	139	136
TITUS	IRRIGATION, TITUS	7	7	7	7	7	7
TITUS	LIVESTOCK, TITUS	77	77	77	37	16	16
TITUS	MOUNT PLEASANT	13188	12735	12329	11780	11305	11134
TITUS	TALCO	348	349	353	356	360	364
TITUS TOTAL		**14524**	**14129**	**13800**	**13221**	**12732**	**12594**
UPSHUR	BI COUNTY WSC	77	76	78	83	89	95
UPSHUR	COUNTY-OTHER, UPSHUR	1117	1266	1334	1446	1566	1668
UPSHUR	DIANA SUD	605	559	504	445	379	307
UPSHUR	EAST MOUNTAIN WATER SYSTEM	8	8	8	9	10	11
UPSHUR	FOUKE WSC	3	2	2	2	1	1
UPSHUR	GILMER	280	275	279	292	306	320
UPSHUR	GLADEWATER	72	64	54	47	38	0
UPSHUR	GLENWOOD WSC	18	16	17	22	27	32
UPSHUR	IRRIGATION, UPSHUR	568	568	568	568	568	568
UPSHUR	LIVESTOCK, UPSHUR	403	403	403	403	403	403
UPSHUR	MINING, UPSHUR	119	129	95	61	36	36
UPSHUR	ORE CITY	1526	1525	1526	1529	1531	1534
UPSHUR	PRITCHETT WSC	186	185	186	189	193	197
UPSHUR	SHARON WSC	133	132	133	136	139	142
UPSHUR	UNION GROVE WSC	144	142	143	147	150	153
UPSHUR TOTAL		**5259**	**5350**	**5330**	**5379**	**5436**	**5467**
VAN ZANDT	BEN WHEELER WSC	14	0	0	0	0	0

COUNTY	WUG	Total Water Supply Surplus in ac-ft/yr					
		2030	2040	2050	2060	2070	2080
VAN ZANDT	CANTON	640	444	254	58	0	0
VAN ZANDT	COUNTY-OTHER, VAN ZANDT	1041	950	825	764	770	669
VAN ZANDT	FRUITVALE WSC	26	0	0	0	0	0
VAN ZANDT	IRRIGATION, VAN ZANDT	17	15	14	12	7	7
VAN ZANDT	LIVESTOCK, VAN ZANDT	884	876	846	897	825	871
VAN ZANDT	MINING, VAN ZANDT	2003	2176	2387	2576	2687	2725
VAN ZANDT	PRUITT SANDFLAT WSC	101	101	110	116	117	127
VAN ZANDT	VAN	68	42	21	3	0	0
VAN ZANDT	WILLS POINT	19	19	19	19	19	19
VAN ZANDT TOTAL		**4813**	**4623**	**4476**	**4445**	**4425**	**4418**
WOOD	BRIGHT STAR SALEM SUD	42	13	0	0	0	0
WOOD	CORNERSVILLE WSC	26	26	26	25	25	24
WOOD	COUNTY-OTHER, WOOD	4010	4023	4054	4071	4097	4134
WOOD	CYPRESS SPRINGS SUD	123	119	111	104	96	86
WOOD	FOUKE WSC	228	197	175	137	100	61
WOOD	HAWKINS	536	530	526	525	523	521
WOOD	IRRIGATION, WOOD	835	835	835	835	835	835
WOOD	JONES WSC	348	315	294	143	208	164
WOOD	LAKE FORK WSC	393	375	364	342	320	298
WOOD	LIVESTOCK, WOOD	527	527	527	527	527	527
WOOD	MINEOLA	806	764	736	685	634	582
WOOD	PRITCHETT WSC	2	1	1	1	1	1
WOOD	QUITMAN	665	656	645	643	639	647
WOOD	RAMEY WSC	10	0	0	0	0	0
WOOD	SHARON WSC	126	106	93	66	40	13
WOOD	SHIRLEY WSC	6	5	5	3	3	2
WOOD	WINNSBORO	797	735	676	607	539	469
WOOD TOTAL		**9480**	**9227**	**9068**	**8714**	**8587**	**8364**

CHAPTER 5 IDENTIFICATION AND EVALUATION OF POTENTIALLY FEASIBLE, RECOMMENDED, AND ALTERNATIVE WATER MANAGEMENT STRATEGIES

The primary emphasis of the regional water supply planning process established by Senate Bill 1 (SB 1) is the identification of current and future water needs and the development of strategies for meeting those needs. This chapter presents the results of the evaluation of various water management strategies, a conceptual framework and overview of the water management strategies recommended for implementation within the North East Texas Region, and specific recommendations to meet specific water supply shortages. Also included within this chapter is the required subsection on Water Conservation, as is required by TAC §357.34(h).

5.1 TWDB Guidelines for Preparation of Regional Water Plans

By rule, the Texas Water Development Board (TWDB) has set forth specific requirements for the preparation of a regional water plan (31 TAC §357). With regard to the identification and evaluation of water management strategies to meet identified water supply needs, as defined in 31 TAC §357.34 and §357.35:

- Regional Water Planning Groups (RWPGs) shall identify and evaluate potentially feasible Water Management Strategies (WMSs) and the Water Management Strategy Projects (WMSPs) required to implement those strategies for all WUGs and WWPs with identified water needs.
- The strategies shall meet new water supply obligations necessary to implement recommended water management strategies of wholesale water providers (WWPs) and Water User Groups (WUGs).
- RWPGs shall plan for water supply during Drought of Record conditions.
- In developing the Regional Water Plans, RWPGs shall provide WMSs to be used during a Drought of Record.

It should be noted that TWDB rules provide that a regional water plan may also identify water needs for which no water management strategy is feasible, i.e., unmet needs, provided applicable strategies are evaluated and reasons are given as to why no strategies are determined to be feasible.

TWDB rules also specify that the regional water plans are to include the evaluation of all water management strategies the RWPG determined to be potentially feasible. Strategies to be considered may include, but not be limited to, the following:

- Water conservation.
- Drought management, including demand management.
- Reuse of wastewater.
- Management of existing water supplies through expanded use or acquisition of existing supplies.

- Conjunctive use.
- Acquisition of available existing water supplies.
- Development of new water supplies.
- Development of regional water supply facilities or providing regional management of water supply facilities.
- Developing large-scale desalination facilities for seawater or brackish groundwater that serve local or regional brackish groundwater production zones identified and designated under TWC §16.060(b)(5).
- Developing large-scale desalination facilities for marine seawater that serve local or regional entities.
- Voluntary transfer of water within the region using, but not limited to, contracts, water marketing, regional water banks, sales, leases, options, subordination agreements, and financing agreements.
- Emergency transfer of water under Texas Water Code (TWC) §11.139.
- Interbasin transfers of surface water.
- System optimization.
- Reallocation of reservoir storage to new uses.
- Enhancements of yields.
- Improvement of water quality including control of naturally occurring chlorides.
- New surface water supply.
- New groundwater supply.
- Brush control.
- Precipitation enhancement.
- Aquifer Storage and Recovery.
- Water supply that could be made available by cancellation of water rights based on data provided by the Texas Commission on Environmental Quality (TCEQ).
- Rainwater harvesting.

Additionally, as defined by TWC §16.053(h)(10), the RWPGs shall consider whether a previously recommended WMS or WMSP in the currently adopted regional water plan is considered infeasible when identifying potentially feasible WMSs. RWPGs will be required to analyze, identify, and remove infeasible strategies/projects from their adopted plans beginning with the next planning cycle to develop the 2026 regional water plans.

All potentially feasible WMSs and WMSPs shall be evaluated in accordance with 31 TAC §357.34, each of the potentially feasible water management strategies are to be evaluated by considering:

- The TCEQ's most current Water Availability Model (WAM) with assumptions of no return flows and full utilization of senior water rights is to be used.
- An equitable comparison between and consistent evaluation and application of all water management strategies the RWPGs determine to be potentially feasible for each water supply need.

- The net quantity, reliability, and cost of water delivered and treated for the end user's requirements during drought of record conditions, taking into account and reporting anticipated strategy water losses, incorporating factors used calculating infrastructure debt payments and may include present costs and discounted present value costs. Costs do not include distribution of water within a WUG after treatment.
- Environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, including consideration of the TCEQ's adopted environmental flow standards under 30 TAC Chapter 298 (relating to Environmental Flow Standards for Surface Water). In the absence of such standards, information from existing site--specific studies or state environmental planning criteria adopted by the Board shall be used.
- Impacts on agricultural resources.
- Impacts on other water resources of the state including other water management strategies and groundwater / surface water interrelationships.
- Threats to agricultural or natural resources.
- If applicable, the provisions in TWC §11.085(k)(1) for interbasin transfers, at a minimum including a summation of water needs in the basin of origin and in the receiving basin.
- Consideration of third party social and economic impacts resulting from voluntary redistributions of water, including impacts of moving water from rural and agricultural areas.
- Major impacts of recommended water management strategies on key parameters of water quality.
- Consideration of water pipelines and other facilities that are currently used for water conveyance.
- Any other factors deemed relevant by the regional water planning group including recreational impacts.

TWDB rules also require the RWPGs to:

- Recommend WMSs and WMSPs required to implement those WMSs to be used during a Drought of Record based on the potentially feasible water management strategies.
- Recommend specific WMSs and WMSPs based upon the identification, analysis, and comparison of WMSs by the RWPG that the RWPG determines are potentially feasible so that the cost effective WMSs that are environmentally sensitive are considered and adopted unless a RWPG demonstrates that adoption of such strategies is inappropriate.

The NETRWPG's approach to the evaluation of water management strategies focused on the modeled water supply yield, cost, the anticipated environmental impact of each water management strategy, and local information developed from the individual WUGs. In accordance with TWDB guidelines, yield is the quantity of water that is available from a particular strategy under drought-of-record hydrologic conditions.

The cost of implementing a strategy includes the estimated capital cost (including construction, engineering, legal, and other costs), the total annualized cost, and the unit cost expressed as dollars per acre-foot of yield. As indicated, cost estimates include the cost of water delivered and treated for end user requirements. Cost estimates were prepared utilizing the most recent official TWDB Unified Costing Model (UCM), in accordance with TWDB guidelines regarding interest rates, debt service, and other project costs (e.g., environmental studies, permitting, and mitigation). Treated and raw water rates at the time of publication were acquired, when possible, from regional water providers, and are to be used solely for comparative purposes of the various strategies considered herein. These costs represent a snapshot indicative of the order of magnitude of potential present contract costs, and are not intended to be indicative of future rates for raw or treated water; as such rates are individually negotiated and will likely vary in the future. In addition to environmental considerations included in estimates of cost for each strategy, environmental impacts were considered and quantitatively assessed at a reconnaissance level.

The TWDB requires groundwater strategies to identify a specific supply source aquifer and location by county and river basin. Many WUGs within Region D are located geographically in multiple counties, multiple river basins, and even have access to multiple aquifers. A diligent effort has been made to determine which supply source county, aquifer, and river basin the proposed strategy is likely to be developed in, but the reality is that there are numerous factors involved in the decision-making process of a specific project which could alter the outcome. Therefore, it should be noted that for the purposes of the 2026 Region D Plan the strategy of “developing additional groundwater supply” includes all available groundwater aquifers in all applicable river basins in all applicable counties for a given WUG.

As noted in Chapter 3, joint groundwater planning for groundwater resources within Groundwater Management Area (GMA) boundaries have been determined through the establishment of Desired Future Conditions (DFCs) for the groundwater resources. After the DFCs are determined by the GMAs, the TWDB performs quantitative analyses 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, another quantitative approach is used to estimate the MAG. In 2011, Senate Bill 660 required that GMA representatives must participate within each applicable RWPG. It also required the Regional Water Plans be consistent with the DFCs in place when the regional plans are initially developed.

TWDB technical guidelines for the current round of planning establishes that the MAG (within each county and basin) is the maximum amount of groundwater that can be used for existing uses and new strategies in Regional Water Plans, with an exception for regions in which no groundwater conservation district exists within the regional water planning area. 31 TAC §357.32(d)(2) states:

> "*If no groundwater conservation district exists within the RWPA, then the RWPG shall determine the Availability of groundwater for regional planning purposes. The Board shall review and consider approving the RWPG-Estimated Groundwater Availability, prior to inclusion in the IPP, including determining if the estimate is physically compatible with the desired future conditions for relevant aquifers in groundwater conservation districts in the co-located groundwater management area or areas. The EA shall use the Board’s groundwater availability models as appropriate to conduct the compatibility review.*"

Within the North East Texas Region, there are two GMAs: 8 and 11. GMA 8 is managed by the Clearwater Underground Water Conservation District and includes 10 Groundwater Conservation Districts (GCDs), none of which are located within Region D. GMA 8 has created desired future conditions (DFCs) for all of its aquifers, and MAG reports have been created by TWDB for each of the aquifers within Region D. GMA 11 includes the Carrizo-Wilcox and Gulf Coast Aquifers, as well as the Nacatoch, Queen City, Sparta, and Yegua-Jackson Aquifers. It does not list a managing entity, but is comprised of 5 GCDs, none of which are in Region D. A groundwater district for Harrison County was created by the 81st Legislature, but the County voters turned this down in 2010. GMA 11 has also adopted DFCs for its aquifers.

As there are no GCDs in Region D, the NETRWPG wanted to exercise the right to refine the groundwater availability estimates to determine if the MAG volumes estimated by the TWDB were appropriate for the Region. The NETRWPG submitted a proposed methodology with application to existing uses and estimates of potential future groundwater needs to the TWDB in accordance with the aforementioned rule, which was reviewed and revised based on TWDB input and local hydrogeological assessments for the purposes of the 2026 Region D Plan. Generally, the MAG volumes function as the cap on groundwater availability for most existing groundwater uses and for the evaluation of availability for strategies. Limited exceptions, whereby local hydrogeological assessments indicated amounts of groundwater available above the MAG amount for a given county, aquifer, and basin, were identified in Chapter 3 for existing groundwater availability. For future groundwater availability specific to a given WMS, the resultant instances where local hydrogeological assessments indicate amounts in excess of the MAG are described individually herein as relevant to a given WMS. All amounts utilized are consistent with the amounts approved by the TWDB.

Over the course of the present planning cycle, efforts have been made to enhance and improve the coordination between Region D and the GMAs. It has already been noted that entities within the North East Texas Region have the legal capability to withdraw groundwater in amounts in exceedance of the MAG volumes. Through this improved coordination and communication with the GMAs and the NETRWPG, the NETRWPG believes the characterization of groundwater availability within the Region has been improved.

In general, most of the projected water supply needs within the North East Texas Region are associated with municipal water user groups. Overall, the recommended strategies for meeting these needs involve the development of additional groundwater supplies in areas where MAG availability is not a constraint, the acquisition of surface water supplies from existing sources, and advanced water conservation. Strategies necessitating significant infrastructure for water supply development (non-groundwater) are as follows (in no priority order):

1. Riverbend Water Resources District, Bowie, Cass, and Red River Counties – Riverbend Strategy – Comprised of the following WMSPs: Water Right Amendment, Contract Amendment for Interim to Ultimate Storage, and new RWRD Intake, Pump Station, Raw Water Pipeline, and Water Treatment Plant (2030).
2. Riverbend Water Resources District, Bowie, Cass, and Red River Counties – New 2.5 MGD Water Treatment Plant (2030).
3. City of Celeste, Hunt County – Treated Water Pipeline and New Contract with City of Greenville (2070).
4. City of Greenville, Hunt County – New WTP (24 MGD; 2030).
5. Irrigation, Lamar County – Pat Mayse Raw Water Pipeline (2030).

6. Livestock, Lamar County – Livestock Water Pipeline (2030).
7. Sabine River Authority, Wood County – New wellfield and pipeline to Sabine River for Bed and Banks Transport.

With the exception of the above listed strategies, no other major water supply development projects are recommended to meet needs within the North East Texas Region. Please refer to Appendix C5 for detailed analyses of all proposed strategies. The regional solutions proposed for localized water supply problems will not adversely impact other water resources of the state, will not aggravate or increase threats to agricultural and natural resources (see Chapter 1), and will not result in adverse socioeconomic impacts to third parties from voluntary redistribution of water (e.g., contractual water sales). Also, to the extent that future interbasin transfers from the North East Texas Region to adjacent regions are contemplated in another region's water plan, it is primarily the responsibility of that region to fully consider the provisions of current state law relating to state authorization of interbasin transfers (TWC, Section 11.085(k)(1)).

5.2 Regional Summary

5.2.1 Current and Projected Water Demands

Current and projected water demands within the North East Texas Region are presented in Chapter 2 of this plan. As indicated, both population and water demand are projected to grow by approximately 13% and 11%, respectively, from the years 2030 to 2080, with population increasing from approximately 873,433, in 2030, to 983,981 in 2080. Population projections were developed using the 2020 Census data and other available sources. The largest percentage of water is currently used for municipal, manufacturing, and steam-electric power generation uses. Table 5.1 below summarizes current and projected regional water demands for each of the six major water use categories.

Table 5.1 Population and Water Demand Projections Summary for the North East Texas Region

Total Regional Projection	2030	2040	2050	2060	2070	2080
Population						
Total	873,433	904,455	928,548	947,851	964,080	983,981
Water Demand (ac-ft per year)						
Municipal	156,589	162,106	166,418	169,711	172,670	176,095
Manufacturing	108,499	112,529	116,707	121,036	125,527	130,187
Irrigation	32,608	32,608	32,608	32,608	32,608	32,608
Steam Electric	64,012	64,012	64,012	64,012	64,012	64,012
Mining	5,307	5,326	5,418	5,495	5,557	5,604
Livestock	22,535	22,444	22,305	22,192	22,172	22,172
Total Water Demand (ac-ft)	**389,550**	**399,025**	**407,468**	**415,054**	**422,546**	**430,678**

A difference in the projected demands for the Region is evident when compared to previous plans: overall projected demand is lower for the region, and for this planning cycle is dominated primarily by projected growth in municipal use and Manufacturing. In past rounds of water planning, manufacturing was consistently projected to be the dominant water use in the region. For the purposes of the 2026 water planning process, the TWDB adopted a new, more conservative methodology for projecting non-municipal water uses. A discussion on the new methods employed is presented in Chapter 2, but in summary the result of the newly adopted methods is a more conservative characterization of projected growth in manufacturing and steam-electric power generation water use (the latter of which also reflecting the closure of facilities). With the new approach, the resultant projected water demands for the North East Texas Region over the 50-year planning horizon have thus shifted to being predominantly driven by municipal growth, accounting for roughly 40 percent of water demand in 2030 and 41 percent of water demand in 2080.

5.2.2 Currently Available Water Supply

As discussed in Chapter 3 of this plan, surface water is the primary water source for the North East Texas Region, now and in the future. At present, the surface water sources available to the region during Drought-of-Record hydrologic conditions are approximately 1.2 million ac-ft/yr. This represents more than 82 percent of the total amount of water presently available to the region from all sources (i.e., groundwater, reuse, and local sources). Current surface water supplies, when considering legal and infrastructure constraints, are approximately 491,000 ac-ft/yr.

In addition to the availability of surface water in the region, approximately 191,021 ac-ft/yr, or 13 percent of the total water availability, is estimated to be available from groundwater sources at present. When considering current infrastructure, the current available groundwater supply is about 87,000 ac-ft/yr, or approximately 40 percent of the total availability of groundwater sources.

5.2.3 Water Supply Needs

A user-by-user comparison of supply and demand (as detailed in Chapter 4) reveals that 76 entities within the designated water user groups (WUGs) within the North East Texas Region are projected to experience shortages during the 50-year planning period. Total shortages in all sectors are expected to reach 91,413acre-ft/yr by the year 2080.

Manufacturing shortages have been identified in Bowie, Camp, Cass, Gregg, Titus, Upshur, Van Zandt, and Wood Counties. Steam-electric power generation in Titus County is projected to have a shortage during the 50-year planning period. Mining shortages are projected for Gregg, Harrison, and Wood Counties. Shortages in meeting irrigation demands are projected for Bowie, Harrison, Hopkins, Hunt, Lamar, Rains, and Red River Counties. Shortages in meeting livestock demands are projected for Hopkins, Lamar, and Van Zandt Counties.

5.2.4 Potentially Feasible Water Management Strategies

The RWPG is required by rule to evaluate all water management strategies that are deemed to be "potentially feasible." TAC 357.12(b) states:

> *"A RWPG shall hold a public meeting to determine the process for identifying potentially feasible water management strategies; the process shall be documented and shall include input received at the public meeting;..."*

A process description and a list of possible management strategies were presented to the planning group and adopted in February, 2024, at the RWPG's regular public meeting. In general, the process allowed for an initial broad list of strategies, with 30 days allowed for comment. To be considered feasible a strategy must be cost-effective for the intended use, must meet federal and state environmental constraints, and alone, or in combination with other strategies, must meet the identified shortage. All potentially feasible strategies identified for consideration by TWDB were considered by the NETRWPG, as detailed in Appendix C5-1. Generally, potentially feasible strategies determined to be most applicable within the Region by the NETRWPG included:

- Expanded use of existing supplies.
- Voluntary transfers of water within the region using, but not limited to, sales, leases, options, and financing agreements.
- New supply development including groundwater well development.
- Conservation.
- WTP Expansions
- Reuse.
- Interbasin Transfer.
- Emergency Connections or transfers that would not cause unreasonable damage to the property of the water rights holder.

The NETRWPG established 140 gpcd usage as a limit above which all shortages were evaluated for a water conservation strategy. Further consideration was given to the implementation feasibility of a strategy, and whether or not a strategy had potential beneficial impacts to flood events. A flow chart outlining this process is presented in Figure 5.1

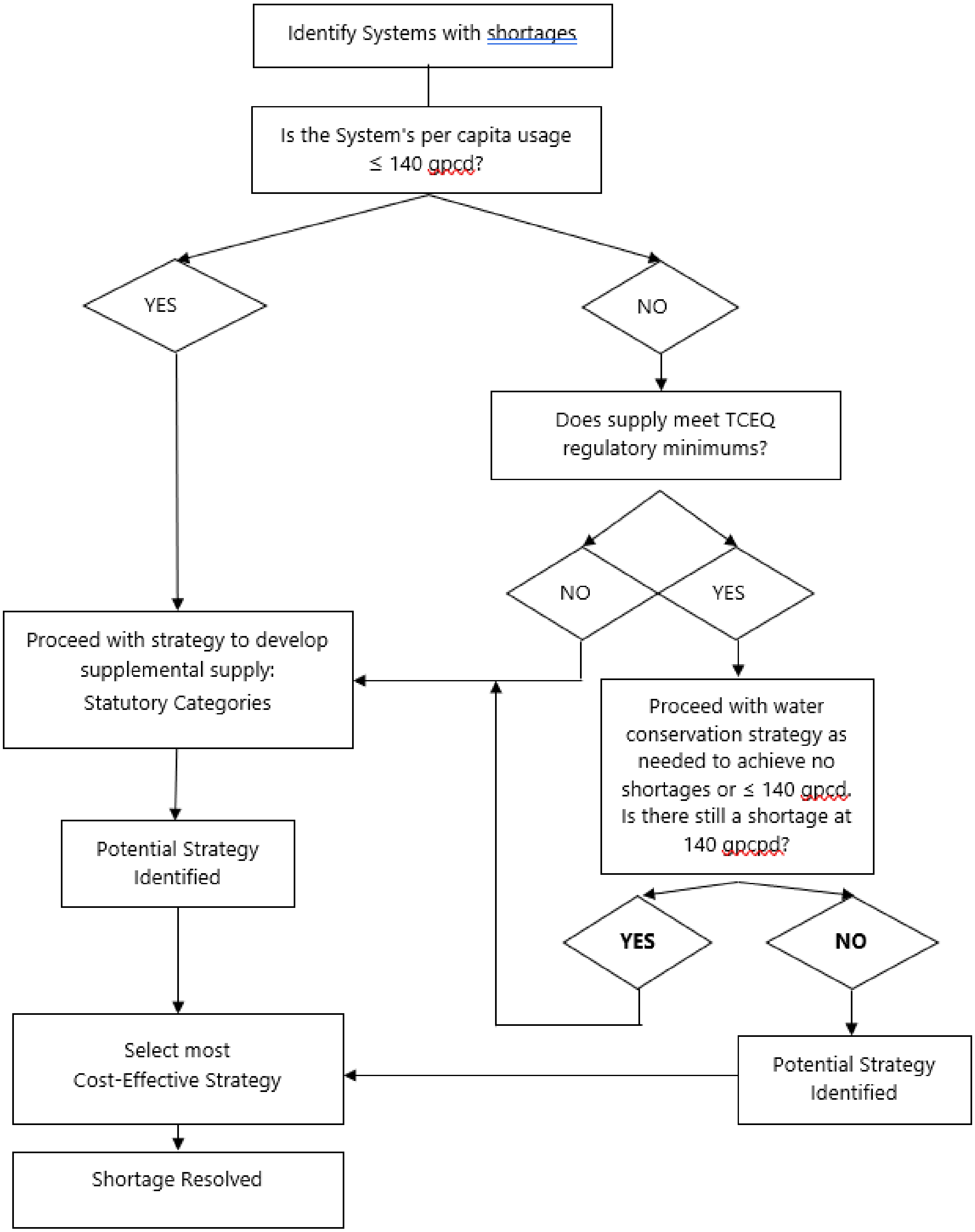


Figure 5.1 Region D Water Conservation Strategy Decision Tree

Ratings of the various strategies for each entity, including strategies proposed by the entity, were developed based on cost, reliability, environmental and political factors. Recommended strategies were presented to the planning group for approvals and included in the Plan.

By count, most of the water supply shortages in the region are projected to occur in municipalities. There are also shortages projected to occur in the industrial and agricultural categories, as discussed in the previous section. Within the municipal water use category, there are two types of shortages: 1) those that are due to expiration of an existing water supply contract and / or an insufficient contract amount; and 2) actual physical shortages of water where the demand for water is projected to exceed currently available water supplies. With few exceptions, the recommended strategy for addressing the "contractual" water shortages is for the individual water user to renew their contract and / or increase the amount of water that can be supplied under an existing contract. Each water user with a contractual water shortage was contacted and their concurrence with the recommended strategy was requested. In several instances, strategies are contingent upon the implementation of a strategy for the water provider, characterized as "seller" water management strategies for the WWPs and WUG Sellers herein. Estimates of water loss for each entity's water management strategy have been based upon average water losses from reported water loss audit data for each entity. Where no losses have been reported for a given entity, average water losses in the region as reported by TWDB (i.e., 18.9 percent) have been assumed. Per 31 TAC §357.34(d)(3)(A), a table presenting these water loss estimates (as an estimated percent loss), are presented in Appendix C5-2.

As indicated above, most of the municipal water users identified with water supply shortages are municipalities, special utility districts, or water supply corporations. Generally speaking, there are four primary categories of water management strategies as follows:

- Advanced Water Conservation.
- Water Reuse.
- Groundwater.
- Surface Water.

Presented below is the discussion of the potentially feasible water management strategies selected by the NETRWPG within each option category. Each of the potentially feasible water management strategies listed below correspond with one or more of those listed in the TWDB rules.

5.2.5 Advanced Water Conservation Subchapter

This subchapter is provided as required by TAC §357.34(g)(2) &(h), which states that planning groups "shall include a subchapter consolidating the RWPG's recommendations regarding water conservation." Also required is the inclusion of model Water Conservation Plans pursuant to TWC §11.1271. The TWC §11.002(8) (1) defines conservation 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."

The RWPG must also consider potentially applicable Best Management Practices (BMPs) appropriate for the region when developing water conservation strategies involving an interbasin transfer to which TWC 11.085(l) applies. BMPs identified by the State's Water Conservation Advisory Council and other information have been considered herein, including conservation quantification studies and other information available on the TWDB website (http://www.twdb.texas.gov/conservation/index.asp).

The adopted water demand projections (see Chapter 2) for municipal water users in North East Texas includes a significant degree of reduction in future per capita water demand due to plumbing code requirements for more efficient fixtures (consistent with the State Water Efficient Plumbing Act of 1991), and more use of water efficient appliances (see Appendix C2-3 for a detailed breakdown of these savings). These assumed reductions tended to increase for future projections. Advanced water conservation includes strategies resulting in savings beyond the aforementioned approaches that reduce the demand for water supply, or increase efficiency to conserve supply to be made available for future use.

Water supply entities and some major water right holders are required by regulations to have a Water Conservation Plan (WCP). A WCP is defined in TAC §288.1(24) as:

> *"A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s)."*

WCPs generally include specific, quantified 5-year and 10-year targets for water savings established by the entity preparing the plan. These targets include goals for water loss programs and goals for municipal use in gallons per capita per day. The following types of water users are required by TWC §11.1271, TWC §13.146, 30 TAC §288, and 30 TAC §363.15 to develop, implement, and submit WCPs and implementation reports:

- An applicant for a new or amended surface water rights permit and from any holder of a permit, certificate, etc. who is authorized to appropriate 1,000 ac-ft/yr or more for municipal, industrial, and other non-irrigation uses;
- Those authorized to appropriate 10,000 ac-ft/yr or more for irrigation uses;
- Applicants to TWDB for financial assistance; and/or
- Applicants relating to the appropriation or use of state water.

Similarly, Drought Contingency Plans (DCPs) are required by law for certain entities. Wholesale and retail public water suppliers and irrigation districts are required to develop DCPs consistent with the appropriate approved regional water plan to be implemented during periods of water shortages and drought. These DCPs feature approaches for water demand reductions when such demand threatens the water supply delivery system's total capacity or when overall supplies are low. If strong conservation measures are taken early in a drought and employed in the planning stages, little or no flexibility remains if the drought exceeds the conservation assumed during planning. The ability to adopt measures more stringent than planned could be limited in times of emergency. Under TWC §11.1272 and 30 TAC §288, the following entities are required to develop, implement, and submit updated DCPs to the TCEQ every five years:

- Retail public water suppliers providing service to ≥3,300 connections[1;]
- Irrigation Water Providers (i.e., Irrigation Districts);
- Applicants for new surface water rights or water right amendments;
- Wholesale Public Water Suppliers; and
- Investor-owned or privately-owned water utilities.

The planning group has developed a model Water Conservation Plan, presented within this subchapter, for use by holders of 1,000 ac-ft/yr or more of water rights. A model Drought Contingency Plan is presented as part of the Drought Management discussion within Chapter 7. The planning rules also require a model drought contingency plan for irrigation districts, but no such districts have been identified in this region, and so no plan was developed.

Several informative findings and recommendations were recently reported in the *2020 Texas Water Conservation Scorecard (June 2020)*, a joint publication of the Sierra Club-Lone Star Chapter, the National Wildlife Foundation, the Galveston Bay Foundation, and the Hill Country Alliance – partners in the Texas Living Waters Project. Reported therein is a review and assessment of the water conservation activities of over 300 Texas water utilities. Although this report focuses broadly upon water utilities throughout the state, its' findings are of relevance to the Region D RWPA.

As noted in this report, "TWDB has provided the opportunity for water utilities to enter water data online, beginning in 2019. This option has helped streamline the process for reporting and has provided a dashboard for utilities to track their own progress on water conservation and other topics…" This effort assists water utilities in their reporting to the State, encouraging hire rates of participation and a more informed discussion on the development and implementation of water conservation approaches.

In addition to recommendations to the TWDB and the State of Texas, the report also provides several recommendations for retail public water utilities with 3,330 connections or more. These are summarized as follows:

- Ongoing adoption of outdoor watering limitations, not just during drought, could realize a significant reduction in annual and peak water use if implemented year-round, or at least on a seasonal basis.
- Adjustment of water rate structures to accurately reflect the cost and value of water to send a stronger conservation pricing signal to effectively encourage customers to conserve. Such a structure should include life-line rates that provide socially vulnerable populations, such as low-income customers, a sufficient amount of water to meet basic needs at an affordable price.
- Evaluation of the potential to tap state financial assistance from the State Water Implementation Fund for Texas (SWIFT) and the related State Water Implementation Revenue Fund for Texas (SWIRFT), or other TWDB funding mechanisms, to finance certain water conservation activities, including especially water loss control.

[1] Retail public water suppliers with less than 3,300 connections must prepare and adopt an updated DCP and make the plan available for inspection by TCEQ, but they are *not* required to submit plans to TCEQ.

- Encouragement of local government officials to consider establishing PACE (Property Assessed Clean Energy) mechanisms to provide a new option for commercial, institutional, and industrial operations and owners of multi-family residential units in their communities to obtain attractive long-term financing to make energy efficiency and water efficiency improvements on their properties.

5.2.5.1 Municipal Water Conservation Strategies

An "advanced" water conservation scenario has been evaluated for municipal water users in the North East Texas Region that have a demand greater than 140 gpcd and an identified need. This scenario includes implementation of the plumbing code measure plus implementation of additional measures by local entities including:

- Single family clothes washer rebates.
- Single family irrigation audits.
- Single family rainwater harvesting.*
- Single family rain barrels.
- Multi-family clothes washer rebates.
- Multi-family irrigation audits.
- Multi-family rainwater harvesting.
- Commercial clothes washer rebates (coin-operated).
- Commercial irrigation audits.
- Commercial rainwater harvesting.*

  *Note: While the municipal conservation best practices guide includes rainwater harvesting, it is acknowledged that for regional water planning purposes rainwater harvesting is considered as a surface water source and is not classified as conservation for the purposes of this Plan.

The advanced water conservation scenario would also involve additional action by the State of Texas, including mandatory implementation of water conservation programs by all municipal water users; a statewide water conservation education program with funding similar to that provided for the "Don't Mess with Texas" highway litter educational program; and requirements for labeling of clothes washers and dishwashers with consumer-oriented water use and conservation information.

The NETRWPG recommends that a minimum consumption of 115 gallons per capita daily (gpcd) should be established for all municipal WUGs, and that a reasonable upper municipal level – a goal but not a requirement – be established at 140 gallons/person/day. The 140 gpcd target was selected to coincide with prior recommendations of the Texas Water Conservation Implementation Task Force. The use of this minimum per capita consumption amount acknowledges the potential for smaller, rural water systems to grow in per capita usage as their systems evolve. Advanced water conservation practices were considered and quantitatively evaluated for all WUGs to which TWC §11.1271 and §13.146 apply. Advanced conservation strategies were considered, but not recommended, in those instances where advanced conservation would not support an entity in meeting the TCEQ regulatory minimum of 0.6 gpm/connection. This process has been utilized in previous planning cycles, and was formally adopted by the NETRWPG for the purposes of this Plan.

After a quantitative evaluation of reported 2011 usage for WUGs lying primarily within the North East Texas Region using the aforementioned 140 gpcd threshold, the advanced water conservation scenario was identified as a feasible strategy by the NETRWPG for seven municipal WUGs with projected needs in the region, see Table 5.2

Several entities serving populations primarily in other regional water planning areas, but serving portions of WUGs with populations within the Region D planning area, have been identified by other RWPG's, namely Region C and Region I. Region C has identified Advanced Water Conservation as a strategy for Hickory Creek SUD for populations in the Region D planning area located in Hunt County.

The amount of savings calculated by these RWPGs for those portions of entities within the respective planning areas are shown in Table 5.2 for consistency between the 2026 Region C, Region I, and Region D Plans.

Table 5.2 Advanced Water Conservation Savings for Selected Municipal Entities

Entity	County	Conservation	2030	2040	2050	2060	2070	2080
410 WSC	Red River	Goal (gpcd)	213	190	166	140	140	140
		Savings (acft-yr)	30	61	90	121	116	111
East Mountain Water System	Upshur	Goal (gpcd)	215	191	167	143	140	140
		Savings (acft-yr)	31	72	112	150	151	149
East Texas MUD	Smith	Goal (gpcd)	367	326	286	245	204	163
		Savings (acft-yr)	122	294	492	719	976	1,262
Hickory Creek SUD	Hunt	Goal (gpcd)	140	140	140	140	140	140
		Savings (acft-yr)	18	20	22	26	29	35
Liberty Utilities Silverleaf Water	Wood	Goal (gpcd)	213	190	166	142	140	140
		Savings (acft-yr)	85	182	288	403	429	447
Scottsville	Harrison	Goal (gpcd)	212	188	165	140	140	140
		Savings (acft-yr)	27	69	107	162	177	190
White Oak	Gregg	Goal (gpcd)	337	299	262	224	187	150
		Savings (acft-yr)	232	506	769	1,026	1,267	1,500
TOTAL SAVINGS (ac-ft/yr)			**545**	**1,204**	**1,880**	**2,607**	**3,145**	**3,694**

5.2.5.2 Manufacturing Water Conservation Strategies

The criteria for evaluating water conservation measures for manufacturing uses was limited to counties showing a need in this sector during the planning period. The counties meeting this criterion include Bowie, Camp, Cass, Gregg, Titus, Upshur, Van Zandt, and Wood Counties.

TWDB Report 362 lists fourteen best management practices for industrial users. Application of each of these practices to the manufacturing industries in these counties is not practical at present. However, the industrial water audit practice is a feasible alternative to consider for implementation. The TWDB Report 362 determined that an audit could result in savings of 10 to 35 percent if an audit has not been performed. Table 5.3 indicates the expected savings of implementation of this water conservation strategy is based on a savings of 10 percent.

Table 5.3 Manufacturing Water Conservation Savings (ac-ft/yr)

County	Demand or Savings					
	2030	2040	2050	2060	2070	2080
BOWIE						
Total Demand	1,835	1,903	1,974	2,047	2,123	2,202
Water Conservation Savings	59	61	63	66	68	71
CAMP						
Total Demand	44	46	48	50	52	54
Water Conservation Savings	4	5	5	5	5	5
GREGG						
Total Demand	1,552	1,610	1,670	1,732	1,796	1,863
Water Conservation Savings	0	38	98	160	180	186
UPSHUR						
Total Demand	85	88	91	94	97	101
Water Conservation Savings	7	7	7	7	8	8
VAN ZANDT						
Total Demand	556	577	598	620	643	667
Water Conservation Savings	56	58	60	62	64	67
WOOD						
Total Demand	2,912	3,020	3,132	3,248	3,368	3,493
Water Conservation Savings	291	302	313	325	337	349
TOTAL SAVINGS	**417**	**470**	**546**	**625**	**662**	**686**

5.2.5.3 Steam Electric Power Generation Conservation Strategies

TWDB's Water Conservation Best Management Practices (BMP) Guide for Industrial Users can be found at http://www.twdb.texas.gov/conservation/BMPs/Ind/index.asp. These guides provide information on measures that can be used to reduce the amount of water used in electric power generation plant's cooling towers. The measures include: once-through cooling, improved system monitoring and operation, optimal contaminant removal, use of alternative sources for make-up water, and reducing heat load to evaporative cooling. The demand for steam-electric use is projected to remain constant during the 50-year period. The projections for steam-electric use were provided by the TWDB.

Most of the demand will be consumed by increasing existing contracts, which include conservation in the projected water use, and voluntary reallocations of existing supply. In this round of planning, estimates were not made for steam-electric power water conservation because data on operating strategies for each power plant were not available, and many plants have currently implemented conservation measures already, particularly once-through cooling, which consumes less water than cooling towers by forced evaporation. The plants do have water conservation plans, whereby annual reports on annual conservation and projected future conservation measures are considered.

In the 2026 Region D Water Plan, only one conservation strategy is recommended for the Steam Electric Power Generation within the Titus County WUG. The projected water needs for Steam-Electric Power in Titus County are estimated to increase from 1,076 ac-ft/yr in 2030 to 6,293 ac-ft/yr by 2080.

5.2.5.4 Conservation Strategies for Other Uses

Water conservation strategies for other users (irrigation, livestock and mining) for all water needs were considered by the NETRWPG but ultimately not recommended for the purposes of the 2026 Region D Plan. Irrigation demand is projected to decline from 8 percent to 7 percent of the demand over the planning period. Livestock and mining comprise a total of 5 percent and 1 percent of the demand respectively. The cost of water in these industries comprises a small percentage of the overall business cost and it is not expected these industries will see a significant economic benefit to water conservation.

5.2.5.5 Water Conservation Environmental Issues

No substantial environmental impacts are anticipated, as water conservation is typically a non-capital intensive alternative that is not associated with direct physical impacts to the natural environment. A summary of the few environmental concerns that might arise for this strategy is presented in Table 5.4.

Table 5.4 Potential Environmental Issues associated with Water Conservation

Environmental Issue	Evaluation Result
Implementation Measures	Voluntary reduction, water pricing, drought contingency plans
Environmental Water Needs/Instream Flows	No substantial impact identified, assuming relatively low reduction in diversions and return flows: substantial reductions in municipal and industrial diversions from water conservation would result in possibly low to moderate positive impacts as more stream flow would be available for environmental water needs and instream flows.
Bays and Estuaries	Not applicable
Fish and Wildlife Habitat	No substantial impact identified, assuming relatively low reductions in diversions and return flows; possible low to moderate positive impact to aquatic and riparian habitats with substantial reductions as more stream flow would be available to these habitats.
Cultural Resources	No substantial impact identified
Threatened and Endangered Species	No substantial impact identified, assuming relatively low reduction in diversions and return flows; possible low to moderate positive impact to aquatic and riparian threatened and endangered species (where they occur) with substantial diversion reductions.
Comments	No significant change in infrastructure has been assumed

5.2.5.6 Water Conservation Cost Considerations

Since water conservation plans are required for each community, regular costs for implementing and enforcing a general conservation program were not estimated. Only the efforts needed to enforce a more stringent conservation plan over and above the assumed passive water savings reflected in the projections of water demand were considered. Although no municipal water conservation strategies were identified as feasible for those entities with projected water needs over the 50-year planning horizon, unit costs for selected municipal conservation strategies are presented herein for reference. Costs for several municipal conservation measures were generated using the TWDB's Municipal Water Conservation Planning Tool (v1), with unit costs as shown in Table 5.5 below. For further details regarding the derivation of these conservation measures, their specification, and their data sources, refer to TWDB (Nov. 2018) "Municipal Water Conservation Planning Tool, Version 1, User Guide – A Tool for Planning and Tracking Municipal Water Conservation Programs." Costs for manufacturing and steam electric conservation approaches were assumed negligible, as these approaches reflect industrial water auditing and the implementation of 4-times business-as-usual (BAU) facilities in the future.

Table 5.5 Assumed Unit Costs of Advanced Conservation

Measures		$ Per Acre-Foot
SINGLE-FAMILY MEASURES	HE Toilet Rebate	$ 362
	Bathroom Retrofit	$ 746
	Showerhead and Aerator Kit	$ 273
	Clothes Washer Rebate	$ 1,370
	Home Water Reports	$ 516
	Irrigation Audits – High Users	$ 924
	High-Efficiency Sprinkler Nozzle Rebate	$ 1,098
	Smart Irrigation Controller Rebate	$ 831
	WaterWise Landscape Rebate	$ 777
	Rainwater Harvesting Rebate	$ 556
	Rain Barrel	$ 929
MULTI-FAMILY MEASURES	HE Toilet Rebate	$ 246
	Bathroom Retrofit	$ 429
	Showerhead and Aerator Kit	$ 267
	Clothes Washer Rebate	$ 783
	Irrigation Audits – High Users	$ 533
	High-Efficiency Sprinkler Nozzle Rebate	$ 1,023
	Smart Irrigation Controller Rebate	$ 538
	WaterWise Landscape Rebate	$ 741
	Rainwater Harvesting Rebate	$ 394
INDUSTRIAL, COMMERCIAL, INSTITUTIONAL MEASURES	HE Toilet Rebate	$ 349
	Urinal Rebate	$ 657
	Clothes Washer Rebate	$ 455
	Commercial General Rebate	$ 252
	Kitchen Pre-Rinse Spray Valve Installation	$ 322

Measures		$ Per Acre-Foot
	Irrigation Audits – High Users	$ 533
	High-Efficiency Sprinkler Nozzle Rebate	$ 1,023
	Smart Irrigation Controller Rebate	$ 538
	WaterWise Landscape Rebate	$ 741
	Rainwater Harvesting Rebate	$ 394
	Commercial Dishwasher Rebate	$ 394
	Commercial Food Steamer Rebate	$ 238

5.2.5.7 Water Conservation Implementation Issues

Water conservation as a water supply option has been evaluated, as shown in Table 5.6, and has been determined to meet the evaluation criteria.

Table 5.6 Water Conservation Implementation Evaluation

Impact Category	Comment
A. Water Supply	
1. Quantity	Limited
2. Reliability	Variable, reliant upon acceptance
3. Cost	Reasonable
B. Environmental Factors	
1. Environmental Water Needs	None to low impact
2. Habitat	No impact
3. Cultural Resources	None
4. Bays and Estuaries	Not applicable
C. Impact on Other State Water Resources	No apparent impacts on state water resources or navigation
D. Threats to Agriculture and Natural Resources	None
E. Equitable Comparison of Strategies Deemed Feasible	Option considered
F. Requirements for Interbasin Transfers	Not applicable
G. Third Party Social and Economic Impacts from Voluntary Redistribution	Not applicable

5.2.5.8 Model Water Conservation Plan

The planning group has developed and provides herein a model water conservation plan for use by holders of surface water rights of 1,000 acre feet or more for municipal, industrial, and other non-irrigation uses, and holders of surface water rights of 10,000 ac-ft/yr or more for irrigation uses. Model drought contingency plans for use by wholesale and groundwater suppliers, as well as for municipal, manufacturing, and steam-electric users are presented as part of Chapter 7 of this Plan. The planning rules also require a model drought contingency plan for irrigation districts, but no such districts were identified in this region, and so no plan has been developed at present. A standalone version of this Plan is presented in Appendix C5-3.

General Information

Introduction

Water conservation includes those practices, techniques, and technologies 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. As the prospect of acquiring new water source supplies is diminishing, Texans are realizing that saving the water we currently have is an important strategy for ensuring sufficient water supply for future generations. Even in the North East Texas Region, which is dotted with surface reservoirs and subsurface aquifers, water conservation is a vital tactic in the effort to protect our water resources.

Having well-managed and adequate water supplies is not only important for current residents of the North East Texas Region, but it also aids residential and commercial growth of the area, and encourages industry to locate in our region. If we are to remain in competition with metropolitan areas for residential and industrial growth, we must protect and preserve our natural resources, one of the most important being our water supplies. With this in mind, NETRWPG supports water conservation as a water management strategy, and has developed this guidance to assist those in the region who are incorporating a water conservation plan into their policies.

The holder of an existing permit, certified filing, or certificate of adjudication for the appropriation of surface water in the amount of 1,000 ac-ft/yr a year or more for municipal, industrial, and non-irrigation uses shall develop, submit, and implement a water conservation plan meeting the requirements of Subchapter A of this chapter (relating to Water Conservation Plans). The water conservation plan must be submitted to the executive director not later than May 1, 2005. Thereafter, the next revision of the water conservation plan…must be submitted not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. Any revised plans must be submitted to the executive director within 90 days of adoption. The revised plans must include implementation reports. The requirement for a water conservation plan under this section must not result in the need for an amendment to an existing permit, certified filing, or certificate of adjudication. [30 TAC Chapter 288, Subchapter C]

If you fall into one of the categories listed above, you are required to submit a plan to the TCEQ. Send your plan to the following address: TCEQ, Resource Protection Team, Mail Code 160, P.O. Box 13087, Austin, TX 78711-3087 for regular and certified mail, or 12100 Park 35 Circle, Austin, TX 78753 for express carrier deliveries (U.S. Post Office Express Mail, FedEx, UPS, etc.). If you do not fall into the above category, but are creating a plan for another reason, you are not required to submit your plan to TCEQ.

Each entity required to submit a Water Conservation Plan (WCP) to TCEQ must also submit a copy to TWDB no later than May 1, 2025. In addition, entities that are applying for or receiving financial assistance from the TWDB of more than $500,000, and/or retail public water suppliers providing water service to 3,300 or more connections must develop, submit and implement a WCP to TWDB. These plans should be sent to TWDB, 1700 North Congress Ave., PO Box 13231, Austin, Texas 78711-3231.

This guidance document was created using several reference materials, including Texas Administrative Code (TAC) Title 30 Chapter 288, TAC Chapter 363, the TWDB's 'Water Conservation Plan Guidance Checklist,' and the TWDB and TCEQ websites. Example wording that you may want to use in your plan will be included throughout in bold italics. Water conservation forms are available in MSWord and PDF formats on the TCEQ website (www.tceq.state.tx.us), water conservation page.

The ________________ (water system) recognizes that water conservation is a viable strategy to protecting its water supply. This Water Conservation Plan (Plan) has been developed to protect the system's water source and extend its useful life in order to ensure that a sufficient water supply is available for both present and future needs. The water conservation portion of the Plan looks at year-round methods for reducing water use. It will consider methods that should result in a continuous reduction of water use. However, because some of the methods take place primarily in summer months, these impacts may be more noticeable on a seasonal basis. The drought contingency portion of the Plan will look at measures designed to reduce water use on a temporary basis in the event of a period of drought or an emergency situation such as water source contamination. Methods considered here are not necessarily needed on a continual basis, but should be achievable in the short term.

Include a description of your service area so that users can become familiar with the service area. The following is a very general guideline.

The _______________ (water system) is located in __________ County, along _____________ (give a general location using major highways or rivers). It is a rural community comprised of around ____ citizens. (Locate nearest bodies of water, important landmasses, etc.). ________'s (water system) water supply comes from _____________ (water rights, contract with..., etc. List contract amounts and lengths). _________ (water system) treats its own water, and also owns its own wastewater treatment facility.

It is also helpful to include in the introduction a detailed description of your water supply and your storage and distribution systems. You can summarize your systems here, but need to complete the TCEQ 'Utility Profile' form, which will provide specific system information. This form can be downloaded in MSWord or PDF from the Conservation Program page of the TCEQ website or by calling 512-239-4691.

All water conservation plans for municipal uses by public drinking water suppliers must include ... a utility profile including, but not limited to, information regarding population and customer data, water use data, water supply system data, and wastewater system data. [30 TAC Chapter 288]

Coordination with the North East Texas Regional Water Planning Group

The NETRWPG's Regional Water Plan contains population and water use projections for the next 50 years for all water systems within the North East Texas Region. We request that you review the latest version of this plan and use our projections in your plan. If you are unable to use our projections, please document your reasons.

In order to ensure that the water conservation plan is in agreement with the policies of the NETRWPG, we request that you submit a copy of your plan, once approved, to: RWRD, c/o Mr. Kyle Dooley, Riverbend Water Resources District, 228 Texas Avenue, Suite A New Boston, TX 75570

A copy of this plan was submitted to the NETRWPG on ________ (date).

Coordination with Wholesale Water Provider

If you purchase all or a portion of your supply from a wholesaler, then please include this section. If you own your own water rights, or use groundwater, then disregard this section.

In order to create cohesive plans between water users, it is recommended that you review your wholesaler's water conservation plan before you create your own plan. You are not required to imitate the wholesaler's plan, but your plan should not contradict your wholesaler's plan.

We have reviewed the _______________ (wholesale provider) water conservation plan and have created our plan to compliment that plan.

Coordination with the Public

The ______________________________(water supplier) gave the public an opportunity to provide input into this plan by ________________________(public notice, public hearing, letter requesting comments, etc.). Public comments included ______________.

WATER CONSERVATION GOALS

All water conservation plans for municipal uses by public drinking water suppliers must include beginning May 1, 2005, specific, quantified five-year and ten-year targets for water savings to include goals for water loss programs and goals for municipal use, in gallons per capita per day. The goals established by a public water supplier under this subparagraph are not enforceable. –30 TAC Chapter 288

The ____________ (water system) average daily water use is ______gpcpd according to _______ (source). The ____________ (water system) utilized Regional Water Planning Group projections when setting water savings goals. The system's 5-year goal for municipal use is to reduce daily water use (by/to) ___ gpcpd. Our water loss goal is ____________. The system's 10-year goal is to reduce daily water use (by/to) ___ gpcpd, thus achieving the projected ____ gpcpd by ____ (year) as stated in the Regional Water Plan. Our water loss goal is ___________.

Note that there should be a goal for water loss and a goal for municipal water use; water use should be calculated in gpcd.

PLAN FOR MEETING GOALS

Required Programs

Master Meter

All water conservation plans for municipal uses by public drinking water suppliers must include…metering devices with an accuracy of plus or minus 5.0% in order to measure and account for the amount of water diverted from the source of supply. –30 TAC Chapter 288

Discuss the type of master meter you currently have, and any plans for a new meter. If you cannot comply with the requirements, please explain.

Universal Metering

All water conservation plans for municipal uses by public drinking water suppliers must include…a program for universal metering of both customer and public uses of water… –30 TAC Chapter 288

Discuss your existing and/or proposed universal metering program. If you do not comply with these requirements, please explain.

Meter Testing & Repair Program

All water conservation plans for municipal uses by public drinking water suppliers must include…a program for meter testing and repair… –30 TAC Chapter 288

Discuss your existing and/or proposed meter testing and repair program. If you cannot comply with these requirements, please explain.

Meter Replacement Program

All water conservation plans for municipal uses by public drinking water suppliers must include…a program for periodic meter replacement. –30 TAC Chapter 288

Discuss plans for meter replacement. List any replacement schedules you have in place. If you do not have a meter replacement program, please explain.

Unaccounted for Water

All water conservation plans for municipal uses by public drinking water suppliers must include…measures to determine and control unaccounted-for uses of water (for example, periodic visual inspections along distribution lines; annual or monthly audit of the water system to determine illegal connections; abandoned services, etc.). –30 TAC Chapter 288

Discuss your existing and/or proposed measures to find and control unaccounted-for water use. This should include discussion of leak detection and repair programs. The TWDB offers free assistance for water loss determination, including on-site water audit assistance and free water loss audit workshops. In addition, TWDB will loan out leak detection and flow meter testing equipment to aid in determining water loss. You may also find the Water Loss Audit Manual for Texas Utilities helpful in determining water loss. More information can be found on TWDB's website or by calling the Water Conservation Division.

In addition to the examples above, some systems have water-billing programs that note accounts with higher than normal activity, which could be a water leak. If you have this program, please discuss it here.

Public Education and Information Program

All water conservation plans for municipal uses by public drinking water suppliers must include…a program of continuing public education and information regarding water conservation. –30 TAC Chapter 288

There are numerous ways to inform and educate the public about water conservation. Some examples include:

1. Provide conservation pamphlets, available at City Hall or your water office. The TWDB offers free and low cost pamphlets on its website, www.twdb.state.tx.us.
2. Add water conservation slogans to your monthly water bill, e.g., "Every drop counts – Be water smart!"; "Conserve water – It makes cents!"; "Please use the month of May to check your toilets for leaks."
3. Set up a water conservation booth at local fairs and festivals. Offer conservation oriented handouts.
4. Sponsor a school project related to conservation in your local elementary school. TWDB offers the Major Rivers Water Education curriculum for 4th and 5th graders, and the Raising Your Water IQ curriculum for 6th graders. In addition, there is a TWDB kid's page which promotes conservation with interactive games, coloring pages, and water facts. These can be accessed on TWDB's website or by calling TWDB.
5. Create a running banner on your website with water conservation tips that change periodically.
6. Present a water conservation program at local service club meetings and industry group meetings. Free brochures from TWDB could be dispersed.
7. Offer field trips of your water treatment facility to local schools, and use the opportunity to talk about conservation.
8. Include "Keep Texas Beautiful" affiliate groups in conservation projects.
9. Encourage your agricultural extension agency to present xeriscape programs to local high school horticulture classes, garden clubs, and other interested groups.

Discuss your program for public awareness.

Non-promotional Water Rates

All water conservation plans for municipal uses by public drinking water suppliers must include…a water rate structure which is not "promotional," i.e., a rate structure which is cost-based and which does not encourage the excessive use of water. –30 TAC Chapter 288

Attach a copy of your water rates to the plan and summarize your rates here. If you need to impose a non-promotional water rate structure, or otherwise update your rates, discuss your plan here.

Reservoir Systems Operations Plan

All water conservation plans for municipal uses by public drinking water suppliers must include…a reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin in order to optimize available water supplies. –30 TAC Chapter 288

If this section applies to you, discuss your plan here. If you do not comply, please explain.

Additional Programs

If necessary to meet the 5 and 10-year target goals, you can add any other water conservation strategies to your plan. They should be discussed in detail here, and can include, but are not limited to:

1. Conservation-oriented rate structures.
2. Requiring structures undergoing substantial modification or addition to install water conserving plumbing fixtures.
3. Creating a program for the replacement or retrofit of water-conserving plumbing fixtures in existing structures.
4. Reusing and/or recycling of wastewater and/or graywater.
5. Creating a program for pressure control and/or reduction in the distribution system and/or for customer connections.
6. Creating a program and/or ordinance(s) for landscape water management.

Additional Requirements for Systems Serving over 5,000 Population

Water conservation plans for municipal uses by public drinking water suppliers serving a current population of 5,000 or more and/or a projected population of 5,000 or more within the next ten years subsequent to the effective date of the plan must include the following elements: (A) a program of leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system in order to control unaccounted-for uses of water; (B) a record management system to record water pumped, water deliveries, water sales, and water losses which allows for the desegregation of water sales and uses into the following user classes: (i) residential; (ii) commercial; (iii) public and institutional; and (iv) industrial; and (C) a requirement in every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this chapter. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with the provisions of this chapter. –30 TAC Chapter 288

If you are selling to a water provider who, in turn, intends to wholesale the water to a retail customer, your water supply contract, when renewed, must state that the subsequent wholesaler is required to have a water conservation plan in place. If this section applies, discuss the proposed contract changes here. If it does not apply, state why.

Schedule for Meeting Targets

In this section, please discuss your estimated timeline for implementing any programs noted in the "Required Program" section. For example, if you are proposing a meter replacement program, please discuss the schedule here.

Means of Implementation and Enforcement

All water conservation plans for municipal uses by public drinking water suppliers must include…a means of implementation and enforcement which shall be evidenced by: (i) a copy of the ordinance, resolution, or tariff indicating official adoption of the water conservation plan by the water supplier; and (ii) a description of the authority by which the water supplier will implement and enforce the conservation plan. –30 TAC Chapter 288

The _______________ (Mayor, President, etc.), or his/her designee, is hereby authorized to implement and enforce the water conservation plan.

The water conservation plan has made this plan official policy by means of a _________ (resolution, tariff, ordinance), passed on ______________ (date). A copy of the ______________ has been included at the end of the plan.

Revision/Updates

Beginning May 1, 2005, a public water supplier for municipal use shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The public water supplier for municipal use shall review and update the next revision of its water conservation plan not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. – 30 TAC Chapter 288

The _____________ (authorized representative) shall be responsible for updating and revising this plan five years after its adoption, or May 1, 2014, whichever is earlier.

PLAN FOR EMERGENCIES (DROUGHT CONTINGENCY)

A drought contingency plan is required for all public water suppliers, in addition to this Water Conservation Plan. Please see the NETRWPG guidance documents for drought contingency plans in Chapter 7 herein, and use the one that is appropriate for you – either wholesale or retail.

1.2 MODEL WATER CONSERVATION PLAN – RETAIL WATER PROVIDERS

General Information

Introduction

Drought is a very real natural disaster that occurs in Texas, even in the verdant bottomlands, green pastures, and piney woods of northeast Texas. As recently as 2011, drought strained water systems in the northeast Texas region. In addition to natural drought, there are also water supply emergencies that occur from time to time in which water supply becomes contaminated. A good example of this is the Methyl Tertiary Butyl Ether (MTBE) spill into Lake Tawakoni in May 2000, which contaminated supply for several Hunt County water systems for multiple days.

In an effort to better respond to drought conditions, the North East Texas Regional Water Planning Group (NETRWPG) has prepared this document, with the idea that if water providers study their water supply system before a drought or emergency occurs, then they will be better prepared to respond. In preparing this document, several references were used, including Chapters 288 and 363 of the Texas Administrative Code, the Texas Commission on Environmental Quality's (TCEQ) 'Handbook for Drought Contingency Planning for Retail Public Water Suppliers,' Texas Water Code §11.1272, and the TCEQ and TWDB websites. All of these resources are available to you if you need further information or clarification. You may also contact the TCEQ at 512-239-4691 with questions or for information. Example wording for your plan will be found throughout in bold italics.

According to the requirements set forth in the amended Chapter 288, Subchapter C of the Texas Administrative Code, retail public water suppliers providing water service to 3,300 or more connections must submit revisions to existing drought contingency plans to the executive director not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. Any new or revised plans must be submitted to the executive director within 90 days of adoption by the community water system. Any new retail public water suppliers providing water service to 3,300 or more connections shall prepare and adopt a drought contingency plan within 180 days of commencement of operation, and submit the plan to the executive director within 90 days of adoption. If you are a retail supplier, but serve less than 3,300 connections, you are still required to develop and implement a plan, but you do not need to submit the plan unless specifically requested by TCEQ. If you provide wholesale supply in addition to retail supply, you will also need to develop a wholesale drought contingency plan. Please see the North East Texas Region's guidance document for wholesale drought contingency plans.

The _________________(water provider) understands that water conservation is a viable strategy for protecting water resources both now and in the future, and that adequate planning for times of drought or emergency is a necessary part of conservation. The purpose of this plan is to prepare for the possibility of a drought or emergency situation where water is in short supply. This plan will help to ensure that ______________________(water supplier) uses water wisely and efficiently during periods of drought.

Though not specifically required by rule, it is helpful to the reader if you summarize your water supply and distribution systems in the introduction. This will familiarize users of the Plan with your system, and help them to make sense of the actions that you intend to take. In addition, discussing your water system here will assist those who update the plan in five years, because they will know exactly what the system looked like when the plan was created.

The ____________(water supplier) utilizes groundwater /surface water from _____________(source). Supply is secured by a (water right, water supply contract, etc.) through the year ____. We currently have ____ connections, and our average daily use is ___. Our storage and distribution systems consist of ____.

Coordination with the North East Texas Regional Water Planning Group

The drought contingency plan must document coordination with the regional water planning groups for the service area of the retail public water supplier to ensure consistency with the appropriate approved regional water plans. – 30 TAC Chapter 288

A copy of this adopted plan will be submitted to the NETRWPG via its administrator, Mr. Walt Sears, Northeast Texas Municipal Water District, P. O. Box 955, Hughes Springs, Texas 75656.

Informing the Public/Requesting Input

Preparation of the plan shall include provisions to actively inform the public and to affirmatively provide opportunity for user input. Such acts may include, but are not limited to, having a public meeting at a time and location convenient to the public and providing written notice to the public concerning the proposed plan and meeting. – 30 TAC Chapter 288

The _____________________________(water supplier) gave the public an opportunity to provide input into this plan by ________________________(public notice, public hearing, letter requesting comments, etc.). Public comments included ______________.

Efforts to inform the public about each stage of the plan, and when stages are implemented or rescinded, will be through ________________________ (newspaper articles, radio announcements, website announcements, etc.).

Authorization/Applicability

The ______________ (mayor, president, city administrator, etc.) is hereby authorized to monitor the weather as well as water supply and demand conditions and to implement the Drought Contingency Plan as appropriate.

The ____________________(City Council, Board of Directors, etc.) authorizes the Plan by a _____________(resolution, ordinance), which has been included in this Plan.

Coordination with the Texas Commission on Environmental Quality

According to 30 TAC Chapter 288, Subchapter C, "For retail public water suppliers providing water service to 3,300 or more connections, the drought contingency plan must be submitted to the executive director not later than May 1, 2005. Thereafter, the retail public water suppliers providing service to 3,300 or more connections shall submit the next revision of the plan not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. Any new or revised plans must be submitted to the executive director within 90 days of adoption by the community water system. Any new retail public water suppliers providing water service to 3,300 or more connections shall prepare and adopt a drought contingency plan within 180 days of commencement of operation, and submit the plan to the executive director within 90 days of adoption."

This plan was submitted to the executive director of the Texas Commission on Environmental Quality on ______________________(date).

Send your plan to the following address: TCEQ, Resource Protection Team, Mail Code 160, P.O. Box 13087, Austin, TX 78711-3087 for regular and certified mail, or 12100 Park 35 Circle, Austin, TX 78753 for express carrier deliveries (U.S. Post Office Express Mail, FedEx, UPS, etc.).

If you serve less than 3,300 connections, the following rule applies:

For all the retail public water suppliers, the drought contingency plan must be prepared and adopted not later than May 1, 2005 and must be available for inspection by the executive director upon request. Thereafter, the retail public water suppliers shall prepare and adopt the next revision of the plan not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. Any new retail public water supplier providing water service to less than 3,300 connections shall prepare and adopt a drought contingency plan within 180 days of commencement of operation, and shall make the plan available for inspection by the executive director upon request. – 30 TAC Chapter 288

In other words, if you serve less than 3,300 connections, you are still required to prepare and adopt a plan, but you do not have to turn it in unless TCEQ asks for it. Your section would read:

Submission of this plan to the TCEQ was not required; however, the plan will be made available to TCEQ if requested.

For questions to the TCEQ, you can check the website at www.tceq.state.tx.us, or call 512/239-4691.

Coordination with Wholesale Water Supplier

This section only applies if you purchase supply from a wholesale provider. If you have a contract or an agreement with a water provider, then complete this section. If you have water rights or otherwise own your supply, this section does not apply.

This plan has been created with consideration of our water provider, _______________'s drought contingency plan. We have included _________________'s (water provider) requirements within our plan and have created this plan to compliment ____________'s (water provider) plan. _____________(water provider) has been provided a copy of this plan.

Plan Definitions

For the purposes of this Plan, the following definitions, taken from TCEQ guidance, shall apply:

<u>Aesthetic water use</u>: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.

<u>Commercial and institutional water use</u>: water use which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.

<u>Conservation</u>: those practices, techniques, and technologies 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 supply is conserved and made available for future or alternative uses.

<u>Customer</u>: any person, company, or organization using water supplied by ________________ (name of water supplier).

<u>Domestic water use</u>: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.

<u>Even number address</u>: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8 and locations without addresses.

<u>Industrial water use</u>: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.

<u>Landscape irrigation use</u>: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, rights-of-way and medians.

<u>Non-essential water use</u>: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:

(a) ***irrigation of landscape areas, including parks, athletic fields, and golf courses, except otherwise provided under this Plan;***
(b) ***use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;***
(c) ***use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;***
(d) ***use of water to wash down buildings or structures for purposes other than immediate fire protection;***
(e) ***flushing gutters or permitting water to run or accumulate in any gutter or street;***
(f) ***use of water to fill, refill, or add to any indoor or outdoor swimming pools or jacuzzi-type pools;***
(g) ***use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;***

(h) ***failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and***

(i) ***use of water from hydrants for construction purposes or any other purposes other than fire fighting.***

<u>Odd numbered address</u>: street addresses, box numbers, or rural postal route numbers ending in 1, 3, 5, 7, or 9.

RESPONSE TO A DROUGHT EVENT

In this portion of the plan, it will need to be determined whether a water constraint will more likely be caused by a shortage in water supply or by constraints in your storage and distribution system. Associated goals and water management measures should correspond to the type of constraint expected. For example, if insufficient storage is determined to be the most likely cause of water shortage during a drought, then an emergency back-up supply source would not solve the problem; reduced use during peak hours (banning lawn watering, etc.) would more likely solve the problem by giving storage tanks a better opportunity to refill.

The drought contingency plan should be designed for drought conditions at least as severe as the drought of record according to TCEQ rules. Since the drought of record in Texas occurred in the 1950's, few systems will have water use records still available to plan by. Therefore, the NETRWPG suggests using the most recent drought for the State, which occurred in 2011. If your system does not have records for 2011, use the time period in your records when your system was the most strained by dry weather conditions.

During each stage, it will need to be determined what will trigger initiation, what the water use reduction target goal is, what water management strategies will be put into place, and, finally, what will terminate the stage. Keep in mind that a supplier which is also a customer of its wholesale provider must comply with its provider's Drought Contingency Plan (DCP). Do not develop stages or management strategies that are in conflict with your water provider's DCP.

Stage 1 – Mild Water Shortage

Initiation: The ____________________(water supplier) will consider that a mild water shortage exists when______________________________ (i.e. water levels in the reservoir reach____; average daily water use reaches ___% of capacity for three consecutive days; water level in elevated storage tank is at or below ____ for more than 12 hours, etc.), ***or when requested by _________*** (entity's water provider) if applicable.

Target Goal: When a mild water shortage exists, the __________________(water supplier) will implement water management strategies in an attempt to reduce daily water use to _______________________(i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 1 shall be rescinded when ________________________ (i.e. water levels in the reservoir rise above ___ for 7 consecutive days; average daily water use falls below ___% of capacity for three consecutive days; storage facilities return to normal levels for 24 consecutive hours, etc.), ***or when Stage I is rescinded by _______________________***(entity's water provider) if applicable.

Water Management Strategies: During Stage 1, we will take the following steps to reduce water use:_____________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

1. Request voluntary water conservation from all customers.
2. Reduce operating procedures that use water (i.e. flushing of mains) as appropriate.
3. Cease providing potable water for dust control, road building and similar construction purposes.
4. Enhance water supply and demand monitoring, as well as leak detection and repair efforts.
5. Request that water customers voluntarily limit the irrigation of landscaped areas.
6. Request that non-essential water uses be eliminated, including:
   a. Wash down of any sidewalks, walkways, driveways, parking lots, or other hard-surfaced areas;
   b. Wash down of buildings or structures for purposes other than immediate fire protection;
   c. Use of water for dust control;
   d. Flushing gutters or permitting water to run or accumulate in any gutter or street; and,
   e. Failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

Stage 2 – Moderate Water Shortage

Initiation: The ___________________(water supplier) will consider that a moderate water shortage exists when____________________________(i.e. water levels in the reservoir reach____; average daily water use reaches ___% of capacity for three consecutive days; water level in elevated storage tank is at or below ____ for more than 12 hours, etc.), ***or when requested by*** _________ (entity's water provider) if applicable.

Target Goal: When a moderate water shortage exists, the _________________(water supplier) will implement water management strategies in an attempt to reduce daily water use to ______________________(i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 2 shall be rescinded when _______________________ (i.e. water levels in the reservoir rise above ___ for 7 consecutive days; average daily water use falls below ___% of capacity for three consecutive days; storage facilities return to normal levels for 24 consecutive hours, etc.), ***or when Stage 2 is rescinded by*** ______________________(entity's water provider) if applicable. ***Upon termination of Stage 2, Stage 1 becomes operative.***

Water Management Strategies: During Stage 2, we will take the following steps to reduce water use:_____________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

1. Modify reservoir operations if applicable.
2. Cease providing potable water for dust control, road building and similar construction purposes.

3. Enhance water supply and demand monitoring, as well as leak detection and repair efforts.
4. Limit use of water from hydrants to fire fighting, related activities, or other activities necessary to maintain public health, safety, and welfare.
5. Restrict irrigation of landscaped areas, for example, "Irrigation of landscape areas with hose-end sprinklers or automatic irrigation systems shall be prohibited except during the evening hours between 10:00 p.m. and 6:00 a.m. However, irrigation of landscaped areas is permitted at anytime if it is by means of a hand-held hose, a faucet filled bucket or watering can of five (5) gallons or less, or a drip irrigation system." Please consider your individual system when restricting landscape watering. Allow watering when other types of water use are low to prevent strain on your system. Only use even/odd water days if you know it will work for your system – this type of watering plan can sometimes encourage lawn watering that otherwise wouldn't take place.
6. Prohibit use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station.
7. Prohibit use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or Jacuzzi-type pools.
8. Prohibit operation of any ornamental fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life.
9. Prohibit non-essential water uses such as:
   a. Wash down of any sidewalks, walkways, driveways, parking lots, or other hard-surfaced areas;
   b. Wash down of buildings or structures for purposes other than immediate fire protection;
   c. Use of water for dust control;
   d. Flushing gutters or permitting water to run or accumulate in any gutter or street;
   e. Failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

Stage 3 – Severe Water Shortage

Initiation: The ____________________(water supplier) will consider that a severe water shortage exists when ______________________________(i.e. water levels in the reservoir reach____; average daily water use reaches ___% of capacity for three consecutive days; water level in elevated storage tank is at or below ____ for more than 12 hours, etc.), ***or when requested by*** _________ (entity's water provider) if applicable.

Target Goal: When a severe water shortage exists, the __________________(water supplier) ***will implement water management strategies in an attempt to reduce daily water use to*** ______________________(i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 3 shall be rescinded when ________________________ (i.e. water levels in the reservoir rise above ___ for 7 consecutive days; average daily water use falls below ___% of capacity for three consecutive days; storage facilities return to normal levels for 24 consecutive hours, etc.), ***or when Stage 3 is rescinded by*** _______________________(entity's water provider) if applicable. ***Upon termination of Stage 3, Stage 2 becomes operative.***

Water Management Strategies: During Stage 3, we will take the following steps to reduce water use:_____________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

1. All of the strategies in Stage 2 are appropriate in Stage 3, except that landscape watering may need to be prohibited.
2. Implement water rate surcharges (i.e. a set charge for any use above average monthly use)
3. Implement price adjustments (i.e. increase the price per 1,000 gallons of water used above the average monthly use).
4. Utilize alternate or emergency water sources.

Stage 4 – Emergency Water Shortage

This stage could apply in the instance of a major water line break, contamination of the water supply source, or other urgent water system conditions. Most likely, this stage would be initiated by decision of the authorized plan implementer (Mayor, President, Manager, etc.).

Initiation: The ___________________(water supplier) will consider that an emergency water shortage exists when_____________________________ (i.e. the water main at the water treatment plant bursts or is otherwise significantly damaged; the reservoir is contaminated by oil spill; etc.,), ***or when requested by ________*** (entity's water provider) if applicable.

Target Goal: When an emergency water shortage exists, the _________________(water supplier) will implement water management strategies in an attempt to reduce daily water use to ______________________(i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 4 shall be rescinded when _______________________ (i.e. the main at the water treatment plant is restored and storage tanks have been allowed to refill; analysis of the source water indicates that supply is safe to use; etc.), ***or when Stage 4 is rescinded by ______________________***(entity's water provider) if applicable.

Water Management Strategies: During Stage 4, we will take the following steps to reduce water use: _____________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

- Utilize alternative or emergency water supplies (i.e. tying into a neighboring water system, etc. (This may require approval by the TCEQ Executive Director).
- Modify reservoir operations.
- All strategies that are used in Stage 3 could be applicable in Stage 4.

PLAN EXECUTION

Public Involvement

This section should discuss the ways in which the supplier will inform its customers about the initiation and termination of drought stages, as well as management strategies that customers are expected to follow. Public involvement can be in the form of special public hearings, articles and notices in the local newspaper, radio announcements, announcements on local television stations, notices in billing statements, etc.

> ***The ___________________ (water provider) will keep its customers apprised of initiation of the drought contingency plan, and changes in stages, by means of ________________________.***
>
> **Enforcement**
>
> ***The _____________ (Mayor, City Manager, President, etc.), or his/her designee, is responsible for monitoring weather conditions and water supply and determining when to initiate and terminate the stages of the DCP.***
>
> ***The ______________*** (governing body) ***has adopted this plan through __________*** (ordinance, resolution), ***and has made it an official ________*** (city, Corporation, etc.) ***policy. The ______________*** (ordinance, resolution, etc.) ***is attached hereto as Figure ___***.

Provision for Responding to Wholesale Provider Restrictions

Any water supplier that receives all or a portion of its water supply from another water supplier shall consult with that supplier and shall include in the drought contingency plan appropriate provisions for responding to reductions in that water supply. – 30 TAC Chapter 288

If you have a wholesale provider, then add this section. If you own your own supply, please skip this section.

> ***As stated in each water shortage stage, we intend to comply with all requirements of our wholesale provider's drought contingency plan. This plan is as stringent as our provider's plan, and in some cases may be more so.***

Notification of TCEQ on Mandatory Provisions

A wholesale or retail water supplier shall notify the executive director within five business days of the implementation of any mandatory provisions of the drought contingency plan. – 30 TAC Chapter 288

> ***The Executive Director at TCEQ shall be notified with 5 business days if any mandatory provisions of this plan are implemented.*** *The Executive Director can be reached at 512-239-3900.*

Variance Procedures

The drought contingency plan must include procedures for granting variances to the plan. – 30 TAC Chapter 288

The ____________ (authorized representative) may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, or fire protection for the public or the customer requesting such variance and if one or more of the following conditions are met:

(a) ***Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.***
(b) ***Alternative methods can be implemented which will achieve the same level of reduction in water use.***

Customers requesting an exemption from the provisions of this Plan shall file a petition for variance with the _____________ (water supplier) within 5 days after the Plan or a particular drought response stage has been invoked. All petitions for variances shall be reviewed by the ________ (authorized representative), and shall include the following:

(a) ***Name and address of the petitioner(s).***
(b) ***Purpose of water use.***
(c) ***Specific provision(s) of the Plan from which the petitioner is requesting relief.***
(d) ***Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.***
(e) ***Description of the relief requested.***
(f) ***Period of time for which the variance is sought.***
(g) ***Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.***
(h) ***Other pertinent information.***

Variances granted by the ______________ (water supplier) shall be subject to the following conditions, unless waived or modified:

(a) ***Variances granted shall include a timetable for compliance.***
(b) ***Variances granted shall expire when the Plan is no longer in effect, unless the petitioner has failed to meet specified requirements.***

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

5-year Updates

The retail public water supplier shall review and update, as appropriate, the drought contingency plan, at least every five years, based on new or updated information, such as the adoption or revision of the regional water plan. – 30 TAC Chapter 288

This plan shall be revaluated and updated every five years based on the most recent information; especially the latest adopted NETRWPG Regional Water Plan.

5.2.5.9 Water Conservation and Drought Management Recommendations

The NETRWPG offers the following water conservation and drought management recommendations:

1. The State Water Conservation Implementation Task Force recommended a statewide goal for municipal use of 140 gpcd. Systems which experience a per capita usage greater than 140 gpcd should perform a water audit to more clearly identify the source of the higher consumption. 140 gpcd should not be considered an enforceable limit, but rather a reasonable target, which may not be appropriate for all entities. Among other tasks, the audit should establish record management systems that allow the utility to readily segregate user classes. A water audit worksheet by TWDB (http://www.twdb.texas.gov/conservation/municipal/waterloss/), can be used along with the Task Force's Best Management Practices Guide in performing an audit. The BMP Guide can be downloaded from the TWDB's website on the conservation webpage at (http://www.twdb.texas.gov/conservation/BMPs/index.asp).
2. Higher per capita consumption figures are often related to "unaccounted-for" water – water which is produced or purchased, but not sold to the end user. Systems with a water "loss" greater than 15 percent should be encouraged to perform physical and records surveys to identify the sources of this unaccounted-for water. TWDB will provide assistance in the form of on-site review of the worksheet, water loss workshops, and the loaning of water loss detection equipment. More information can be obtained on the TWDB website, www.twdb.state.tx.us.
3. The planning group encourages funding and implementation of educational water conservation programs and campaigns for the water-using public; and continued training and technical assistance to enable water utilities to reduce water losses and improve accountability.

5.2.6 Water Reuse

Wastewater reuse uses treated wastewater effluent as either a replacement for a potable water supply (direct reuse), or involves the treatment of wastewater to parameters that allows it to be returned to the water source for non-potable reuse or additional treatment (indirect reuse). This strategy includes the direct use of reclaimed water for non-potable purposes (e.g., irrigation, industrial and steam electric cooling water). This strategy was considered and deemed applicable only to entities with a central wastewater collection and treatment system, or when a request from an entity was received and supporting data provided.

Water reuse is more feasible for larger municipalities or industrial users. Within Region D, there are relatively few occurrences of reuse where it has been determined to be economically viable, as most WUGs at present have not implemented such strategies due to the availability of other, lower cost water management strategies. At present, there are multiple recommended reuse strategies within the Region, reflecting the City of Canton's request for inclusion of their application to TCEQ to secure a water right for indirect reuse (and potential direct reuse) and reuse strategies implemented by North Texas MWD in various counties (Collin, Hopkins, Hunt, Kaufman, Rains, Rockwall, and Van Zandt).

5.2.7 Groundwater

This strategy includes the development of new supply (e.g., drilling additional wells), receipt of a contract supply from another provider, and consideration of advanced treatment scenarios (e.g., demineralization, removal of iron, manganese, or fluoride).

Due to the increasing costs to comply with more stringent regulations, this strategy was considered and deemed applicable only to entities with demands considered small with respect to the entire region. For example, a small, isolated water supply corporation with available groundwater and wells and a relatively low demand is a likely candidate for this option.

It is recommended that groundwater supplied systems in the Region combine resources and / or solicit future water supply from neighboring systems and/or major water providers in the region where possible. If feasible alternatives become available, such as system grouping or creation of a large surface water supply network, groundwater supply recommendations should be re-evaluated.

5.2.7.1 Groundwater Environmental Issues

Potential environmental issues related to the development of groundwater strategies are presented in Table 5.7.

Table 5.7 Potential Environmental Issues associated with Groundwater Strategies

Environmental Issue	Evaluation Result
Implementation Measures	Local impacts resulting from development of well fields, storage facilities, pump stations, and pipelines
Environmental Water Needs/Instream Flows	Potential increase in return flows to streams
Bays and Estuaries	Not applicable
Fish and Wildlife Habitat	No substantial impact identified
Cultural Resources	No substantial impact identified
Threatened and Endangered Species	No substantial impact identified

5.2.7.2 Groundwater Cost Considerations

Costs are predominantly related to the distance from the development of the wells to the need for the water. Facilities requiring capital investment include wells, pipelines, pump stations and storage. In some cases, water supply developed from groundwater wells may require treatment. Total capital costs have been calculated using the TWDB UCM. Groundwater strategies addressing well development over multiple decades necessitate developing distinct projects as new wells are developed over time. Thus, a single groundwater strategy, i.e., Drill New Wells, may contain multiple projects over the 2030 – 2080 analysis period. Hence, the UCM model was individually applied to each decadal project within a single strategy. The total capital costs for each project were then summed up to develop the total capital cost for the recommended strategy. For an accurate comparison to be made between groundwater strategies and other types of strategies, the TWDB UCM was then applied to the entire strategy, to determine a single comparable annual cost and unit cost for the groundwater strategy, reflecting debt service amounts in a manner similarly derived as to other strategy types.

5.2.7.3 Groundwater Implementation Issues

This water supply option has been evaluated as shown in Table 5.8.

Table 5.8 Groundwater Strategy Implementation Evaluation

Impact Category	Comment
A. Water Supply	
1. Quantity	Adequate to meet identified need
2. Reliability	High
3. Cost	Moderate
B. Environmental Factors	
1. Environmental Water Needs	Low impact
2. Habitat	Low impact
3. Cultural Resources	Low impact
4. Bays and Estuaries	Not applicable
C. Impact on Other State Water Resources	No apparent impacts, no effect on navigation
D. Threats to Agriculture and Natural Resources	None
E. Equitable Comparison of Strategies Deemed Feasible	Option considered for all WUGs
F. Requirements for Interbasin Transfers	None
G. Third Party Social and Economic Impacts from Voluntary Redistribution	None

5.2.8 Surface Water

This strategy includes receipt of contract supply from another provider (e.g., water purchase contracts), the development of new supply (e.g., new run-of-the-river diversions, new reservoirs, enhanced yields of existing sources), the voluntary redistribution of available surplus supply, and consideration of interbasin transfers. WUGs and/or WWPs that have the capability to meet demands through the renewal of existing contracts, or the expansion of existing contracts, either by having available supplies, currently providing needs through voluntary redistribution, or having the ability to obtain new supplies have been identified. It is important to note that redistribution of water is voluntary. As such, no entity is required to participate.

5.2.8.1 Surface Water Environmental Issues

Potential environmental issues related to the development of surface water strategies are presented in Table 5.9. Potential environmental concerns can vary significantly depending upon the type of surface water strategy. The purchase and/or expansion of surface water supply via contract is generally assumed to have low environmental impacts, unless significant changes to existing infrastructure is warranted. The impacts to the environment due to pipeline construction are expected to be temporary and minimal. New surface water projects may have more significant environmental issues.

Table 5.9 Potential Environmental Issues associated with Surface Water Strategies

Environmental Issue	Evaluation Result
Implementation Measures	Local impact resulting from development of pump stations, pipelines, and/or storage facilities (including reservoirs if applicable).
Environmental Water Needs/Instream Flows	Probable significant impact, relative to specific strategy
Bays and Estuaries	Not applicable
Fish and Wildlife Habitat	Possible high to moderate impacts to species in general. Potential moderate impacts to State-listed species.
Cultural Resources	Probable moderate to significant impact.
Threatened and Endangered Species	Possible moderate to low impact pending identification of such species in a project area.

5.2.8.2 Surface Water Cost Considerations

Costs will vary with each project. Surface water strategies may vary significantly, from the development of stock ponds for livestock use, to the purchase and/or expansion of surface water supply via contract, to the development of new surface water supplies. For livestock surface water strategies, costs are generally low. Potential costs for water contracts include the cost of raw water, treatment costs, conveyance costs, and potential additional costs required by the water supplier. New surface water projects may have significant costs associated with the development of the supply, including intake structures, pump stations, conveyance costs, and possibly storage facilities.

The cost of implementing a strategy includes the estimated capital cost (including construction, engineering, legal, and other costs), the total annualized cost, and the unit cost expressed as dollars per acre-foot of yield. As indicated, cost estimates include the cost of water delivered and treated for end user requirements. Cost estimates were prepared utilizing the TWDB UCM, in accordance with TWDB guidelines regarding interest rates, debt service, and other project costs (e.g., environmental studies, permitting, and mitigation). Treated and raw water rates at the time of publication were acquired, when possible, from regional water providers, and are to be used solely for comparative purposes of the various strategies considered herein. These costs represent a snapshot indicative of the order of magnitude of potential present contract costs, and are not intended to be indicative of future rates for raw or treated water; as such rates are individually negotiated and will likely vary in the future. In addition to environmental considerations included in estimates of cost for each strategy, environmental impacts were considered and assessed at a reconnaissance level.

5.2.8.3 Surface Water Implementation Issues

Surface water supply strategies have been considered with regard to implementation issues, as depicted in Table 5.10.

Table 5.10 Surface Water Strategy Implementation Evaluation

Impact Category	Comment
A. Water Supply	
1. Quantity	Adequate to meet identified need
2. Reliability	High (low to moderate for run-of-river diversions)
3. Cost	Reasonable to High
B. Environmental Factors	
1. Environmental Water Needs	Moderate impact (except contracts)
2. Habitat	High impact (except contracts)
3. Cultural Resources	High impact (except contracts)
4. Bays and Estuaries	Not applicable
C. Impact on Other State Water Resources	Moderate impacts on state water resources (availability); moderate effect on navigation
D. Threats to Agriculture and Natural Resources	If reservoir, potential high impacts to habitat, mitigation requirements
E. Equitable Comparison of Strategies Deemed Feasible	Priority given to all other possible approaches before consideration of a new reservoir as a strategy
F. Requirements for Interbasin Transfers	Potential interbasin transfers
G. Third Party Social and Economic Impacts from Voluntary Redistribution	Varies: Potential for positive economic impacts

5.2.9 Other Potentially Feasible Strategies

Identified, potentially feasible water management strategies as required by rule and statute (TWC §16.053(e)(5), 31 TAC §357.34 and §357.35), and listed in Section 5.1 herein, have been considered in terms of feasibility for each WUG/WWP in the North East Texas Region. Unless specifically addressed in the discussion for each WUG/WWP in the Region, such strategies were considered for each water user and found not to be feasible in the North East Texas Region and were therefore not further evaluated.

As described in more detail in Chapter 7 of this Plan, the NETRWPG does support the provision of drought management measures as an explicit WMS in the 2026 Region D Plan. Drought management measures vary within the Region, and are temporary strategies intended to conserve supply and reduce impacts during drought and emergency times, and are implemented in the Region to address long-term demands. An analysis of potential savings from demand reductions related to drought management is presented in Chapter 7.

Brush control, rainwater harvesting, and precipitation enhancement are approaches to increasing water supply that do not provide the degree of reliability during drought conditions that is required for municipal, manufacturing, and steam electric uses in the Region. Similarly, large-scale desalination facilities for seawater or brackish groundwater, conjunctive use, aquifer storage and recovery, water rights cancellations, and control of naturally occurring chlorides are not feasible to address the needs of water users in the North East Texas Region. Per TWC §16.053(e)(10), explicit consideration and discussion of the NETRWPG was given to the potential for aquifer storage and recovery projects to meet projected needs; however, due to the availability of existing surface and groundwater sources, such projects were deemed presently not feasible due to projected cost. For strategies contemplating the development of infrastructure by 2020, consideration was further given to the ability of the WUGs to complete development of the infrastructure. Instances with significant infrastructure by 2020 (e.g., pipelines) that are recommended herein may not be completed by the end of the current year; however, in those instances it is more likely that those WUGs will implement groundwater strategies to utilize groundwater supplies in excess of the current MAG amounts required for regional planning purposes.

5.3 Recommended Water Management Strategies

Senate Bill 1 requires future projects to be consistent with the regional water plans to be eligible for TWDB funding and TCEQ permitting. The provision related to TCEQ is found in TWC §11.134. It provides that the Commission shall grant an application to appropriate surface water, including amendments, only if the proposed appropriation, "addresses a water supply need in a manner that is consistent with the state water plan and the relevant approved regional water plan for any area in which the proposed appropriation is located, unless the commission determines that conditions warrant waiver of this requirement." For TWDB funding, TWC § 16.053(j) states that after January 5, 2002, TWDB may provide financial assistance to a water supply project only after the Board determines that the needs to be addressed by the project will be addressed in a manner that is consistent with the regional water plan for the region of the state that includes the area benefiting from the proposed project, and is consistent with that regional water plan. The TWDB may waive this provision if conditions warrant.

The NETRWPG recognizes that a wide variety of proposals could be brought before TCEQ and TWDB. For example, TCEQ considers water right applications for irrigation, hydroelectric power, and industrial purposes, in addition to water right applications for municipal purposes. It also considers other miscellaneous types of applications, such as for navigation or recreational uses. Many of these applications are for small amounts of water, often less than 1,000 ac-ft/yr. Some are temporary. Small applications to the TCEQ of this nature are consistent with the 2026 North East Texas Regional Water Plan, when the surface water uses will not have a significant impact on the region's water, even though not specifically recommended in the regional water plan. TWDB receives applications for financial assistance for many types of water supply projects. Some involve repairing plants and pipelines and constructing new water towers. Water supply projects that do not involve the development of, or connection to, a new water supply is considered consistent with the regional water plan even though not specifically recommended in the regional water plan.

The NETRWPG has identified a total of 76 Water User Groups with shortages during the 2030 – 2080 planning period which will require strategies in this plan. A total of 118 Water Management Strategies (WMSs) are recommended herein to meet these projected shortages. There are many instances wherein multiple strategies are recommended to meet the projected demands for a given WUG. 16 shortages will be resolved by simply renewing, extending, or increasing existing water purchase contracts, and will not require capital expenditure or new sources of supply. 9 shortages will be partially resolved with the implementation of Advanced Water Conservation measures. 52 shortages will be resolved with additional groundwater supplies, by far the most commonly recommended water management strategy. There is one instance of recommended voluntary reallocation of existing supplies, recommended to WWP and WUG sellers in the region to meet projected customer needs. There are 7 water management strategies that have been recommended that entail more significant development of infrastructure to develop additional supplies utilizing existing surface water resources in the region. Included within Appendix C5-4 through Appendix C5-12 are the required tabulations of the various recommended Water Management Strategies organized by WUG/WWP, county, and by source. Appendix C5-13 presents calculated Management Supply Factors for WUGs and MWPs. Appendices C5-14 through C5-22 incorporate the required output from the TWDB's Regional Water Planning Database (DB22).

5.3.1 Recommended Strategies for Entities with Contractual Shortages

Within the North East Texas Region, there are 12 entities with shortages that can be addressed via contract. There are three possible approaches to resolve these shortages: increase an existing contract, renew an existing contract, or renew and increase a contract. The slightly more common strategy (10 occurrences in the 2026 Plan) is to increase the existing contract. Two entities, the City of Celeste and Wolfe City are recommended to establish a new contract along with additional infrastructure (presented within the discussion on infrastructure below. Fourteen (14) entities have strategies for contract renewals with Riverbend Water Resources District/Texarkana, which have been included herein at the request of Riverbend Water Resources District. In total, there are 13 recommended contractual strategies in the 2026 Region D Plan, as shown in Table 5.11. Also shown in Table 5.11 are those instances where the WMS is contingent upon another WMS.

5.3.2 Recommended Groundwater Strategies

There are 48 entities in the North East Texas Region for which 52 groundwater strategies are recommended. Table 5.12 details these strategies. Supplemental information on the evaluation of water management strategies for each entity with identified needs can be found in Appendix C5-7.

5.3.3 Recommended Strategies necessitating the Development of Additional Supply

There are 52 recommended strategies based on the development of additional groundwater supply. There are 27 strategies based on the development or enhancement of use from surface water supplies and infrastructure for 7 entities. Advanced water conservation has been recommended for 20 entities, while is one recommendation for voluntary reallocations of existing supply (recommended for wholesale water providers and sellers to meet projected customer needs). A number of entities have multiple recommended strategies under various categories. Although there are more individual entities with a recommendation for groundwater, surface water becomes the predominant recommended strategy in terms of the amount of supply, accounting for approximately 82 percent of the total supply required in 2030, and 84 percent of the total supply required in 2080. Table 5.13 summarizes the strategies for entities with actual shortages, as well as those instances where the WMS is contingent upon another WMS. Supplemental information on the evaluation of water management strategies for each entity with identified needs can be found in Appendix C5-7.

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Table 5.11 Recommended Strategies for Entities with Contractual Shortages

County	Entity (WUG Basin)	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (If Applicable)	Supply Source				
		2030	2040	2050	2060	2070	2080				Ground-water	Surface Water	County	Basin	Total Capital Cost ($)
Red River	410 WSC (Red Basin)	-87	-81	-74	-69	-64	-58	Increase Contract (410 WSC to Lamar County WSD)				Pat Mayse Lake/Reservoir	Reservoir	Red	
		46	45	46	45	46	46								
Red River	410 WSC (Sulphur Basin)	-48	-41	-32	-25	-17	-10	Increase Contract (410 WSC to Lamar County WSD)				Pat Mayse Lake/Reservoir	Reservoir	Red	
		59	60	59	60	59	59								
Hopkins	North Hopkins WSC	-231	-271	-297	-325	-354	-383	Increase Existing Contract					Reservoir	Sulphur	
		383	383	383	383	383	383								
Cass	Holly Springs WSC	-15	-11	-8	-5	-2	0	Increase Existing Contract				O' the Pines Lake/Reservoir	Reservoir	Cypress	$ 130,000
		50	50	50	50	50	50								
Hopkins	Brinker WSC	-97	-122	-130	-143	-157	-171	Increase Existing Contract		Sulphur Springs		Chapman/Cooper Lake/Reservoir Non-System Portion	Reservoir	Sulphur	
		97	122	130	143	157	171								
Hunt	Cash SUD	0	0	0	0	-272	-579	Increase Existing Contract	Region C NTMWD WMS	NETMWD		North Texas MWD Lake/Reservoir System	Reservoir	Trinity	
		416	568	642	471	337	337								
Hunt	MacBee SUD	0	0	0	0	-8	-15	Increase Contract - MacBee SUD to SRA				Fork Lake/Reservoir	Reservoir	Sabine	
		0	0	0	0	17	14								
Lamar	County-Other, Lamar (Red Basin)	-29	-29	-28	-28	-28	-28	Increase Existing Contract		Lamar County WSD		Pat Mayse Lake/Reservoir	Reservoir	Red	
		121	124	127	129	131	131								
Lamar	County-Other, Lamar (Sulphur Basin)	-92	-85	-86	-86	-87	-85	Increase Existing Contract		Lamar County WSD		Pat Mayse Lake/Reservoir	Reservoir	Red	
		83	88	97	105	113	113								
Morris	Holly Springs WSC	-20	-15	-8	-4	0	0	Increase Existing Contract				O' the Pines Lake/Reservoir	Reservoir	Cypress	
		30	30	30	30	30	30								
Van Zandt	MacBee SUD (Sabine Basin)	0	0	0	0	-121	-338	Increase Contract - MacBee SUD to SRA		Sabine River Authority		Fork Lake/Reservoir	Reservoir	Sabine	
		0	0	0	0	950	954								
Van Zandt	MacBee SUD (Trinity Basin)	0	0	0	-5	-278	-614	Increase Contract - MacBee SUD to SRA		Sabine River Authority		Fork Lake/Reservoir	Reservoir	Sabine	
		0	0	0	0	576	578								
Lamar	Livestock, Lamar	-47	-47	-47	-47	-47	-47	Lamar Livestock Pipeline and Contract with Lamar Co WSD		Lamar Co WSD		Pat Mayse Lake/Reservoir	Reservoir	Red	$32,176,000
		617	617	617	617	617	617								

Table 5.12 Recommended Groundwater Strategies

County	Entity (WUG Basin)	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (If Applicable)	Supply Source				Total Capital Cost ($)
		2030	2040	2050	2060	2070	2080				Ground-water	Surface Water	County	Basin	
Van Zandt	Ben Wheeler WSC	0	-36	-83	-134	-186	-230	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Neches	
		0	228	228	228	227	228								
Upshur	Big Sandy	-19	-20	-20	-16	-12	-8	Drill New Wells			Carrizo-Wilcox Aquifer		Upshur	Sabine	
		85	85	85	85	85	85								
Van Zandt	Canton	0	0	0	0	-197	-400	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Sabine	$2,295,000
		0	0	0	0	0	145								
Hunt	Celeste	-14	-19	-24	-28	-32	-35	Drill New Wells			Woodbine Aquifer		Hunt	Trinity	$1,118,000
		35	35	35	35	35	35								
Red River	Clarksville	-252	-179	-106	-49	0	0	Drill New Wells with RO Treatment			Blossom Aquifer		Red River	Sulphur	$1,965,000
		388	388	388	388	388	388								
Cass	County-Other, Cass	-285	-235	-182	-133	-82	-25	Drill New Wells			Carrizo-Wilcox Aquifer		Cass	Cypress	$35,555,000
		323	323	323	323	323	323								
Cass	County-Other, Cass	-76	-56	-34	-15	0	0	Drill New Wells			Carrizo-Wilcox Aquifer		Cass	Sulphur	$1,973,000
		216	216	216	216	216	216								
Smith	East Texas MUD	0	-9	-161	-302	-444	-586	Drill New Wells			Queen City Aquifer		Smith	Sabine	$1,324,000
		0	108	216	432	648	648								
Van Zandt	Edom WSC	-46	-51	-56	-59	-60	-60	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Neches	$3,948,000
		60	60	60	60	60	60								
Bowie	Irrigation, Bowie (Red Basin)	-2184	-2184	-2184	-2184	-2184	-2184	Drill New Wells			Carrizo-Wilcox Aquifer		Bowie	Sulphur	$2,325,000
		1,102	1,102	1,102	1,102	1,102	1,102								
Bowie	Irrigation, Bowie (Red Basin)	-2184	-2184	-2184	-2184	-2184	-2184	Drill New Wells			Nacatoch Aquifer		Bowie	Red	$17,451,000
		1,882	1,882	1,882	1,882	1,882	1,882								
Bowie	Irrigation, Bowie (Sulphur Basin)	-3032	-3032	-3032	-3032	-3032	-3032	Drill New Wells			Carrizo-Wilcox Aquifer		Bowie	Sulphur	$10,120,000
		3,032	3,032	3,032	3,032	3,032	3,032								
Harrison	Irrigation, Harrison	-283	-283	-283	-283	-283	-283	Drill New Wells			Queen City Aquifer		Harrison	Cypress	$17,451,000
		484	484	484	484	484	484								
Harrison	Irrigation, Harrison	-191	-191	-191	-191	-191	-191	Drill New Wells			Queen City Aquifer		Harrison	Sabine	$577,000
		41	35	30	19	13	7								
Hopkins	Irrigation, Hopkins (Sulphur Basin)	-3673	-3673	-3673	-3673	-3673	-3673	Drill New Wells			Carrizo-Wilcox Aquifer		Hopkins	Sabine	$193,000
		0	111	387	420	423	423								
Hopkins	Irrigation, Hopkins (Sulphur Basin)	-3673	-3673	-3673	-3673	-3673	-3673	Drill New Wells			Carrizo-Wilcox Aquifer		Hopkins	Sulphur	$2,869,000
		43	42	41	41	39	39								
Hunt	Irrigation, Hunt (Sabine Basin)	-124	-124	-124	-124	-124	-124	Drill New Wells			Nacatoch Aquifer		Hunt	Sabine	$2,748,000
		151	151	151	151	151	151								
Hunt	Irrigation, Hunt (Sulphur Basin)	-69	-69	-69	-69	-69	-69	Drill New Wells			Nacatoch Aquifer		Hunt	Sabine	$2,777,000
		79	79	79	79	79	79								

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County	Entity (WUG Basin)	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (If Applicable)	Supply Source				Total Capital Cost ($)
		2030	2040	2050	2060	2070	2080				Ground-water	Surface Water	County	Basin	
Red River	Irrigation, Red River	-2469	-2469	-2469	-2469	-2469	-2469	Drill New Wells			Nacatoch Aquifer		Red River	Sulphur	$2,777,000
		1,450	1,450	1,451	1,451	1,451	1,451								
Van Zandt	Little Hope Moore WSC (Neeches Basin)	-4	-6	-9	-11	-14	-15	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Neches	$4,848,000
		0	0	0	0	0	0								
Van Zandt	Little Hope Moore WSC (Sabine Basin)	-8	-14	-19	-25	-30	-33	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Neches	$617,000
		0	0	0	0	0	0								
Van Zandt	Livestock, Van Zandt (Neeches Basin)	-84	-86	-87	-88	-89	-90	Drill New Wells			Queen City Aquifer		Van Zandt	Neches	
		89	89	89	89	89	90								
Van Zandt	Livestock, Van Zandt (Sabine Basin)	-104	-104	-102	-101	-105	-103	Drill New Wells			Queen City Aquifer		Van Zandt	Neches	
		105	105	105	105	105	104								
Upshur	Manufacturing, Upshur	-27	-28	-30	-31	-32	-33	Drill New Wells			Queen City Aquifer		Upshur	Cypress	
		161	161	161	161	161	161								
Van Zandt	Manufacturing, Van Zandt	-344	-365	-380	-400	-433	-453	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Trinity	
		386	386	386	386	386	386								
Wood	Manufacturing, Wood	-1410	-1518	-1630	-1746	-1866	-1991	Drill New Wells			Queen City Aquifer		Wood	Sabine	$4,857,000
		1,991	1,991	1,991	1,991	1,991	1,991								
Hopkins	Miller Grove WSC (Sabine Basin)	-30	-40	-44	-51	-58	-64	Drill New Wells			Carrizo-Wilcox Aquifer		Hopkins	Sulphur	$1,210,000
		67	66	66	65	65	64								
Rains	Miller Grove WSC (Sabin Basin)	-6	-8	-10	-11	-14	-16	Drill New Wells			Carrizo-Wilcox Aquifer		Hopkins	Sulphur	$1,541,000
		13	14	14	15	15	16								
Harrison	Mining, Harrison (Cypress Basin)	-433	-425	-416	-409	-399	-399	Drill New Wells			Queen City Aquifer		Harrison	Cypress	
		332	332	332	332	332	332								
Harrison	Mining, Harrison (Sabine Basin)	-1419	-1409	-1400	-1392	-1383	-1383	Drill New Wells			Queen City Aquifer		Harrison	Cypress	$384,000
		0	0	0	0	0	0								
Harrison	Mining, Harrison (Sabine Basin)	-1419	-1409	-1400	-1392	-1383	-1383	Drill New Wells			Queen City Aquifer		Harrison	Sabine	$1,555,000
		369	319	268	167	117	67								
Wood	Mining, Wood	-38	-36	-34	-31	-29	-25	Drill New Wells			Queen City Aquifer		Wood	Sabine	
		38	38	38	38	38	38								
Van Zandt	Myrtle Springs WSC (Sabine Basin)	-7	-25	-42	-62	-82	-102	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Sabine	
		102	102	102	102	102	102								
Van Zandt	Myrtle Springs WSC (Trinity Basin)	-17	-61	-104	-154	-203	-253	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Sabine	
		253	253	253	253	253	253								
Delta	North Hunt SUD (Sulphur Basin)	-20	-22	-23	-25	-25	-24	Drill New Wells			Nacatoch Aquifer		Hunt	Sabine	
		20	22	25	25	25	25								
Hunt	North Hunt SUD (Sulphur Basin)	-172	-160	-150	-137	-124	-115	Drill New Wells			Nacatoch Aquifer		Hunt	Sabine	$2,826,000
		172	162	159	159	159	159								

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County	Entity (WUG Basin)	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (If Applicable)	Supply Source				Total Capital Cost ($)
		2030	2040	2050	2060	2070	2080				Ground-water	Surface Water	County	Basin	
Van Zandt	R P M WSC	-21	-26	-24	-23	-19	-14	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Neches	$1,596,000
		0	0	0	0	0	0								
Harrison	Scottsville (Cypress Basin)	-31	-42	-45	-56	-66	-76	Drill New Wells			Queen City Aquifer		Harrison	Cypress	
		18	35	35	53	53	53								
Harrison	Scottsville (Sabine Basin)	-91	-116	-118	-144	-170	-194	Drill New Wells			Queen City Aquifer		Harrison	Cypress	$1,429,000
		36	73	73	109	109	109								
Hunt	Texas A&M University Commerce	-276	-275	-275	-275	-275	-275	Drill New Wells			Nacatoch Aquifer		Hunt	Sabine	$3,642,000
		276	275	275	275	275	275								
Smith	Winona	-11	-30	-43	-55	-66	-77	Drill New Wells			Carrizo-Wilcox Aquifer		Smith	Sabine	$761,000
		0	0	0	0	0	0								
Van Zandt	Fruitvale WSC	0	-3	-18	-43	-76	-95	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Sabine	$2,295,000
		0	95	95	95	95	95								
Van Zandt	Grand Saline	-121	-128	-122	-117	-120	-109	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Sabine	$2,295,000
		128	128	128	128	128	128								
Wood	New Hope SUD	-167	-162	-160	-141	-122	-105	Drill New Wells			Carrizo-Wilcox Aquifer		Wood	Sabine	
		167	167	167	167	167	167								
Wood	Ramey WSC	0	0	0	0	-106	-255	Drill New Wells			Carrizo-Wilcox Aquifer		Wood	Sabine	
		255	255	255	255	255	255								
Rains	South Rains SUD	0	-12	-28	-49	-70	-92	Drill New Wells			Carrizo-Wilcox Aquifer		Rains	Sabine	
		92	92	92	92	92	92								

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Table 5.13 Recommended Strategies Necessitating Development of Additional Supply

County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (If Applicable)	Supply Source				Total Capital Cost ($)
		2030	2040	2050	2060	2070	2080				Ground-water	Surface Water	County	Basin	
Bowie	Burns Redbank WSC	-260	-274	-291	-310	-329	-349	Riverbend Strategy		Hooks		Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		260	274	291	310	329	349								
Bowie	Central Bowie County WSC	-118	-118	-119	-120	-121	-122	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		118	118	119	120	121	122								
Bowie	Central Bowie County WSC	-651	-651	-657	-663	-669	-675	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		651	651	657	663	669	675								
Cass	County-Other, Cass	-76	-56	-34	-15	0	0	Riverbend Strategy Cass County				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		44	44	44	44	44	44								
Bowie	De Kalb	-48	-48	-47	-47	-46	-45	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		48	48	47	47	46	45								
Bowie	De Kalb	-218	-215	-214	-210	-208	-205	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		218	215	214	210	208	205								
Hunt	Greenville	-12,829	-15,468	-17,138	-18,569	-20,046	-21,296	New WTP Greenville		Greenville		Tawakoni Lake/Reservoir	Reservoir	Sabine	
		12,571	12,571	12,571	12,571	12,571	12,571								
Bowie	Hooks	-317	-313	-310	-305	-301	-296	Riverbend Strategy		Riverbend Water Resources District		Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		317	313	310	305	301	296								
Lamar	Irrigation, Lamar	-3,883	-3,883	-3,883	-3,883	-3,883	-3,883	Pat Mayse Raw Water Pipeline (Irrigation Lamar)		Paris		Pat Mayse Lake/Reservoir	Reservoir	Red	$ 31,893,000
		1,140	1,140	1,140	1,140	1,140	1,140								
Lamar	Irrigation, Lamar	-808	-808	-808	-808	-808	-808	Pat Mayse Raw Water Pipeline (Irrigation Lamar)		Paris		Pat Mayse Lake/Reservoir	Reservoir	Red	
		328	328	328	328	328	328								
Lamar	Livestock, Lamar	-47	-47	-47	-47	-47	-47	Lamar Livestock Pipeline and Contract with Lamar Co WSD		Lamar County WSD		Pat Mayse Lake/Reservoir	Reservoir	Red	$ 32,176,000
		617	617	617	617	617	617								
Bowie	Macedonia Eylau MUD 1	-710	-705	-698	-688	-677	-666	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		710	705	698	688	677	666								
Bowie	Manufacturing, Bowie	-289	-300	-311	-323	-335	-348	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		289	300	311	323	335	348								
Bowie	Manufacturing, Bowie	-1,512	-1,569	-1,629	-1,690	-1,754	-1,820	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		33,256	59,567	66,135	74,346	82,558	84,318								
Bowie	Maud	-164	-162	-161	-158	-156	-153	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		164	162	161	158	156	153								
Bowie	Nash	-314	-309	-306	-302	-297	-292	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		314	309	306	302	297	292								
Bowie	New Boston	-403	-399	-396	-389	-383	-377	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		428	399	396	389	383	377								

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County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (If Applicable)	Supply Source				Total Capital Cost ($)
		2030	2040	2050	2060	2070	2080				Ground-water	Surface Water	County	Basin	
Bowie	New Boston	-831	-823	-814	-801	-787	-773	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		962	898	889	876	862	848								
Bowie	Redwater	-337	-333	-329	-323	-317	-311	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		337	333	329	323	317	311								
Bowie	Riverbend Water Resources District (Red Basin)	-211	-209	-206	-203	-200	-196	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	$417,615,000
		211	209	206	203	200	196								
Bowie	Riverbend Water Resources District (Sulphur Basin)	-169	-166	-165	-162	-159	-157	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		169	166	165	162	159	157								
Bowie	Texarkana	-840	-832	-825	-813	-802	-790	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		840	832	825	813	802	790								
Bowie	Texarkana	-5,929	-5,870	-5,824	-5,741	-5,657	-5,572	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		5,929	5,870	5,824	5,741	5,657	5,572								
Bowie	Wake Village	-649	-641	-635	-625	-615	-605	Riverbend Strategy				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		649	641	635	625	615	605								

Table 5.14 Other Recommended Strategies

County	Entity (WUG Basin)	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (If Applicable)	Supply Source				Total Capital Cost ($)
		2030	2040	2050	2060	2070	2080				Ground-water	Surface Water	County	Basin	
Hunt	B H P WSC	-53	-134	-217	-288	-357	-414	Wright Patman Reallocation for NTMWD AND TRWD				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		0	0	0	0	42	42								
Hunt	Caddo Basin SUD	-174	-392	-695	-879	-963	-1115	Wright Patman Reallocation for NTMWD AND TRWD				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		0	0	0	0	142	142								
Van Zandt	Canton	0	0	0	0	-197	-400	Canton Reuse				Indirect Reuse	Van Zandt	Sabine	$20,194,000
		255	255	255	255	255	255								
Hunt	Cash SUD	0	0	0	0	-272	-579	Wright Patman Reallocation for NTMWD AND TRWD				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		0	0	0	0	88	88								
Rains	Cash SUD	0	0	0	0	-133	-163	Wright Patman Reallocation for NTMWD AND TRWD				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		0	0	0	0	1	1								
Hunt	Greenville	-12,829	-15,468	-17,138	-18,569	-20,046	-21,296	Voluntary Reallocation of Hunt Manufacturing Surplus (Greenville, Tawakoni)				Tawakoni Lake/Reservoir	Reservoir	Sabine	
		455	455	455	455	455	455								
Hunt	Poetry WSC	-19	-58	-99	-130	-120	-128	Wright Patman Reallocation for NTMWD AND TRWD				Wright Patman Lake/Reservoir	Reservoir	Sulphur	
		0	0	0	0	34	34								

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5.3.4 Bowie County

5.3.4.1 Riverbend Water Resources District

Description/Discussion of Needs

Riverbend Water Resources District (Riverbend WRD) is a conservation and reclamation district created by the Texas Legislature in 2009 to conserve and develop water resources in order to control, store, preserve, and distribute water to their Member Entities in Bowie, Cass, and Red River Counties. Riverbend WRD formally represents through interlocal agreements the interests in water supply for:

1. The City of Annona.
2. The City of Atlanta.
3. The City of Avery.
4. The City of DeKalb.
5. The City of Hooks.
6. The City of Leary.
7. The City of Maud.
8. The City of Nash.
9. The City of New Boston.
10. The City of Redwater.
11. The City of Texarkana, Texas.
12. The City of Wake Village.
13. TexAmericas Center.
14. Central Bowie County WSC.
15. Oak Grove WSC

The City of Red Lick holds a Memorandum of Understanding (MOU) with Riverbend WRD for the collaboration and partnership of developing the region's water resource needs. The District can be expanded in the future if additional entities so request.

In 1969 Texarkana, Texas, entered into separate water supply contracts with surrounding communities. The contracts provided that Texarkana, Texas, and member cities would participate in paying debt service on bonds to be issued by Lake Texarkana Water Supply Corporation (LTWSC, today known as Riverbend WRD). These member cities would all make payments for water supplied through facilities. In exchange Texarkana, Texas, and member cities were guaranteed ownership interest in LTWSC facilities and specified amounts of water in Wright Patman. Each city was guaranteed a maximum amount of water sufficient to meet the needs of the member cities, but also agreed to pay a minimum amount to ensure adequate funding for LTWSC facilities. Member cities historically relied on Texarkana, Texas, to manage and administer the water, the LTWSC facilities and water rates fairly for the benefits of all parties. When debt was paid off member cities would own an undivided interest in LTWSC facilities equal to that percentage that was paid by each member city to discharge debt.

In the past, Texarkana, Texas executed water supply contract extensions, an interlocal cooperation agreement with Riverbend, and the formation of an advisory committee regarding the creation of water facilities and new cooperative agreements. The City of Texarkana sells and/or supplies surface water to: City of Atlanta, Central Bowie County WSC, City of De Kalb, City of Hooks, Macedonia-Eylau MUD#1, City of Maud, City of Nash, City of New Boston, City of Queen City, Red River County WSC, City of Redwater, TexAmericas Center, City of Wake Village, Oak Grove WSC, County-Other portions of Bowie, Cass and Red River Counties, and Manufacturing in Bowie and Cass Counties. The system does have a water conservation and drought management plan in place.

This 2026 Plan recognizes that Riverbend has recently become the contracting entity between its members and Texarkana, TX. The strategies shown herein for entities with shortages in Bowie and Red River Counties rely on continued use of water from Lake Wright Patman. Presently, the strategies related to these member entities and their customers are presented with the Riverbend WRD's water management strategies. However, the strategies should be considered consistent with the plan for this planning cycle if Texarkana, TX, is the contracting party rather than Riverbend WRD, as long as the water source remains Lake Wright Patman.

The following text is from the Riverbend Water Resources District Regional Water Master Plan (SRC; 2018):

> *"The Riverbend WRD study area is located in the Piney Woods and East Texas Timberlands Regions of Texas along the Interstate 30 corridor between the Cities of Dallas, Texas, and Little Rock, Arkansas. This study area serves as a transportation, commercial, and industrial center for the Texas-Arkansas corridor, as well as a hub for portions of Oklahoma and Louisiana. The primary source of water supply for Riverbend WRD Member Entities is Wright Patman Lake; however, supplemental supply is intermittently provided from Millwood Lake…"*

Riverbend WRD has performed numerous studies characterizing the availability of water supplies to the District, evaluating the feasibility of a regional water system to replace and/or supplement the multiple systems currently in service, investigating water management strategies and treatment options to provide water supply and infrastructure to meet the demands of their municipal and industrial customers and members. Riverbend WRD is the formal agent for Wright Patman Lake and issues related to sales and distribution of raw and potable water for the aforementioned entities. Given this status, the evaluation of these entities and their municipal and industrial customers was aggregated to remain consistent with the Regional Master Planning efforts conducted by Riverbend WRD.

Evaluated Strategies

Riverbend WRD is supplied by water in Lake Caney and Lake Eliot. A request was submitted by Riverbend WRD to consider a number of WMS and WMSPs, including implementation of the Ultimate Rule Curve via contract with the USACE, amending the current surface water right to increase diversion from Wright Patman Lake up to a maximum firm storage available within the Ultimate Rule Curve, and new infrastructure including a new intake, pump station, pipeline, and water treatment plant to be located at the Texas Americas Center, and a new 2.5 MGD water treatment plant for the provision of municipal supplies in Cass County.

The requested strategies have been considered to meet the Riverbend WRD's (along with its member entities and their customers) identified contractual water supply shortages. There are no significant current water needs in the area that could be met by water reuse. Groundwater was not considered as an alternative as the entities rely upon existing surface water supplies. Conservation targets for near term reductions in demand are reflected in the City of Texarkana, Texas' Water Conservation and Drought Contingency Plan. However, Advanced Water Conservation is not recommended as a water management strategy as such a strategy would not potentially meet the TCEQ regulatory minimum of 0.6 gpm/connection.

Riverbend WRD has requested consideration of the strategy to decommission the existing New Boston Rd WTP and construct a new WTP by 2030 (referred to hereafter as the Riverbend Strategy), although the timing of this action is still under development by the Riverbend WRD and its member entities. As the Riverbend WRD has indicated a desire to remain flexible, alternatives as to the timing of various WMS projects have not been ruled out at present, and should be considered consistent for the purposes of the 2026 Region D Plan.

While future growth utilizing the adopted TWDB methodology is limited, significant growth has been contractually obligated for customer demands for manufacturing in Bowie County. Along with moderate projections of municipal growth in the area, the contracted manufacturing demands largely represent the dominant need over the 2030 – 2080 period.

Detailed Description of Evaluated Water Management Strategy Projects

Riverbend WRD has requested for inclusion a water management strategy entailing multiple WMSPs. A summary of each project is included here.

Amendment of Water Right (2030) Based on the contractual demands identified herein, this WMSP is planned to occur by 2030, and would entail amendment of Certificate of Adjudication 03-4836. The amendment would include changing the total use of the water right to a more general, multi-use permit, and an increase in diversion of 57,517 ac-ft/yr, for a total permitted diversion of 237,517 ac-ft/yr. If the actual implementation of this strategy is a new surface water permit, such an approach should be considered consistent for the purposes of this Plan.

Interim to Ultimate Storage (2030) - In order to meet the contracted and projected demands for the District, development of this WMSP by 2030 would entail full implementation of the Ultimate Rule Curve per the contract with the USACE for storage in Lake Wright Patman.

New Intake, Pump Station, Raw Water Pipeline, and New WTP (2030) – The District has requested this WMSP to meet contractual and projected demands by 2030. This evolving WMSP has been identified specifically to provide the infrastructure necessary to meet member entities' and their customers' needs in the year 2030. The Riverbend WRD's Regional Water Master Plan (Roth, 2018) and the Second Cost Estimates (AECOM 2018) were utilized as the basis to evaluate and identify the specifics of the project. Sizing, timing, and costs were necessarily updated from that information to meet the contractual demands identified by Riverbend WRD and adopted for the purposes of the 2026 Region D Plan. Costs have been derived utilizing the UCM. Where appropriate, costs and assumptions from the Riverbend WRD Regional Water Master Plan and Second Cost Estimates were incorporated into the UCM. This strategy entails the construction of a new intake location with a deeper invert elevation allowing access to additional storage in Wright Patman, a new pump station, raw water pipeline, a new 25 MGD WTP, a 5 MGD WTP expansion in 2040 and a final 10 MGD WTP expansion in 2050, and the decommission of the existing New Boston WTP to meet member entities' and wholesale customer contractual and projected needs. The supply necessary to meet the contractual needs identified in the 2026 planning process is a maximum firm supply of 115,360 ac-ft/yr. The total project cost is $649.1 million, with an annual cost up to $63.5 million and a unit cost of $549 per ac-ft. during debt service ($1.68/1,000 gal.) and $156 per ac-ft after debt service. Supply adequate to meet the identified needs, when considered in conjunction with all member entities' and customer needs, do not over allocate the existing firm supply available from Wright Patman Reservoir within the Ultimate Rule Curve, if other recommended Water Management Strategy Projects are also employed. It is noted that the District's present plans are for implementation of this project by 2026, although the timing of this WMSP may vary and should be considered consistent with the 2026 Region D Plan.

New 2.5 MGD Package WTP and Transmission Line (2030*)* – The District has requested this WMSP to meet municipal demands starting in 2030 for its member entities and customers in Cass County. Utilizing the existing Graphics Packaging International (GPI) intake, this WMSP entails construction of a 12" transmission pipeline to be connected from the IP intake, which would be routed to a new 2.5 MGD package WTP, along with clearwells for a total of 3 MG of ground storage capacity, high service pumps, and electrical modifications. The supply from this WMSP would total 1,918 ac-ft/yr, assuming a peaking factor of 1.46. The total project cost is $79.1 million, with an annual cost of $8.3 million and a unit cost of $5,570 per ac-ft during debt service ($17.09/1,000 gal.) and $1,852 per ac-ft after debt service.

Recommendations

To meet the Riverbend WRD's, its member entities', and customers' contractual and projected needs and the requested approach for the 2026 RWP, it is recommended that the water right be amended to multi-use for a total permitted diversion of 237,517 ac-ft/yr utilizing the permitted storage at the Ultimate Rule Curve, full implementation up to the Ultimate Rule Curve per contract for storage out of Lake Wright Patman with the USACE, and construction of a new intake, pipeline, and water treatment plant be constructed by 2030 to meet these WUGs' contractual needs. It is further recommended that a new 2.5 MGD package WTP and transmission line be constructed by 2030 to meet identified municipal needs in Cass County. Each of these WMSPs are contingent upon the other, as each are necessary to secure the identified supplies necessary to meet the projected municipal demands and contractual industrial demands identified herein.

At present, considerable discussions are underway between all the member entities of Riverbend Water Resources District. As noted previously and reiterated here, this 2026 Plan recognizes that Riverbend may become the contracting entity between its members and the City of Texarkana, Texas. The strategies shown herein for entities with shortages in Bowie, Cass, and Red River Counties rely on continued use of water from Lake Wright Patman. Presently, the strategies related to Riverbend WRD are presented with the Riverbend WRD's water management strategies. However, the strategies should be considered consistent with the plan for this planning cycle if the City of Texarkana, Texas, is the contracting party rather than Riverbend WRD, as long as the water source remains Lake Wright Patman.

5.3.4.2 Burns Redbank WSC

Description/Discussion of Needs

Burns Redbank Water Supply Corporation (WSC) provides water service in Bowie County. The system population is projected to be 2,344 in 2030 and 3,171 in the year 2080. The WSC has a contract for water supply with the City of Hooks from Lake Wright Patman. The WSC is projected to have a shortage of 260 ac-ft/yr in 2030 due to the aging of Texarkana's Water Treatment Plant.

Evaluated Strategies

There were four alternative strategies considered to meet the WSC's water supply shortages. Advanced conservation was not determined to be feasible because the WSC's supply is not projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the WSC is planning on continuing to purchase surface water from the City of Hooks. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein.

Recommendations

It is recommended that the Burns Redbank WSC continue its surface water purchase from the City of Hooks contingent upon Riverbend WRD's strategies. This WUG has unmet needs after WMS of 61 ac-ft/yr in 2030 and 156 ac-ft/yr in 2080.

5.3.4.3 Central Bowie County WSC

Description/Discussion of Needs

Central Bowie County WSC provides water service in Bowie County. The WSC's population is projected to be 9,911 in 2030 and 10,350 in the year 2080. The WSC has a contract for water supply with the RWRD (City of Texarkana, Texas) from Lake Wright Patman. The WSC is projected to have a shortage of 769 ac-ft/yr in 2030 due to the aging of Texarkana's WTP.

Evaluated Strategies

There were four alternative strategies considered to meet the WSC's water supply shortages. Advanced conservation was not determined to be feasible because the WSC's supply would not be projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the utility is planning on continuing to purchase surface water from the City of Texarkana, Texas and/or Riverbend WRD. A request was submitted by Riverbend Water Resources District to consider a new WTP, pipeline, pump station, and intake to Wright Patman Reservoir. Thus, a renewal contract contingent upon the Riverbend WRD's WMSPs has been considered herein.

Recommendations

It is recommended that the Central Bowie County WSC continue its surface water purchase from the City of Texarkana, Texas and/or Riverbend WRD contingent upon Riverbend WRD's recommended strategies. This WUG has unmet needs of 51 ac-ft/yr in 2030 and surpluses throughout the rest of planning period.

5.3.4.4 The City of DeKalb

Description/Discussion of Needs

The City of De Kalb provides water service in Bowie County. The City population is projected to be 1,398 in 2030 and 1,319 in the year 2080. The City has a contract for water supply with RWRD (City of Texarkana) from Lake Wright Patman. The City is projected to have a shortage in 2030 due to aging of Texarkana's Water Treatment Plant.

Evaluated Strategies

There were five alternative strategies considered to meet the City's water supply shortages. Advanced conservation was not determined to be feasible because De Kalb's supply is not projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein. The most recent water loss audit report shows a water loss of approximately 32.14% and recommends water loss mitigation.

Recommendations

It is recommended that the City of DeKalb continues its surface water purchase from Texarkana contingent upon Texarkana/Riverbend strategies and adopt Water Loss Mitigation. This WUG has no unmet needs after WMS.

5.3.4.5 The City of Hooks

Description/Discussion of Needs

The City of Hooks provides water service in Bowie County. The City population is projected to be 2,637 in 2030 and 2,475 in the year 2080. The City has a contract for water supply with the City of Texarkana from Lake Wright Patman. The City is projected to have a shortage in 2030 due to the aging of Texarkana's Water Treatment Plant.

Evaluated Strategies

There were five alternative strategies considered to meet the City's water supply shortages. Advanced conservation was not determined to be feasible because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein. The most recent water loss audit report shows a water loss of approximately 35.85% and recommends water loss mitigation

Recommendations

It is recommended that the City of Hooks continue its surface water purchase from Texarkana contingent upon Texarkana/Riverbend strategies and adopt Water Loss Mitigation. This WUG has no unmet needs after WMS.

5.3.4.6 Bowie County Irrigation

Description/Discussion of Needs

The Irrigation WUG in Bowie County has a demand that is projected to be 10,067 ac-ft/yr in 2030 through 2080. The Irrigation WUG in Bowie County is projected to be supplied by surface water supplies from run-of-river diversions from the Red and Sulphur Rivers. The current round of planning has identified a deficit of 3,032 ac-ft/yr in the Sulphur basin and a deficit of 2,184 ac-ft/yr in the Red River basin, projected to occur in 2030 through 2080.

Evaluated Strategies

Four alternative strategies were considered to meet the Bowie County Irrigation WUG's projected water supply shortages. Advanced water conservation for irrigation practices were not determined to be feasible in this planning effort, as present irrigation practices likely already incorporate many BMPs to extend water supplies, thus no additional conservation would be feasible. The use of reuse water from nearby municipalities is not feasible as it would not be effective to deliver reuse water to rural farm irrigation systems. Groundwater from the Carrizo-Wilcox aquifer has been identified as a potential source of water for irrigation in Bowie County. Surface water was not determined to be a viable alternative to meet projected demands due to this option would be considered cost prohibitive.

Recommendations

The recommended strategy for the Bowie County Irrigation WUG to meet projected demands during the planning period is to drill 13 new ground water wells with average production capacity of 250 gpm in the Carrizo-Wilcox Aquifer in Bowie County. A well operating at an average of 250 gpm is capable of delivering 403 ac-ft per year per well. This WUG has unmet needs of 1,082 ac-ft/yr throughout the planning period.

5.3.4.7 Macedonia-Eylau MUD #1

Description/Discussion of Needs

Macedonia-Eylau MUD #1 provides water service in Bowie County. The MUD's population is projected to be 8,447 in 2030 and 7,925 in the year 2080. The MUD has a contract for water supply with RWRD (City of Texarkana) for 552 ac-ft/yr. The MUD is projected to have a deficit of 710 ac-ft in 2030 and decreasing to a deficit of 666 ac-ft by 2080.

Evaluated Strategies

There were four alternative strategies considered to meet the MUD's water supply shortages. Advanced conservation was not determined to be feasible because the per capita use per day was less than the 140 gpcd threshold established by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the MUD is planning on continuing to purchase surface water from the City of Texarkana.

Recommendations

Renewal of the existing surface water purchase from City of Texarkana is the recommended strategy to meet the Macedonia-Eylau MUD No. 1's needs contingent on Riverbend WRD's recommended strategies. This WUG has no unmet needs after WMS.

5.3.4.8 Bowie County Manufacturing

Description/Discussion of Needs

The Manufacturing WUG in Bowie County has a demand that is projected to be 1,835 ac-ft/yr in 2030 increasing to 2,168 ac-ft/yr in 2080. Manufacturing demands identified via contract between the Riverbend WRD and TexAmericas Center range from 33,604 ac-ft/yr in 2030 to 100,813 ac-ft/yr in 2080. The Manufacturing WUG in Bowie County is projected to be supplied by existing groundwater supplies from the Carrizo-Wilcox Aquifer, surface water from existing run-of-river rights in the Red River Basin, and contracted water supplies from Wright Patman Lake from the Riverbend WRD. The current round of planning has identified a projected 2030 deficit of 1,512 ac-ft/yr in the Sulphur River Basin and a deficit of 300 ac-ft/yr in the Red River Basin. This deficit in the Sulphur River Basin is projected to increase to 1,820 ac-ft/yr by 2080, whereas the projected deficit in the Red River Basin increases slightly to 348 ac-ft/yr by 2080. Contractual need in the Sulphur River Basin is established by the aforementioned contract between Riverbend WRD and TexAmericas Center, and the need established by Riverbend WRD to replace aging infrastructure by 2030.

Evaluated Strategies

Five alternative strategies were considered to meet the Bowie County Manufacturing WUG's projected water supply shortages. Advanced water conservation for manufacturing practices were considered feasible, whereby industrial water auditing BMPs could extend water supplies through an assumed 10 percent demand reduction. The use of reuse water from nearby municipalities is not feasible as it would not be effective to deliver reuse water to this WUG. Groundwater from the Carrizo-Wilcox and Nacatoch aquifers was determined to be insufficient to meet the full contractual needs identified for manufacturing in Bowie County. Riverbend WRD requested consideration of the Riverbend WRD WMSPs to meet the identified need.

Recommendations

The recommended strategy for the Bowie County Manufacturing WUG to meet projected demands during the planning period is advanced conservation and renewal of the existing contract with Riverbend WRD contingent upon implementation of the Riverbend WRD's recommended WMS and WMSPs. As the recommended approach is contingent upon the Riverbend WRD's recommended WMSPs, which are not planned to come online until 2026, the 2026 Region D Plan projects a surplus manufacturing supply of 31,964 ac-ft/yr in 2030 if the above WMS supply is considered.

5.3.4.9 The City of Maud

Description/Discussion of Needs

The City of Maud provides water service in Bowie County. The City population is projected to be 787 in 2030 and 738 in the year 2080. The City has a contract for water supply with the City of Texarkana from Lake Wright Patman. The City is projected to have a shortage of 164 ac-ft/yr in 2030 due to aging of Texarkana's Water Treatment Plant.

Evaluated Strategies

There were four alternative strategies considered to meet the City's water supply shortages. Advanced conservation was not determined to be feasible because Maud's supply would not be projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, pump station, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein.

Recommendations

It is recommended that the City of Maud renew its existing contract with Texarkana contingent upon Riverbend WRD recommended strategies. This WUG has no projected unmet needs.

5.3.4.10 The City of Nash

Description/Discussion of Needs

The City of Nash provides water service in Bowie County. The City population is projected to be 4,160 in 2030 and 3,905 in the year 2080. The City has a contract for water supply with the City of Texarkana from Lake Wright Patman. The City is projected to have a shortage of 314 ac-ft/yr in 2030 due to constraints in supply availability and aging of Texarkana's Water Treatment Plant.

Evaluated Strategies

There were five alternative strategies considered to meet the City's water supply shortages. Advanced conservation was not determined to be feasible because Nash's supply would not be projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein. The most recent water loss audit report shows a water loss of approximately 19.51% and RWPG recommends water loss mitigation.

Recommendations

It is recommended that the City of Nash continue its surface water purchase from Texarkana contingent upon Riverbend WRD's recommended strategies and adopt Water Loss Mitigation. This WUG has no projected unmet needs.

5.3.4.11 The City of New Boston

Description/Discussion of Needs

The City of New Boston provides water service in Bowie County. The WUG population is projected to be 5,383 in 2030 and 5,050 in the year 2080. The city has a contract for water supply with the City of Texarkana for 1,680 ac-ft/yr. New Boston also has a water right permit for run-of-river diversions from the Sulphur River, but no infrastructure to utilize it. The City is projected to have a shortage in 2030 due to constraints in supply availability and aging of Texarkana's Water Treatment Plant.

Evaluated Strategies

There were five alternative strategies considered to meet New Boston's water supply shortages. Advanced conservation was not determined to be feasible because New Boston's supply would not be projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the city has historically utilized surface water supplies and, at present, is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, pump station, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein. The most recent water loss audit report shows a water loss of approximately 51.14% and RWPG recommends water loss mitigation.

Recommendations

It is recommended that the City of New Boston continue its surface water purchase from Texarkana contingent upon Riverbend WRD's recommended strategies and adopt Water Loss Mitigation. This WUG has not projected unmet needs after WMS.

5.3.4.12 The City of Redwater

Description/Discussion of Needs

The City of Redwater provides water service in Bowie County. The City population is projected to be 2,964 in 2030 and 2,780 in the year 2080. The City has a contract for water supply with the City of Texarkana from Lake Wright Patman, and groundwater supply from the Carrizo-Wilcox Aquifer. The City is projected to have a shortage in 2030 due to constraints in water supply and aging of the Texarkana's Water Treatment Plant.

Evaluated Strategies

There were five alternative strategies considered to meet the City's water supply shortages. Advanced conservation was not determined to be feasible because Redwater's supply would not be projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, pump station, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein. The most recent water loss audit report shows a water loss of approximately 27.91% and RWPG recommends water loss mitigation.

Recommendations

It is recommended that the City of Redwater continue its surface water purchase from Texarkana contingent upon Riverbend WRD's recommended strategies and adopt Water Loss Mitigation. The development of infrastructure necessary to provide water to the City's customers is to be considered consistent with this recommended strategy. This WUG has no projected unmet needs after WMS.

5.3.4.13 The City of Texarkana, Texas

Description/Discussion of Needs

The City of Texarkana, Texas, is a municipality located in Bowie County, Texas. Although the City of Texarkana, Texas, is a separate and distinct entity from the City of Texarkana, Arkansas, both entities are served by the same system (operated by Texarkana Water Utility). For the purposes of the 2026 Region D Water Plan, it has been assumed that water supplied from Arkansas (i.e., Millwood Reservoir) serves the population of Texarkana, Arkansas, while water supplied from Texas serves Texarkana, Texas.

For the City of Texarkana, Texas, the system is projected to serve 36,860 people in 2030, decreasing to 34,795 by 2080. The current sources of supply based in Texas are surface water from Lake Wright Patman and a run of river diversion permit from the Red River (although no infrastructure is currently in place for the latter). The City provides water to area municipal and industrial customers and is projected to have a water supply deficit of 6,769 ac-ft/yr in 2030 decreasing to 6,362 ac-ft/yr in 2080, due to water supply constraints and the age and functionality of the existing New Boston Water Treatment Plant and GPI treatment plant.

Summary of Evaluated Strategies

There were several alternative strategies considered to meet the City's water supply shortages. Advanced conservation was not determined to be feasible because the City's supply would not be projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on continuing to utilize surface water from Lake Wright Patman. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, pump station, and intake to Wright Patman Reservoir. Thus, a renewal for supply in conjunction with Riverbend WRD has been considered herein.

Recommendations

It is recommended that the City of Texarkana, Texas continue and renew its surface water use and contracting approach as a participating member entity with Riverbend WRD contingent upon Riverbend WRD's recommended strategies.

As noted previously and reiterated here, this 2026 Plan recognizes that Riverbend has become the contracting entity between its members and Texarkana, Texas. The strategies shown herein for entities with shortages in Bowie, Cass, and Red River Counties rely on continued use of water from Lake Wright Patman. Presently, the strategies related to the City of Texarkana, Texas, are presented with the Riverbend WRD's water management strategies. However, the strategies should be considered consistent with the plan for this planning cycle if the City of Texarkana, Texas, is the contracting party rather than Riverbend WRD, as long as the water source remains Lake Wright Patman. This WUG has no projected unmet needs after WMS.

5.3.4.14 The City of Wake Village

Description/Discussion of Needs

The City of Wake Village provides water service in Bowie County. The City's population is projected to be 5,831 in 2030 and 5,470 in the year 2080. The City has a contract for water supply with the City of Texarkana from Lake Wright Patman. The City is projected to have a shortage of 649 ac-ft/yr in 2030 due to constraints on water supply and aging of Texarkana's Water Treatment Plant.

Evaluated Strategies

There were four alternative strategies considered to meet the City's water supply shortages. Advanced conservation was not determined to be feasible because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, pump station, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein.

Recommendations

It is recommended that the City of Wake Village continue its surface water purchase from Texarkana contingent upon Riverbend WRD recommended strategies. This WUG has no projected unmet needs after WMS.

5.3.5 Camp County

5.3.5.1 Manufacturing in Camp County

Description/Discussion of Needs

The Manufacturing WUG in Camp County has a demand that is projected to be increasing from 44 ac-ft/yr in 2030 to 54 ac-ft/yr in 2080. Manufacturing in Camp County has a current surface water supply from Bob Sandlin Lake/Reservoir through City of Pittsburg and NETMWD and a groundwater supply from Bi-County WSC. The total rated available supply from these sources is 2 ac-ft/yr in 2080. Manufacturing in Camp County is projected to have a water supply deficit of 42 ac-ft/yr in 2030 decreasing to a deficit of 46 ac-ft/yr in 2050 and increasing to a deficit of 52 ac-ft/yr in 2080.

Evaluated Strategies

Three alternative strategies were considered to meet the Camp County Manufacturing water supply shortages as summarized in the following table. Advanced conservation and water reuse was not considered because operational procedures for the existing manufacturer are not available. Surface water alternatives include increasing their contract with the City of Pittsburg.

Recommendations

The recommended strategy for the Camp County Manufacturing to meet their projected deficit of 3 ac-ft/yr in 2030 would be to increase their contract with the City of Pittsburg. The recommended supply source will be Lake Bob Sandlin in Camp County. Lake Bob Sandlin in Camp County is projected to have a more than ample supply availability to meet the needs of the Manufacturing in Camp County for the planning period.

5.3.5.2 Camp County Livestock

Description/Discussion of Needs

The Livestock WUG in Camp County has a demand that is projected to be a constant 4,914 ac-ft/yr from 2020 to 2070. Livestock in Camp County, Cypress has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer, Queen City Aquifer, and Local Supplies. The total rated available supply from these sources is 952 ac-ft/yr in 2020 thru 2070. Livestock in Camp County, Cypress is projected to have a water supply deficit of 3,962 ac-ft/yr in 2020 thru 2070.

Evaluated Strategies

Three alternative strategies were considered to meet the Camp County, Livestock, Cypress water supply shortages. Advanced conservation and water reuse were not determined to be feasible because the demands are very rural in nature. Surface water alternatives were not utilized due to the rural nature of the demands.

Recommendations

The recommended strategy for the Camp County, Livestock, Cypress to meet their projected deficit of 3,962 ac-ft/yr in 2020 thru 2070 would be to construct twenty-five water wells prior to 2020. The recommended supply source will be the Queen City Aquifer in Camp County. One well with rated capacity of 100 gpm each would provide approximately 161 ac-ft/yr. Twenty-five new wells will be needed to provide the 3,962 ac-ft/yr needed. The Queen Aquifer in Camp County is projected to have a more than ample supply availability to meet the needs of the Livestock in Camp County for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.6 Cass County

5.3.6.1 Cass County-Other

Description/Discussion of Needs

The County Other WUG in Cass County is a split entity and has a demand that is projected to be decreasing from 1,087 ac-ft/yr in 2020 to 846 ac-ft/yr in 2070. County Other in Cass County has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer and surface water from Lake O’ the Pines (Avinger thru NETMWD), and Wright Patman Lake (Domino thru Texarkana Water Utilities/Riverbend). The total rated available supply from these sources is 638 ac-ft/yr. County Other in Cass County is projected to have a water supply deficit of 449 ac-ft/yr in 2020 and staying even to a deficit of 208 ac-ft/yr in 2070.

Evaluated Strategies

There were several alternative strategies considered to meet the Cass County-Other water supply shortages. Advanced conservation was not determined to be feasible because the per capita use per day would be less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater has been identified as a potentially feasible strategy from the Carrizo-Wilcox Aquifer in the Cypress and Sulphur River basins. Voluntary reallocation of manufacturing supply was identified in order to account for the fact that the City of Domino's present supply comes via diversion of supply for GPI at Lake Wright Patman, a part of the Cass Manufacturing WUG, thus the amount for voluntary reallocation does not affect the 120,000 ac-ft/yr of contracted supply between Texarkana and GPI. Further, a request was submitted by Riverbend Water Resources District to consider a new 2.5 MGD package water treatment plant and transmission line for supply from Lake Wright Patman. Thus, a renewal contract with Texarkana/Riverbend has been considered herein.

Recommendations

The recommended strategy for the Cass County, County Other, Cypress to meet their projected deficit of 282 ac-ft/yr in 2020 reducing to 106 ac-ft/yr in 2070 would be to construct three water wells prior to 2020. The recommended supply source will be the Carrizo Wilcox Aquifer in Cass County. One well with rated capacity of 200 gpm each would provide approximately 108 ac-ft/yr. Three new wells will be needed to provide the 282 ac-ft/yr needed.

The recommended strategy for the Cass County, County Other, Sulphur to meet their projected deficit of 167 ac-ft/yr in 2020 reducing to 102 ac-ft/yr in 2070 would be to construct two water wells prior to 2020. The recommended supply source will be the Carrizo Wilcox Aquifer in Cass County. One well with rated capacity of 200 gpm each would provide approximately 108 ac-ft/yr. Two new wells will be needed to provide the 167 ac-ft/yr needed. The Carrizo Wilcox Aquifer in Cass County is projected to have a more than ample supply availability to meet the needs of the County Other in Cass County for the planning period.

It is recommended that the City of Domino continue its surface water purchase from Texarkana contingent upon voluntary reallocation of supply from Cass Manufacturing and Riverbend WRD's recommended strategy for a new 2.5 MGD package water treatment plant and transmission line.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.6.2 Holly Springs WSC

Description/Discussion of Needs

The Holly Springs WSC WUG is a split WUG. In Cass County Cypress, it has a demand that is projected to be decreasing from 75 ac-ft/yr in 2030 to 58 ac-ft/yr in 2080. Holly Springs WSC in Cass County has a current water supply from Hughes Springs through NETMWD and Lake O' Pines. The total rated available supply from this source is 60 ac-ft/yr in 2030, decreasing to 59 in 2080. Holly Springs WSC in Cass County is projected to have a water supply deficit of 15 ac-ft/yr in 2030 and increasing to surplus of 1 ac-ft/yr in 2080.

In Morris County, Cypress, it has a demand that is projected to be decreasing from 52 ac-ft/yr in 2030 to 30 ac-ft/yr in 2080. Holly Springs WSC in Morris County has a current water supply from Hughes Springs through NETMWD and Lake O' Pines. The total rated available supply from this source is 32 ac-ft/yr in 2030 through 2040 and 33 ac-ft/yr in 2050 thru 2080. Holly Springs WSC in Morris County is projected to have a water supply deficit of 20 ac-ft/yr in 2030 and increasing to a surplus of 3 ac-ft/yr in 2080.

Evaluated Strategies

Three alternative strategies were considered to meet the Holly Springs WSC Cass County water supply shortages as summarized in the following table. Advanced conservation and water reuse was not considered because it is a rural system. Surface water alternatives include increasing their contract with the City of Hughes Springs through NETMWD and Lake O' Pines.

Recommendations

The recommended strategy for the Holly Springs WSC to meet their projected deficit of 35 ac-ft/yr in 2030 would be to increase their contract with City of Hughes Springs through NETMWD and Lake O' Pines. The recommended supply source will be Lake O'Pines in Marion County. Lake O' Pines in Marion County is projected to have a more than ample supply availability to meet the needs of the Holly Springs WSC through Hughes Springs and NETMWD for the planning period.

5.3.7 Delta County

5.3.7.1 Cooper

Description/Discussion of Needs

The City of Cooper in Delta County has a demand that is projected at 748 ac-ft/yr in 2030 and 749 ac-ft/yr in 2080. They serve 2,067 people in 2030 decreasing to 1,967 people in 2080. The City of Cooper in Delta County is supplied by surface water from the Lake Big Creek and run-of-river diversions from the Sulphur River. They also have a contract with Sulphur River MWD for 1,072 ac-ft/yr throughout the planning period. A deficit of 73 ac-ft/yr is projected to occur in 2080.

Evaluated Strategies

Four alternative strategies were considered to meet the projected shortages for City of Cooper. Advanced conservation was not selected because the WUG's overall supply is not projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. The most recent water loss audit report shows a water loss of approximately 25% and RWPG recommends water loss mitigation.

Recommendations

The recommended strategies for the Delta County Livestock to meet their projected deficit of 73 ac-ft/yr in 2080. This WUG has surpluses from 2030-2070 and a projected unmet need of 29 ac-ft/yr in 2080 after WMS.

5.3.8 Franklin County

No strategies recommended for Franklin County

5.3.9 Gregg County

5.3.9.1 White Oak

Description/Discussion of Needs

The City of White Oak is located in Gregg County and serves the incorporated area of the City. The population is projected to decrease from 6421 persons in 2030 to 6125 persons in 2080. The City is included as a WUG. in Gregg County. The system's current water supply consists of surface water from the Sabine river basin. The total supply capacity is 2590 ac-ft/yr. The System does not have a water conservation plan. The system is projected to have a water supply deficit of 66 ac-ft/yr in 2030 decreasing to a surplus of 61 ac-ft/yr in 2080.

Evaluated Strategies

Four alternative strategies were considered to meet the City's water supply shortages as summarized in the following table. Advanced conservation was not considered because the per capita use per day was below the 140 gpcd threshold set by the planning group. Water reuse was not considered because the system does not have a demand for non-potable water. Increased water purchase contracts with the City of Longview shall be utilized to remedy the water deficit.

Recommendations

The recommended strategy for the City to meet their projected deficit of 66 ac-ft/yr in 2030 and deficit of 26 ac-ft/yr in 2060 would be to increase the water purchase contract with the City of Longview.

5.3.9.2 Gregg County Mining

Description/Discussion of Needs

The Mining WUG in Gregg County is a split entity and has a demand that is projected to be decreasing from 260 ac-ft/yr in 2020 to 171 ac-ft/yr in 2070. Mining in Gregg County has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer and a Sabine Run-of-River Permit. The total rated available supply from these sources varies from 171 ac-ft/yr to 407 ac-ft/yr over the planning period. Mining in Gregg County is projected to have a water supply deficit of 11 ac-ft/yr in 2020 increasing to a deficit of 19 ac-ft/yr in 2030 and decreasing to a deficit of 6 ac-ft/yr in 2070 for the Gregg Sabine split.

Evaluated Strategies

Three alternative strategies were considered to meet the Gregg County Mining water supply shortages. Advanced conservation and water reuse was not determined to be feasible because operational procedures for the existing mines are not available. Surface water alternatives were omitted since there is not a supply source within close proximity to the county with available supply. Wells in the Carrizo-Wilcox Aquifer (Sabine River Basin) were identified as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for the Gregg County Mining Sabine to meet their projected deficit of 11 ac-ft/yr in 2020 and 19 ac-ft/yr in 2030 would be to construct one additional water well similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Carrizo-Wilcox Aquifer in Gregg County. Three wells with rated capacity of 50 gpm each would provide approximately 27 ac-ft/yr. The Carrizo-Wilcox Aquifer in Gregg County is projected to have a more than ample supply availability to meet the needs of the Mining in Gregg County Sabine for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.10 Harrison County

5.3.10.1 Harleton WSC

Description/Discussion of Needs

The Harleton WSC system is located in northwest Harrison County and southern Marion County. The WSC served 1,480 connections in 2018. The population is projected to increase from 4,486 persons in 2020 to 6,787 persons in 2070. The WSC is included as a W.U.G. in Harrison and Marion Counties. The system's current water supply consists of four water wells from the Carrizo-Wilcox Aquifer and a contract with NETMWD for surface water from Lake O' the Pines. The total rated capacity of these sources is approximately 610 GPM, or 328 ac-ft/yr. The system is bounded on the west by the Diana SUD, the south Gum Springs WSC, the east by Talley WSC and Cypress Valley WSC, and the north by Lake O' the Pines. The System does have a water conservation plan. The System is projected to have a water supply deficit of 62 ac-ft/yr in 2020 decreasing to 230 ac-ft/yr in 2070.

Evaluated Strategies

Four alternative strategies were considered to meet the WSC's water supply shortages. Advanced conservation was not determined to be feasible because the per capita use per day was below the 140 gpcd threshold set by the planning group. Water reuse was not determined to be feasible because the system does not have a sewer collection system. Groundwater of acceptable quality is difficult to find in the Harleton Service area. Existing well water is blended with surface water to meet quality standards. Harleton WSC has an existing contract with NETMWD for treated water from Lake O' the Pines.

Recommendations

The recommended strategy for the Harleton WSC to meet their projected deficiency of 62 ac-ft/yr in 2020 and deficit of 230 ac-ft/yr in 2070 would be to increase their contract with NETMWD just prior to each decade as the deficits occur. The recommended supply source will be the Lake O' the Pines in Marion County. The Lake O' the Pines in Marion County is projected to have a more than ample supply availability to meet the needs of Harleton WSC for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.10.2 Harrison County Irrigation

Description/Discussion of Needs

The Irrigation WUG in Harrison County is a split entity and has a demand that is projected to be constant 560 ac-ft/yr from 2030 to 2080. Irrigation in Harrison County, Cypress Basin has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer, surface water from Cypress Run-of-River permit, and Sabine Run-of-River permit. The total rated available supply from these sources is 53 ac-ft/yr for the Cypress split. Irrigation in Harrison County is projected to have a water supply deficit of 283 ac-ft/yr in 2030 and staying even to a deficit of 283 ac-ft/yr in 2080 for the Cypress split.

Irrigation in Harrison County, Sabine Basin has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer surface water from Sabine Run-of-River permit, and Cypress Run-of-River permit. The total rated available supply from these sources is 33 ac-ft/yr for the Sabine split. Irrigation in Harrison County is projected to have a water supply deficit of 191 ac-ft/yr in 2030 thru 2080 for the Sabine split.

Evaluated Strategies

Three alternative strategies were considered to meet the Harrison County Irrigation water supply shortages as summarized in the following table. Advanced conservation and water reuse was not considered because operational procedures for the existing irrigation is not available. Surface water alternatives were omitted since there is not a supply source within close proximity to the county with available supply. New wells in the Queen City Aquifer was identified as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for the Harrison County Irrigation, Cypress Basin, to meet their projected deficit of 283 ac-ft/yr in 2030 through 2080 would be to construct three water wells prior to 2030 as the deficits occur. The recommended supply source will be the Queen City Aquifer in Harrison County. Three wells with rated capacity of 100 gpm each would provide approximately 161 ac-ft/yr per year each or 283 ac-ft/yr.

The recommended strategy for the Harrison County Irrigation, Sabine Basin, to meet their projected deficit of 191 ac-ft/yr in 2030 from 2080 would be to construct one water well prior to 2030. The recommended supply source will be the Queen City Aquifer in Harrison County Sabine. One well with rated capacity of 100 gpm each would provide approximately 161 ac-ft/yr. The Queen City Aquifer in Harrison County Sabine is projected to have a more than ample supply availability to meet the needs of the Irrigation in Harrison County for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.10.3 Harrison County Mining

Description/Discussion of Needs

The Mining WUG in Harrison County is a split entity and has a total demand that is projected to be 2,691 ac-ft/yr in 2030 to 2080. Mining in Harrison County, Cypress has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer and Queen City Aquifer, and contract with Sabine River Authority for surface water from Lake Fork. The total rated available supply from these sources is 299 ac-ft/yr in 2030 increasing to 333 ac-ft/yr in 2080. Mining in Harrison County is projected to have a water supply deficit of 433 ac-ft/yr in 2030 and increasing to a deficit of 399 ac-ft/yr in 2080 for the Harrison Cypress split.

Mining in the Harrison County Sabine split has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer, surface water from Sabine Run-of-River permit, and contract with Sabine River Authority for surface water from Lake Fork. The total rated available supply from these sources is 540 ac-ft/yr in 2030 increasing to 576 ac-ft/yr in 2080. Mining in Harrison County is projected to have a water supply deficit of 1,419 ac-ft/yr in 2030 increasing to a deficit of 1,383 ac-ft/yr in 2080 for the Sabine split.

Evaluated Strategies

Four alternative strategies were considered to meet the Harrison County Mining water supply shortages as summarized in the following table. Advanced conservation and water reuse was not considered because operational procedures for the existing mines is not available. Surface water alternatives were omitted since there is not a supply source within close proximity to the county with available supply. Wells in the Queen City Aquifer (portions in the Cypress Creek and Sabine River basins) were identified and evaluated as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for the Harrison County Mining, Cypress Basin, to meet their projected deficit of 433 ac-ft/yr in 2030 and 416 ac-ft/yr in 2050 would be to construct two additional water wells similar to their existing wells just prior to each decade as the deficits occur to 2050. The recommended supply source will be the Queen City Aquifer in Harrison County Cypress. Two wells with rated capacity of 100 gpm each would provide approximately 161 ac-ft/yr each or 332 ac-ft/yr.

The recommended strategy for the Harrison County Mining, Sabine Basin, to meet their projected deficit of 1,419 ac-ft/yr in 2030 would be to construct one additional water well similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Queen City Aquifer in Harrison County Sabine. Nine wells with rated capacity of 100 gpm each would provide approximately 161 ac-ft/yr each or 1,452 ac-ft/yr. The Queen City Aquifer in Harrison County Sabine is projected to have a more than ample supply availability to meet the needs of the Mining in Harrison County for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.10.4 Panola-Bethany WSC

Description/Discussion of Needs

The Panola Bethany WSC is located in southeastern Harrison County and serves the communities of Panola and Bethany an area northeast of the City of Carthage. In 2018, the system had 545 residential connections. The population is projected to increase from 1,508 persons in 2020 to 3,407 persons in 2070. The WSC is included as a W.U.G. in Harrison County. The system's current water supply consists of five water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is 576 GPM, or 310 ac-ft/yr. The system is bounded on the north by Waskom Rural WSC, on the east by the State of Louisiana, on the south by the Deadwood WSC, and on the west by the City of Carthage. The WSC has a water conservation plan. Panola Bethany WSC is projected to have a water supply surplus of 12 ac-ft/yr in 2020 decreasing to a deficit of 332 ac-ft/yr in 2070.

Evaluated Strategies

Four alternative strategies were considered to meet the Panola Bethany WSC water supply shortages. Advanced conservation was not determined to be feasible because the per capita use per day was below the 140 gpcpd threshold set by the planning group. Water reuse was not determined to be feasible because the WSC does not have a sewer collection system. Surface water alternatives were omitted since there is not a supply source within close proximity to the WSC and surface water treatment is not economically feasible for a system of this size. Groundwater wells in the Queen City Aquifer (Sabine Basin) were identified as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for the Panola Bethany WSC to meet their projected deficit of 31 ac-ft/yr in 2030 and 332 ac-ft/yr in 2070 would be to construct six additional water wells similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Queen City Aquifer in Harrison County Sabine. One well with rated capacity of 100 gpm each would provide approximately 54 ac-ft/yr each or 324 ac-ft/yr total. The Queen City Aquifer in Harrison County Sabine is projected to have a more than ample supply availability to meet the needs of the Panola Bethany WSC for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.10.5 The City of Scottsville

Description/Discussion of Needs

The City of Scottsville is located in southeastern Harrison County and serves the incorporated city limits and an area immediately north, east, and south of the City of Scottsville. In 2018, the system had 480 residential connections. The population is projected to increase from 1,308 persons in 2030 to 1,887 persons in 2080. The City is included as a WUG. in Harrison County. The system's current water supply consists of three water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is 402 GPM, or 216 ac-ft/yr. The system is bounded on the east by the Waskom Rural Water WSC #1, on the south by Blocker Crossroads WSC, on the west by the City of Marshall, and the north by Leigh WSC. The City does not have a water conservation plan. The City of Scottsville is projected to have a water supply deficit of 122 ac-ft/yr in 2030 increasing to a deficit of 270 ac-ft/yr in 2080.

Evaluated Strategies

Four alternative strategies were considered to meet the City of Scottsville's water supply shortages. Advanced conservation was not considered because the per capita use per day was below the 140 gpcd threshold set by the planning group. Water reuse was not considered because the City does not have a central sewer collection system. Surface water alternatives were omitted since there is not a supply source within close proximity to the City and surface water treatment is not economically feasible for a system of this size. Wells in the Queen City Aquifer (Cypress Basin) in Harrison County were identified as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for the City of Scottsville to meet their projected deficit of 122 ac-ft/yr in 2030 and 270 ac-ft/yr in 2080 would be to construct one additional water well similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Queen City Aquifer in Harrison County Cypress. The Queen City Aquifer in Harrison County Cypress is projected to have more than ample supply availability to meet the needs of the City of Scottsville for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.11 Hopkins County

5.3.11.1 Brinker WSC

Description/Discussion of Needs

Brinker WSC provides water service in Hopkins County. It is projected that the users in the WUG will have a shortage in 2030. The WUG population is projected to be 2,591 by 2030 and increases to 3,066 by 2080. The WSC utilizes groundwater from the Carrizo-Wilcox aquifer and has a contract for water supply with City of Sulphur Springs for 77 ac-ft/yr. Brinker WSC is projected to have a deficit of 97 ac-ft in 2030, increasing to a deficit of 171 ac-ft by 2080.

Evaluated Strategies

Four alternative strategies considered to meet the WSC's water supply shortages. Advanced conservation was not selected because the WUG's overall supply is not projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Additional use of groundwater has been identified as a likely source of water for Brinker WSC in Hopkins County; however, projected needs exceed the availability of groundwater in the Sulphur basin based on the modeled available groundwater (MAG) estimates and review of available information from a local hydrogeological assessment. A potential strategy is purchase of additional surface water from Sulphur Springs Lake under the existing contract from the City of Sulphur Springs was also considered.

Recommendations

To meet the identified needs for Brinker WSC, the recommended strategy is to increase the existing surface water contract from the City of Sulphur Springs. This WUG has no projected unmet needs after WMS.

5.3.11.2 North Hopkins WSC

Description/Discussion of Needs

North Hopkins WSC serves a growing population, projected to increase from 9,220 in 2030 to 10,486 in 2080. The district currently relies on a wholesale water supply contract with Sulphur Springs, providing 921 ac-ft/yr from Chapman/Cooper Lake Reservoir. However, the total water demand is expected to rise from 1,152 ac-ft/yr in 2030 to 1,304 ac-ft/yr by 2080, resulting in a growing supply deficit. The projected shortage begins at 231 ac-ft/yr in 2030 and increases to 383 ac-ft/yr by 2080.

Evaluated Strategies

Four alternative strategies were considered to meet the North Hopkins WSC water supply shortages. Advanced conservation was not considered because the per capita use per day was below the 140 gpcd threshold set by the planning group. Water reuse was not considered because the WSC does not have a central sewer collection system. Groundwater strategies are not feasible. Surface water alternatives are considered potentially feasible.

Recommendations

To address the projected shortages, North Hopkins WSC is recommended to increase its existing contract with Sulphur Springs to secure an additional 383 ac-ft/yr from Chapman/Cooper Lake Reservoir within the Sulphur Basin. This increase will fully eliminate projected shortages in all decades, ensuring a reliable and adequate water supply for the service area through 2080.

5.3.11.3 Hopkins County Irrigation

Description/Discussion of Needs

The Irrigation WUG in Hopkins County has a demand that is projected to remain constant at 3,910 ac-ft/yr for the planning period. The Irrigation WUG in Hopkins County is supplied by groundwater from the Carrizo-Wilcox Aquifer and run-of-river diversions from the Sabine and Sulphur Rivers. A deficit of 3,787 ac-ft/yr is projected to occur throughout the planning period.

Evaluated Strategies

Three alternative strategies were considered to meet the projected shortages for Hopkins County Irrigation. Advanced water conservation for irrigation practices was not determined to be feasible, as present irrigation practices likely already incorporate many BMPs to extend water supplies, thus no additional conservation would be feasible. The use of reuse water from nearby municipalities is not feasible as it would not be effective to deliver reuse water to the distributed farm irrigation systems. Groundwater from the Carrizo-Wilcox aquifer from Sabine and Cypress basins has been identified as a potential source of water for irrigation in Hopkins County.

Recommendations

The recommended strategies for the Hopkins County Irrigation to meet their projected deficit of 3,787 ac-ft/yr would be to construct by 2030 twelve additional water wells with a rated capacity of 300 gpm in the portion of the Carrizo-Wilcox Aquifer located in Hopkins County in the Sulphur River Basin. This portion of the Carrizo-Wilcox Aquifer is projected to have sufficient source availability to only meet a portion of the projected irrigation demands for Hopkins County. It is thus recommended that by 2040 three additional water wells with a rated capacity of 300 gpm be constructed in the portion of the Carrizo-Wilcox Aquifer located in the Sabine River Basin in Hopkins County. This WUG has projected unmet needs of 3,744 ac-ft/yr in 2030 and 3,325 ac-ft/yr in 2080.

5.3.11.4 Hopkins County Livestock

Description/Discussion of Needs

The Livestock WUG in Hopkins County has a demand that is projected to remain constant at 4,253 ac-ft/yr for the planning period. The Livestock WUG in Hopkins County is supplied by groundwater from the Carrizo-Wilcox and Nacatoch Aquifers, livestock local supplies from the Cypress, Sulphur, and Sabine basins, and surface water purchased from Sulphur Springs. A deficit of 44 ac-ft/yr is projected to occur in 2030 increasing to 1,219 ac-ft/yr by 2070 in the Sulphur basin. In both the Cypress and Sulphur basins a surplus of 94 ac-ft/yr and 60 ac-ft/yr are projected by 2030 and 94 ac-ft/yr and 505 ac-ft/yr by 2080 respectively.

Evaluated Strategies

Seven alternative strategies were considered to meet the projected shortages for Hopkins County Livestock. Advanced water conservation for livestock practices was not determined to be feasible, as present livestock practices likely result in sale of the livestock to reduce demand and extend water supply. The use of reuse water is not feasible as there is no centralized water supply. Groundwater from the Nacatoch aquifer has been identified as a potential source of water for irrigation in Hopkins County; however, the total needs exceed the availability of groundwater in the Nacatoch Aquifer based on the modeled available groundwater (MAG) estimates. Groundwater from the Carrizo-Wilcox aquifer has been identified as a potential source of water for irrigation in Hopkins County. Increasing the existing contract with the City of Sulphur Springs was also considered as a potential alternative to meet projected demands.

Recommendations

The recommended strategy for the Hopkins County Livestock to meet their projected deficit of 44 ac-ft/yr would be to construct 13 additional water wells with a rated capacity of 75 gpm in the Carrizo-Wilcox/Sulphur/Hopkins aquifer. The recommended supply source will be the Carrizo-Wilcox Aquifer in Hopkins County, Sulphur River Basin. The portion of the Carrizo-Wilcox Aquifer in the Sulphur River Basin in Hopkins County is projected to have sufficient supply availability to meet the needs of Hopkins County Livestock over the planning period. This WUG has projected unmet needs of 34 ac-ft/yr in 2030 after WMS.

5.3.11.5 Miller Grove WSC

Description/Discussion of Needs

Miller Grove WSC provides water service in Hopkins County. It is projected that the users in the WUG will have a shortage in 2030. The WUG population is projected to be 1,384 by 2030 and increases to 1,654 by 2080. Miller Grove WSC utilizes groundwater from the Carrizo-Wilcox aquifer. Miller Grove WSC is projected to have a deficit of 36 ac-ft by 2030 increasing to 80 ac-ft by 2080.

Evaluated Strategies

Three alternative strategies were considered to meet the WSC’s water supply shortages. Advanced conservation was not selected because the WUG’s overall supply is not projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Additional use of groundwater has been identified as a potential source of water the WSC.

Recommendations

The recommended strategy for Miller Grove WSC to meet their projected deficit of 36 ac-ft/yr in 2030 and 80 ac-ft/yr in 2080 would be to construct two additional water wells with a rated capacity of 75 gpm in the Carrizo-Wilcox/Sulphur/Hopkins aquifer. Two wells with rated capacity of 75 gpm each would provide approximately 40 ac-ft/yr each. Construction of this well in the year preceding the decade of need would allow for sufficient provision of supply to meet the projected demands. This WUG has no projected unmet needs after WMS.

5.3.12 Hunt County

5.3.12.1 B H P WSC

Description/Discussion of Needs

B H P WSC provides water service in western Hunt County, southeastern Colin County and northeastern Rockwall County. The WUG population is projected to be 6,056 people in 2030 and 10,352 by the year 2080. The water supply for this WSC is treated surface water purchased from NTMWD, the source of whose supplies derive from the NTMWD system (i.e., indirect reuse via Lake Lavon and the NTMWD reservoir system) and the Sabine River Authority's system (i.e., Lake Fork and Lake Tawakoni). The WSC is projected to have a deficit of 53 ac-ft/yr in 2030 increasing to a deficit of 414 ac-ft/yr by 2080.

Evaluated Strategies

Multiple alternative strategies were considered to meet B H P WSC's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group; however, coordination with the Region C Planning Group will be further incorporated into the Final Plan. Reuse is not a feasible option because water supply is mainly used for public consumption. Potentially feasible strategies include an increase of the existing contract with NTMWD. Groundwater use from the portion of the Nacatoch Aquifer located in the Sabine River Basin in Hunt County was also evaluated as a potentially feasible strategy.

Recommendations

The recommended strategy for B H P WSC is to increase the existing contract with the NTMWD. This strategy is contingent upon Region C recommended strategies for the NTMWD.

5.3.12.2 Caddo Basin SUD

Description/Discussion of Needs

Caddo Basin SUD provides water service in western Hunt County and eastern Collin County. The WUG population is projected to be 18,175 in 2030 and 43,698 by the year 2080. The SUD purchases treated water from North Texas MWD and Farmersville. The SUD is projected to have a shortage beginning in 2030 based on the availability of current firm supplies from North Texas MWD. The SUD is projected to have a deficit of 198 ac-ft in 2030 increasing to a deficit of 2,615 ac-ft by 2080.

Evaluated Strategies

Six alternative strategies were considered to meet the SUD's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group; however, coordination with the Region C Planning Group indicates that conservation is a potential strategy for that portion of the WUG within the Region C planning area, thus conservation amounts identified by the Region C Planning Group have been incorporated herein for this WUG. Water reuse was not determined to be feasible because the SUD does not have a demand for non-potable water. Groundwater was considered, but the SUD has previously indicated that it currently purchases treated water from NTMWD and is planning to meet its future needs from water purchases. Thus, the SUD could potentially increase existing contracts with NTMWD. Another potentially feasible contract increase could be from the City of Farmersville. The SUD also has an existing emergency interconnect with the City of Greenville, thus, a contract with the City of Greenville was considered.

Recommendations

The recommended strategy for Caddo Basin SUD is to implement Advanced Water Conservation up to the amounts identified herein over the 2030-2080 planning period (consistent with preliminarily identified recommendations for conservation for this WUG for the 2026 Region C Plan), and to increase the existing contract with the NTMWD. This strategy is contingent upon Region C recommended strategies for the NTMWD. This WUG has projected unmet needs of 163 ac-ft/yr in 2030 and 1,633 ac-ft/yr in 2080 after WMS.

5.3.12.3 Cash SUD

Description/Discussion of Needs

Cash SUD provides water in the south-central portion of Hunt County and small areas of northwestern Rains County, western Hopkins County, and eastern Rockwall County from purchased surface water supplies from the North Texas Municipal Water District (NTMWD) and the Sabine River Authority for supplies out of Lake Fork and Lake Tawakoni. According to the contracts, NTMWD supplies 1,427 ac-ft/yr in 2030 and 2,466 ac-ft/yr in 2080, and Sabine River Authority provides a constant supply of 5,804 ac-ft/yr. Over 90% of the SUD’s demand is located in Region D (Hunt County), with less than 10% in Region C (Rockwall County). In both regions, the system is projected to serve a total of 23,510 people in 2030 and 39,330 people by the year 2080. Cash SUD is projected to have a supply surplus of 309 ac-ft/yr by 2030 and a deficit of 513 ac-ft/yr starting 2070 increasing to 970 ac-ft/yr by 2080.

Evaluated Strategies

Cash SUD has a contract with NTMWD for 1,457 ac-ft/yr. Additional supply comes from the SRA. Cash SUD operates its own water treatment plant within Region D to treat the supply from SRA. The water management strategies for Cash SUD include conservation, acquisition of additional supplies from NTMWD, including additional delivery infrastructure.

Recommendations

The NETRWPG recommends Cash SUD increase its’ existing contract with the NTMWD, contingent upon Region C NTMWD strategies. The NETRWPG supports the recommendation (as previously indicated by Region C for the purposes of the 2021 Plan) for construction of a new 16” transmission line from Fate to Union Valley, for an approximate cost of $6 million. The NETRWPG also supports the strategy recommendation from Region C for advanced water conservation for Cash SUD. This WUG has no projected unmet needs after WMS. They have a surplus of 995 ac-ft/yr in 2030 and 248 ac-ft/yr in 2080 after WMS.

5.3.12.4 The City of Celeste

Description/Discussion of Needs

The City of Celeste is a small public water supply located in northwest Hunt County. The system is projected to serve 826 people in 2030 and 996 people by the year 2080. The current sources of supply are two wells into the Woodbine Aquifer with production capacities of 150 gpm and 200 gpm. The City provides water to its own customers in the Sabine River Basin and is projected to have a water supply deficit of 14 ac-ft/yr in 2030 increasing to 35 ac-ft/yr by 2080.

Evaluated Strategies

Multiple alternative strategies were considered to meet Celeste's water supply shortages. Advanced conservation was not selected since per capita use is less than 140 gpcd. The purchase of surface water from the City of Greenville and construction of a treated water pipeline was identified as a potentially feasible strategy and evaluated. Additional supplies from the City of Greenville would be contingent upon City of Greenville water strategies. Pumping additional groundwater from the Woodbine Aquifer was also considered as an alternative for this entity. There is sufficient source availability in the Woodbine Aquifer through 2080, but if this alternative were to be implemented availability would be insufficient by 2070, which would necessitate a smaller contract and infrastructure for treated supply from the City of Greenville by 2070. Such an approach would be contingent upon recommended seller strategies for the City of Greenville.

Recommendations

The recommended strategy for the City of Celeste to meet their projected deficit of 14 ac-ft/yr in 2030 and 35 ac-ft/yr in 2080 would be to construct three additional water wells similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Woodbine Aquifer in Hunt County from Trinity basin. The portion of the Woodbine Aquifer in Hunt County within the Trinity River Basin is projected by Region D to have a more than ample supply availability to meet the needs of the City of Celeste through 2080.

It is recommended that the City of Celeste contract with the City of Greenville for treated water supply and construct a treated water pipeline with necessary infrastructure to convey this amount from the City of Greenville's system to the City of Celeste. This strategy is contingent upon the recommended seller strategies for the City of Greenville.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed. This WUG has no projected unmet needs after WMS.

5.3.12.5 The City of Greenville

Description/Discussion of Needs

The City of Greenville provides water service in Hunt County. The WUG population is projected to be 54,617 in 2030 increasing to 75,417 by the year 2080. The City of Greenville uses surface water from Greenville's city lake and purchases surface water out of Lake Tawakoni from the Sabine River Authority. This contract with SRA is for a constant supply of 21,283 ac-ft/yr which supplies 20,223 ac-ft/yr in 2030 and 19,465 ac-ft/yr in 2080. The City of Greenville sells water to the City of Caddo Mills, Shady Grove WSC and entities within Hunt County-Other, Manufacturing, and Steam Electric WUGs in Hunt County. The City of Greenville is projected to have a deficit of -12,829 ac-ft in 2030 increasing to -21,296 ac-ft by 2080.

Evaluated Strategies

Multiple alternative strategies have been identified and evaluated to meet the City of Greenville's water supply shortages. Advanced conservation is recommended as the gpcd associated with the projected population and demand is approximately 322 gpcd. The City of Greenville's 2019 water conservation plan utilizes a base per capita water use of 156 gpcd. Thus, the recommended advanced water conservation strategy is to achieve the identified per capita water use of 156 gpcd. Water reuse was not determined to be feasible because the City has not presently indicated an identified a demand for non-potable water. Groundwater was not determined to be feasible due to limited availability and the City's current utilization of surface water supplies.

Potentially feasible surface water strategies include the purchase of water out of Chapman Lake from either the City of Sulphur Springs and/or NTMWD, and purchase of raw water from the Sabine River Authority's proposed Toledo Bend Transfer. To utilize the City of Sulphur Springs supply from Chapman Lake, one strategy would necessitate that the City construct an intake structure, pump station, pipeline, and new Water Treatment Plant (WTP) to bring water from Chapman Lake to the City. The City is also presently evaluating the feasibility of a water swap whereby the City would obtain NTMWD supply from Chapman Lake (via construction of a tie-in pipeline to NTWMD's existing raw water line) in a 1-to-1 exchange for Greenville's supply from Lake Tawakoni. Since this strategy would not produce additional supply for the City, it has not been included herein as a feasible strategy to produce additional supply. However, given the identified need, a strategy to purchase supply from NTMWD and construct a tie-in pipeline has been identified and evaluated. Additionally, according to discussions with Region C, Phase 1 of the Toledo Bend Transfer is currently not being considered until 2070, and was thus not determined to be feasible a feasible alternative for Greenville until 2070.

Because the City of Greenville currently provides wholesale water to a number of entities in the surrounding area, shortages for Caddo Mills, Hunt County-Other, the City of Wolfe City (a potential new customer) and the City of Celeste (a potential new customer) were included in the analysis of needed supply for Greenville under the assumption that Greenville could sell treated and untreated water, as needed, to these other entities.

The City of Greenville's existing water treatment plant was expanded in 1993-1994 to a capacity of 13 MGD. Based on TWDB projections, the City will need to expand the WTP by 2030 to accommodate projected demand for the City and its customers. With an assumed peaking factor of 1.8, expanding the WTP to include an additional 15 MGD of capacity will ensure adequate capacity through 2060. By 2070, the City will need to construct an additional new WTP with a total production capacity of 15 MGD to meet projected demands of the City and its customers.
To meet projected demands for the City along with the other existing and potential customers, the City of Greenville would need to implement a voluntary reallocation of surplus supplies to Hunt County Manufacturing. The most recent water loss audit report shows a water loss of approximately 18.25% and RWPG recommends water loss mitigation.

Recommendations

The recommended strategies to meet the projected demands of the City of Greenville and its wholesale customers (both existing and identified potential future customers) first includes advanced water conservation efforts to reduce projected demand rate from 322 gpcd to 156 gpcd. By 2070, the voluntary reallocation of Hunt Manufacturing surplus supply is recommended as well as the construction of an additional 15 MGD WTP to provide additional treatment capacity. The planning group also recommends adopting a Water Loss Reduction strategy. This WUG has no projected unmet needs after WMS.

5.3.12.6 Hickory Creek SUD

Description/Discussion of Needs

Hickory Creek SUD provides water in northwestern Hunt County and small areas of eastern Collin and southern Fannin counties. The projected water groundwater availability limits this supply based on Modeled Available Groundwater (MAG) results. Over 90 percent of the SUD's demand is located in Region D (Hunt County), with less than 10 percent in Region C (Collin and Fannin Counties). In both regions, the system is projected to serve a total of 3,872 people in 2030 and 7,403 people by the year 2080. In Hunt County, Hickory Creek SUD is projected to have a water supply deficit of 224 ac-ft/yr by 2030 increasing to 766 ac-ft/yr by 2080. In Collin and Fannin Counties the projected deficit totals 34 ac-ft in 2030 increasing to 61 ac-ft by 2080.

Evaluated Strategies

Multiple alternative strategies were considered to meet Hickory Creek SUD's water supply shortages. The entities' water usage utilized for demand projections is 149 gpcd. The RWPG recommends conservation to reduce usage to a goal of 140 gpcd. There are no significant current water needs that could be met by water reuse. Groundwater from the Woodbine Aquifer was considered because the SUD is currently using this aquifer as the source of supply for the system. Full use of the existing system could meet projected demands through 2030; however, due to the limited availability of this groundwater source and lack of supporting available technical information, this aquifer is not projected to have sufficient supply to meet all of Hickory Creek SUD's shortage over the 2040-2080 period. Similarly, there are potentially available supplies from the Nacatoch Aquifer, however supplies are limited and insufficient considering other WUG's which may also seek to develop the supply. Additional supplies are limited from the Trinity Aquifer in Hunt County to satisfy the remainder of Hickory Creek SUD's needs.

Although the SUD has previously indicated that it would continue adding wells to meet future demands, given the aforementioned present limitations regarding groundwater source availability, surface water sources were investigated to meet long-term projected water needs for the SUD. The most recent water loss audit report shows a water loss of approximately 43.75% and RWPG recommends water loss mitigation.

Recommendations

Communications with Hickory Creek SUD have indicated that this WUG intends to meet projected water needs through Advanced conservation and Water Loss Mitigation.

In its' evaluation of potentially feasible strategies, the NETRWPG determined that the amounts needed would exceed the amounts identified by MAG amounts for aquifer sources proximate to the WUG. A subsequent process was then performed whereby the NETRWPG exercised its' authority to determine groundwater availability within the RWPA as established by Senate Bill 1101 (passed by the 84th Texas Legislature in 2015). Broadly, this law allows a RWPG to define all groundwater availability as long as there are no GCDs within the RWPA. As noted previously, this applies only to Region D.

Through this process, the TWDB's review identified modeled estimates of compatible groundwater availability for desired future conditions for relevant aquifers which in some instances limited the determined availability. These instances were identified by TWDB's modeling to potentially result in an impact to an adjacent area outside the RWPA that does have established DFCs.

While technically this has been identified as an unmet municipal need for the purposes of the 2026 Region D Plan, it is recognized by the NETRWPG that this WUG intends to meet its' regulatory requirements through a legally implementable WMS. This groundwater strategy is not recommended for the purposes of this 2026 Region D Plan due to the aforementioned limitations in the planning process.

To meet all applicable planning requirements, the NETRWPG considered all potentially feasible strategies including drought management, which are not recommended as they each would be insufficient to meet the projected needs while meeting TCEQ regulatory minimums. In the event of a repeat of the drought of record, the NETRWPG recognizes that the groundwater approach identified by the WUG is within their legal capability to meet projected needs in a manner that ensures public health, safety, and welfare over the planning horizon. It is further recognized that as the Joint Planning Process continues, future adjustments to availability may allow the opportunity to amend this Plan if deemed necessary in the future to address all or a portion of this unmet need. Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed. The NETRWPG supports any efforts and/or studies to further evaluate and characterize groundwater availability in Hunt County, and such efforts should be considered consistent with the purposes of the 2026 Region D Plan. This WUG has projected unmet needs of 61 ac-ft/yr in 2030 and 448 ac-ft/yr in 2080.

5.3.12.7 Hunt County Irrigation

Description/Discussion of Needs

Irrigation in Hunt County has a demand that is projected to remain constant at 316 ac-ft/yr for the planning period. The Irrigation WUG in Hunt County is supplied by groundwater from the Nacatoch Aquifer and run-of-river diversions from the Sabine and Sulphur Rivers. A deficit of 191 ac-ft/yr is projected to occur throughout the planning period. There is a deficit of 124 ac-ft/yr in Sabine basin, 69 ac-ft/yr in Sulphur basin and a surplus of 2 ac-ft/yr in Trinity throughout the planning period.

Evaluated Strategies

Three alternative strategies were considered to meet Hunt County Irrigation WUG’s water supply shortages. Advanced water conservation for irrigation practices were not determined to be feasible in this planning effort, as present irrigation practices likely already incorporate many BMPs to extend water supplies, thus no additional conservation would be feasible. The use of reuse water from nearby municipalities is not feasible as it would not be effective to deliver reuse water to farm irrigation systems. Groundwater has been identified as a potential source of water for irrigation in Hunt County.

Recommendations

The recommended strategy for the Hunt County Irrigation to meet their projected deficit of 191 ac-ft/yr from 2030 to 2080 would be to construct three water wells rated at 75 gpm prior to 2030. The recommended supply source will be the Nacatoch Aquifer in Hunt County. The Nacatoch Aquifer in Hunt County, in the Sabine River Basin, is projected to have sufficient supply availability to meet the needs of the Irrigation in Hunt County for the planning period.

5.3.12.8 North Hunt SUD

Description/Discussion of Needs

North Hunt SUD provides water service in Hunt, Fannin, and Delta counties. It is projected that North Hunt SUD will have a shortage in 2030. The WUG population is projected to be 2,661 in 2030 and 2,397 by the year 2080. The SUD has a contract for water supply with the City of Commerce for 663 ac-ft/yr which supplies 147 ac-ft/yr for 2030-2080 planning period, a well in Hunt County. In Hunt County, the SUD is projected to have a deficit of 172 ac-ft in 2030 decreasing to 115 ac-ft by 2080. The remainder of the SUD is projected to have a deficit of 22 ac-ft in 2030 increasing to 32 ac-ft by 2080.

Evaluated Strategies

Six alternative strategies were considered to meet North Hunt SUD's water supply shortages. Advanced conservation is considered. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater from the Woodbine Aquifer was considered because North Hunt SUD is currently using this aquifer as a source of supply for the system. However, due to the limited availability of this groundwater source, this aquifer will not be able to meet all of North Hunt SUD's shortage. Additional groundwater supplies are available from the Nacatoch Aquifer has been evaluated as well.
Additional purchase of water from the City of Commerce is another alternative; however, Commerce has only a limited volume, potentially available only if existing supplies to the Manufacturing WUG and the Delta County-Other WUG can be reallocated. A separate feasible strategy was considered to utilize surplus supply from Delta County MUD. The North Hunt SUD service area is contiguous with the service area for Delta County MUD, which purchases Big Creek Lake supply from the City of Cooper. North Hunt SUD could contract with the City of Cooper for water supplies from Big Creek Lake, transported via the existing connection between the City of Cooper and Delta County MUD. This strategy would require a pipeline connecting the two systems of sufficient size to provide available supplies and may require a permit amendment for additional yield potentially available from Big Creek Lake. The most recent water loss audit report shows a water loss of approximately 34.83% and RWPG recommends water loss mitigation.

Recommendations

The recommended strategy to adopt Water Loss mitigation and meet North Hunt SUD's needs is to construct twenty three (23) additional groundwater wells sufficient in capacity prior to the projected decadal need. The source of the groundwater supply is the portion of the Nacatoch Aquifer located in the Sabine Basin in Hunt County. Twenty three wells with rated capacity of 75 gpm each would provide approximately 40 ac-ft/yr each. Availability of groundwater supplies in the Nacatoch Aquifer located in the Sabine Basin in Hunt County are projected to be adequate to meet North Hunt SUD's projected needs over the planning period. This WUG has no projected unmet needs after WMS.

5.3.12.9 Poetry WSC

Description/Discussion of Needs

Poetry Water Supply Corporation (WSC) is located in southwestern Hunt County and northern Kaufman County and is situated in the Sabine and Trinity River Basins. Poetry WSC is projected to serve 3,867 people by 2030, and the population is expected to increase to 13,865 by the year 2080. The WSC's current source of supply is treated water purchased from the City of Terrell. Poetry WSC is projected to have a deficit of 39 ac-ft/yr in 2030, up to 777 ac-ft/yr in 2080.

Evaluated Strategies

Four strategies were considered to meet the water supply needs of Poetry WSC. There are no significant current water needs that could be met by water reuse. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group; however, coordination with the Region C Planning Group indicates that conservation is a potential strategy for that portion of the WUG within the Region C planning area, thus conservation amounts identified by the Region C Planning Group have been incorporated herein for this WUG. An identified feasible strategy is to increase the existing contract with Terrell via Sabine River Authority voluntary reallocation of Combined Consumers SUD surplus. The City of Terrell obtains a portion of its supply from Lake Fork via purchase from the Sabine River Authority. Combined Consumers SUD also purchases Lake Fork supply from the Sabine River Authority. A second feasible strategy is that since the City of Terrell also obtains a portion of its supply from the NTMWD reservoir system via purchase from the NTMWD, Cash SUD could increase its contract with the City of Terrell contingent upon a City of Terrell seller strategy to increase its contract with NTMWD, contingent upon recommended Region C NTMWD seller strategies. Development of groundwater supplies from the Nacatoch Aquifer, Sabine River Basin, was evaluated as a potentially cost-effective approach for this entity.

Recommendations

The recommended strategy for Poetry WSC to meet their projected deficit of 39 ac-ft/yr in 2030 and 777 ac-ft/yr in 2080 would be to implement advanced water conservation at the amounts identified herein. Secondly, it is recommended that Poetry WSC increase their existing contract with the City of Terrell, contingent upon a Region C seller strategy for the City of Terrell to increase its' contract with the NTMWD for supply from the NTMWD System, which would be contingent upon recommended Region C seller strategies for the NTMWD.

It is noted, however, that the City of Terrell (primarily located in Region C) could elect to increase its contract with SRA utilizing SRA supplies. Such an approach, if implemented by the City of Terrell and the SRA and/or recommended by Region C and/or Region I, should be considered consistent for this recommended WMS for the Poetry WSC for the purposes of the 2026 Region D Plan. This WUG has projected unmet needs of 27 ac-ft/yr in 2030 and 404 ac-ft/yr in 2080 after WMS.

5.3.13 Lamar County

5.3.13.1 Lamar County-Other

Description/Discussion of Needs

Lamar County-Other is comprised of M-J-C, Pattonville and Petty WSCs. The WUG population is projected to be 2,693 in 2030 and 2,647 by the year 2080. The entities comprising this WUG are supplied by groundwater from the Trinity and Woodbine Aquifers, and purchased surface water from Lamar County WSD. In Lamar County, the County-Other WUG is projected to have a deficit of 121 ac-ft in 2030 and increasing to a deficit of 113 ac-ft by 2080.

Evaluated Strategies

Six alternative strategies were considered to meet the WUG's water supply shortages. Advanced conservation was not selected because the WUG's overall supply is not projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater from the Trinity and Woodbine Aquifers has been identified as a potential source of water for Lamar County Other, although a local hydrogeological assessment performed by Region D did not identify sufficient available technical information to identify sufficient groundwater availability from these aquifers to meet the projected County-Other needs in Lamar County over the 2030-2080 planning period. The purchase of surface water from Pat Mayse from Lamar County WSD has also been identified as a potential water supply source.

Recommendations

The recommended strategy to meet Lamar County-Other needs is to increase the existing contract amounts with Lamar County WSD to meet projected Lamar County-Other needs over the 2030-2080 planning period.

5.3.13.2 Lamar County Irrigation

Description/Discussion of Needs

-----Irrigation WUG in Lamar County is projected to be supplied by surface water from run-of-river diversions from the Red River and groundwater from wells the Trinity and Woodbine Aquifers. Irrigation in Lamar County has a demand that is projected to be a constant 8,095 ac-ft/yr for the planning period 2030 through 2080. A deficit of 4,691 ac-ft/yr is projected to occur throughout the planning period 2030-2080.

Evaluated Strategies

Advanced water conservation for irrigation practices were not determined to be feasible in this planning effort, as present irrigation practices likely already incorporate many BMPs to extend water supplies, thus no additional conservation would be feasible. The use of reuse water from nearby municipalities is not feasible as it would not be effective to deliver reuse water to farm irrigation systems.

Groundwater was identified as a potential source of water for irrigation in Lamar County. Due to limitations of availability, the Woodbine and Trinity aquifers will not cover all shortages. A local hydrogeological assessment performed by Region D did not identify sufficient available technical information to determine additional groundwater source availability. New surface water rights were also evaluated as a potentially feasible strategy, however no firm supply could be identified. A purchase of raw water from the City of Paris was evaluated as a viable supplement to groundwater in order to meet projected demands. Alternatively, a purchase of all needed water from the City of Paris along with necessary construction of raw water conveyance infrastructure was evaluated as potentially feasible strategy.

Recommendations

The recommended strategy for the Lamar County Irrigation WUG to meet projected demands during the planning period is to purchase raw water from Pat Mayse and Crook Reservoirs through the City of Paris. Given the distribution of the Irrigation WUG, the recommended raw water pipeline is an assumed 18-mile long 14 inch pipeline from the City of Paris's raw water intake line. Construction of a project for Daisy Farms in southern Lamar County is a development of water supply consistent with this recommended strategy. This WUG still has unmet needs of 3,223 ac-ft/yr from 2030 to 2080 after WMS.

5.3.13.3 Lamar County Livestock

Description/Discussion of Needs

---Livestock WUG in Lamar County is projected to be supplied by groundwater from wells the Trinity and Woodbine Aquifers and local surface water supplies. Livestock in Lamar County has a demand that is projected to be a constant demand of 1,628 ac-ft/yr for 2030 through 2080. A deficit of 130 ac-ft/yr is projected to occur throughout the planning period in the Red and Sulphur River Basin.

Evaluated Strategies

Advanced water conservation for livestock practices was not determined to be feasible, as present livestock practices likely result in sale of the livestock to reduce demand and extend water supply. The use of reuse water from nearby municipalities is not feasible as the water may be used for livestock consumption. Groundwater was identified as a potential source of water for livestock in Lamar County; however, a local hydrogeologic assessment did not identify sufficient available information to justify additional groundwater source availability in Lamar County in adequate amounts to meet the identified projected needs in the Red River Basin. New surface water rights were also evaluated as a potentially feasible strategy but no firm run-of-river supply was identified. Purchase of raw water from the City of Paris or the Lamar County WSD were evaluated as potentially feasible strategies for the WUG.

Recommendations

The recommended strategy for the Lamar County Livestock WUG to meet projected needs during the planning period is to purchase water from Lamar County WSD. Given the distribution of the Livestock WUG, an assumed 18-mile long 8-inch diameter pipeline to meet the projected needs was developed using the UCM to represent a proximate raw water pipeline. If an alternative characterization of a raw water pipeline for this WUG is contemplated (e.g., alternative location, routing, sizing), it should be recognized as consistent with the 2026 Region D Plan.

5.3.14 Red River County

5.3.14.1 The City of Clarksville

Description/Discussion of Needs

The City of Clarksville is located in Red River County. The system is projected to serve 2,483 people through the planning period. The current sources of supply are wells into the Blossom Aquifer. Groundwater had previously been mixed with surface water from Langford Lake, however sedimentation has hindered its use as a water supply. Water quality issues with the groundwater (TDS) and surface water (turbidity) necessitate mixing of the supplies to meet Texas drinking water standards. The groundwater has over 1,000 ppm of dissolved solids including high levels of sodium, sulfate, and chloride. The City provides water to its own customers in the Sulphur basin and is projected to have a water supply deficit of 252 ac-ft/yr in 2030, due to sedimentation issues in Langford Lake. As the surface water supply for the City diminishes, the capability to mix the surface supply with the groundwater supply commensurately diminishes as well. Thus as surface supply diminishes, so too does the capability to utilize the City's existing groundwater supply. As noted in a 4 October, 2013 memorandum from the City's consultant, Murray, Thomas & Griffin, Inc. (MTG):

"Clarksville has no available surface water when a water level of 417.0 (2006 low water level) and a sediment level at 415.0 (2013 lake bottom) are considered. Each of these conditions has occurred during the past ten years. The surface water is necessary to address total volume needs as well as for blending with the ground water."

For the current regional plan the City's water supply is solely from groundwater, thus the estimated deficit is reflective of the current groundwater production and treatment capacity without mixing of surface water. The system does have a water conservation and drought management plan in place.

Evaluated Strategies

Multiple feasible strategies were considered to meet Clarksville's water supply shortages. Advanced conservation was not selected because Clarksville's supply would not be projected to meet TCEQ regulatory minimums. Furthermore, reduction in demand would not alleviate the aforementioned water quality issues with the City's projected supplies. There are no significant current water needs in Clarksville that could be met by water reuse. Additional groundwater pumping from the Blossom Aquifer in the Sulphur River Basin and Reverse Osmosis treatment of all of the City's existing groundwater supplies has also been considered. The City's existing surface water supply has been made unavailable due to sedimentation issues in Langford Lake, the City's sole existing surface water supply. The City has requested the consideration of multiple potential surface water strategies to meet Clarksville's water supply needs. Potentially feasible strategies evaluated include:

- Additional groundwater wells.
- Treated Water Pipeline to DeKalb – purchasing water from the City of Texarkana's available supply from Wright Patman Reservoir.
- Dredging of sediment from Langford Lake.
- Construction of a new surface water reservoir, Dimple Reservoir.
- Treated Water Pipeline to Detroit – purchasing water from the City of Paris (via Lamar County WSD) from Paris available supply.

The projected amount of firm supply necessary to meet the above projected demands differ due to the City's past methodology of mixing their surface and groundwater supplies at a ratio of 51 percent.

More detailed discussion on this evaluation can be found in Appendix C5-7.

Recommendations

To meet the City's projected deficit in 2030 it is recommended that Clarksville develop additional groundwater wells in the Blossom Aquifer and the associated water treatment capacity.

At present, considerable uncertainty exists in each of the identified feasible water management strategies for the City of Clarksville. The NETRWPG supports any efforts by the City of Clarksville to further study all potential strategies to identify the best approach for the City to meeting all of its future water supply needs, and such a study should be considered consistent with the 2026 North East Texas Regional Water Plan.

5.3.14.2 Red River County Irrigation

Description/Discussion of Needs

The Irrigation WUG in Red River County has a demand that is projected to be 3,783 ac-ft/yr in 2030 through 2080. Irrigation in Red River County is projected to be supplied by existing surface water from run-of-river diversions from the Red and Sulphur Rivers. A deficit of 2,469ac-ft/yr is projected to occur in 2030 through 2080 in the Sulphur Basin. In the Red River Basin, a deficit of 212 ac-ft/yr is projected for the planning period of 2030 through 2080.

Evaluated Strategies

Multiple alternative strategies were considered to meet the Red River County Irrigation WUG's water supply shortages. Advanced water conservation for irrigation practices were not determined to be feasible feasible, as amounts potentially saved would not provide sufficient savings to meet the projected needs over the planning period. The use of reuse water from nearby municipalities is not determined to be feasible as it would not be effective to deliver reuse water to farm irrigation systems.

Groundwater was identified as a potential source of water for irrigation in Red River County. A local hydrogeologic assessment was performed by Region D to assess source groundwater availability, as there is no GCD located within the Region. The assessment is based on source availabilities identified using availabilities identified and approved by the TWDB and the NETRWPG. Based on a relatively low average annual water level decline and the potential for high-productivity wells in the portion of the Nacatoch Aquifer located in the Sulphur River Basin in Red River County, it has been determined that most of the future projected needs can likely be met with additional irrigation wells. For the portion of the Trinity Aquifer located in the Sulphur River Basin in Red River County, the local hydrogeologic assessment did not identify sufficient available data to determine potential productivity.

Treated surface water purchased from Lamar County WSD was considered as a viable supplement to the additional groundwater in order to meet projected demands. Thus, purchasing sufficient treated surface water from Lamar County WSD to meet the entirety of the need was also considered as a possible strategy. Purchasing raw water from the City of Paris has also been considered as a possible strategy, with a higher capital cost but an anticipated lower annual cost. The City's surface water permit for Pat Mayse Reservoir, as amended, allows for the interbasin transfer and use of water in both the Red and Sulphur River basins. However, the use of water via this permit would require a minor amendment to add irrigation as a permitted use.

Recommendations

As no regulatory entity exists within Region D to enforce the MAG limitations, and no Groundwater Conservation District presently exists within the Region D planning area, Region D performed a local hydrogeologic assessment to determine availability. The assessment is based on source availabilities identified using availabilities identified and approved by the TWDB and the NETRWPG. Based on this assessment, it is recommended that by 2030 the Red River County Irrigation WUG drill new wells in the portions of the Nacatoch Aquifer in Red River County located in the Sulphur River Basin to meet 2,681 ac-ft/yr of projected needs for the WUG over the planning period. The Region D analysis indicates that 1,450ac-ft/yr is available from the Nacatoch Aquifer in the Sulphur Basin in Red River County. In the Nacatoch Aquifer, it is recommended that nine wells with a rated capacity of 200 gpm to meet most of the needs, while the remaining 97 ac-ft remains unmet. Construction of wells with the capability to produce these amounts would be sufficient to meet the majority of projected needs for the WUG. An alternative strategy reflecting more groundwater wells to access the additional supply beyond the source availability determined by the MAG has been developed to meet the remaining 97 ac-ft/yr for the purposes of the 2026 Region D Plan.

5.3.15 Smith County

5.3.15.1 East Texas MUD

Description/Discussion of Needs

The East Texas MUD system is located in north Smith County and serves the unincorporated area of the County northeast of the City of Tyler. The population is projected to increase from 2,934 persons in 2030 to 4,690 persons in 2080. The MUD is included as a W.U.G. in Smith County. The system's current water supply consists of two water wells from the Carrizo-Wilcox Aquifer and one water well from the Queen City Aquifer. The total rated capacity of these wells is approximately 2,850 GPM, or 1,532 ac-ft/yr. The system is bounded on the north by the Lindale Rural WSC, on the south and west by the City of Tyler, and on the east by the Starrville-Friendship WSC. The System does have a water conservation plan. The System is projected to have a water supply surplus of 204 ac-ft/yr in 2030 decreasing to a deficit of 586 ac-ft/yr in 2080. A location map is included as Attachment A.

Evaluated Strategies

Four alternative strategies were considered to meet the WSC's water supply shortages as summarized in the following table. Advanced conservation was not considered because the per capita use per day was below the 140 gpcpd threshold set by the planning group. Water reuse was not considered because the system does not have a demand for non-potable water. Surface water alternatives were omitted since surface water treatment is not economically feasible for a system of this size. A groundwater worksheet is included as Attachment B.

Recommendations

The recommended strategy for the East Texas MUD to meet their projected deficit of 9 ac-ft/yr in 2040 and deficit of 586 ac-ft/yr in 2080 would be to construct six additional water wells similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Queen City Aquifer in Smith County. One well with rated capacity of 200 gpm each would provide approximately 108 ac-ft/yr each. The Queen City Aquifer in Smith County is projected to have a more than ample supply availability to meet the needs of East Texas MUD for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.15.2 Pine Ridge WSC

Description/Discussion of Needs

The Pine Ridge WSC system is located in northwestern Smith County and eastern Van Zandt County. The WSC serves the unincorporated area northeast of the City of Van and east of the City of Grand Saline. The WSC reported 611 connections. The population is projected to increase from 1,967 persons in 2030 to 3,173 persons in 2080. The WSC is included as a split WUG in Van Zandt and Smith Counties. The system's current water supply consists of four water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is approximately 669 GPM, or 360 ac-ft/yr. The system is bounded on the north by the Golden WSC, on the west by the Pruitt Sandflat WSC, on the south by the Carroll WSC and on the east by the Lindale Rural WSC. The System does have a water conservation plan. The system is projected to have a water supply surplus of 118 ac-ft/yr in 2030 decreasing to a deficit of 29 ac-ft/yr in 2080.

Evaluated Strategies

Four alternative strategies were considered to meet the WSC's water supply shortages as summarized in the following table. Advanced conservation was not considered because the per capita use per day was below the 140 gpcpd threshold set by the planning group. Water reuse was not considered because the system does not have a central sewer collection system. Surface water alternatives were omitted since there is not a supply source within close proximity to the system and surface water treatment is not economically feasible for a system of this size. Groundwater wells in the Carrizo-Wilcox Aquifer (Sabine Basin) in Smith County were identified as a potentially feasible strategy for the WSC.

Recommendations

The recommended strategy for the Pine Ridge WSC to meet their projected deficit of 2 ac-ft/yr in 2070 and deficit of 29 ac-ft/yr in 2080 would be to construct one additional water well similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Carrizo Wilcox Aquifer in Smith County. One well with rated capacity of 50 gpm would provide approximately 27 ac-ft/yr. The Carrizo Wilcox Aquifer in Smith County is projected to have a more than ample supply availability to meet the needs of Pine Ridge WSC for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.15.3 Smith County MUD 1

Description/Discussion of Needs

The Smith County MUD 1 system is located in north Smith County and serves the unincorporated area of the County northeast of the City of Tyler. The population is projected to increase from 2,033 persons in 2020 to 4,008 persons in 2070. The MUD is included as a WUG in Smith County. The system's current water supply consists of four water wells from the Carrizo-Wilcox Aquifer and two water wells from the Queen City Aquifer. The total rated capacity of these wells is approximately 1,864 GPM, or 1,156 ac-ft/yr. The system is bounded on the north by the Lindale Rural WSC, on the south and west by the City of Tyler, and on the east by the Starrville-Friendship WSC. The System does have a water conservation plan. The System is projected to have a water supply surplus of 246 ac-ft/yr in 2020 decreasing to a deficit of 609 ac-ft/yr in 2070.

Evaluated Strategies

Four alternative strategies were considered to meet the WSC's water supply shortages. Advanced conservation was not determined to be feasible because the per capita use per day was below the 140 gpcd threshold set by the planning group. Water reuse was not determined to be feasible because the system does not have a demand for non-potable water. Surface water alternatives were omitted since surface water treatment is not economically feasible for a system of this size. Groundwater wells in the Queen City Aquifer (Sabine Basin) were identified as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for the Smith County MUD 1 to meet their projected deficit of 13 ac-ft/yr in 2040 and deficit of 609 ac-ft/yr in 2070 would be to construct six additional water wells similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Queen City Aquifer in Smith County. One well with rated capacity of 200 gpm each would provide approximately 108 ac-ft/yr each. The Queen City Aquifer in Smith County is projected to have a more than ample supply availability to meet the needs of Smith County MUD 1 for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.15.4 The City of Winona

Description/Discussion of Needs

The City of Winona system is located in northeastern Smith County and serves the incorporated area of the City. The city reported 398 residential connections. The population is projected to increase from 597 people in 2030 to 818 people in 2080. The City is included as a WUG. in Smith County. The system's current water supply consists of two water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is approximately 320 GPM, or 169 ac-ft/yr. The system is bounded on the north, west, and south by the Sand Flat WSC and on the east by the Star Mountain WSC. The System does not have a water conservation plan. The system is projected to have a water supply deficit of 11 ac-ft/yr in 2030 decreasing to a deficit of 77 ac-ft/yr in 2080.

Evaluated Strategies

Four alternative strategies were considered to meet the City's water supply shortages as summarized in the following table. Advanced conservation was not considered because the per capita use per day was below the 140 gpcd threshold set by the planning group. Water reuse was not considered because the system does not have a demand for non-potable water. Surface water alternatives were omitted since there is not a supply source within close proximity to the system and surface water treatment is not economically feasible for a system of this size. Groundwater wells in the Carrizo-Wilcox Aquifer (Sabine River Basin) were identified as a potentially feasible strategy for the City.

Recommendations

The recommended strategy for the City to meet their projected deficit of 11 ac-ft/yr in 2030 and deficit of 77 ac-ft/yr in 2080 would be to construct one additional water well similar to their existing wells just prior to 2030. The recommended supply source will be the Carrizo Wilcox Aquifer in Smith County. One well with rated capacity of 150 gpm would provide approximately 80 ac-ft/yr. The Carrizo Wilcox Aquifer (Sabine River Basin) in Smith County is projected to have a more than ample supply availability to meet the needs of Winona for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.16 Titus County

5.3.16.1 Titus County Manufacturing

Description/Discussion of Needs

Manufacturing in Titus County has a demand that is projected to increase from 4,455 ac-ft/yr in 2030 to 5,348 ac-ft/yr by 2080. Manufacturing in Titus County is currently supplied by groundwater from the Carrizo-Wilcox Aquifer, direct reuse, and surface water from Tankersley and Bob Sandlin purchased from the City of Mount Pleasant. A surplus of 1,077 ac-ft/yr is projected to occur in 2030 and decrease to 214 ac-ft/yr by 2080. They also have surface water contract with City of Mount Pleasant for 3,345 ac-ft/yr in 2030 and 3,651 ac-ft/yr in 2080.

Evaluated Strategies

Multiple alternative strategies were considered to meet the Titus County Manufacturing WUG's water supply shortages. Advanced water conservation for manufacturing is a potentially feasible strategy in this planning effort to reduce overall demands. The use of reuse water from nearby municipalities was not determined to be feasible in this planning period beyond those amounts currently reported by manufacturing entities in the county. Groundwater can be a potential source of water for manufacturing in Titus County; however, manufacturing needs exceed the availability of groundwater in the basin based on the modeled available groundwater estimates. Surface water was considered as a potential alternative to meet projected demands, both individually, and in conjunction with drilling new wells.

Recommendations

The recommended strategies for the Titus County Manufacturing WUG to meet projected demands starting in 2030 is to implement advanced conservation measures (via industrial water audits). It is projected that advanced conservation could produce up to 415 ac-ft of savings by the year 2080.

5.3.16.2 Titus County Steam Electric Power Generation

Description/Discussion of Needs

Steam Electric Power in Titus County has a demand that is projected to be a constant 29,541 ac-ft/yr for 2030 through 2080. Steam Electric Power in Titus County is currently supplied by groundwater from the Carrizo-Wilcox Aquifer, and surface water from Monticello, Lake O' the Pines, and Welsh purchased from Northeast Texas MWD and surface water from Bob Sandlin purchased from Titus County FWD #1. A deficit of 1,198 ac-ft/yr is projected to occur in 2040 and increase to 5,693 ac-ft/yr by 2080.

Evaluated Strategies

With Pirky Power Plant decommissioned reducing the demand for Titus County Steam Electric by approximately 12,679 ac-ft/yr, there is sufficient supply to meet the needs of the existing Welsh power plant. As such it is recommended that the remaining need be left unmet for the 2026 Regional Water Plan.

Recommendations

The recommended strategies for the Titus County Steam Electric WUG to meet projected demands starting in 2030 is to purchase additional supply from the NETMWD, which has sufficient surplus supplies in excess of existing and projected customer demands to meet these projected needs. Existing generation facilities in Titus County are presently served by Lake Bob Sandlin and Lake O' the Pines, so major infrastructure is already in place. Unit costs have been calculated for the purchase of these supplies based on presently available information, and are utilized herein to present an order of magnitude estimation of present potential cost.

5.3.17 Upshur County

5.3.17.1 Big Sandy

Description/Discussion of Needs

The City of Big Sandy is located in southwest corner of Upshur County and serves the incorporated area of the City. The City reported 788 residential connections. The population is projected to decrease from 1,124 people in 2030 to 1,081 people in 2080. The System is included as a W.U.G. in Upshur County. The system's current water supply consists of three water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is 460 GPM, or 247 ac-ft/yr. The system is bounded on the north and east by the Pritchett WSC and on south by the Sabine River and on the west by the Fouke WSC. The System does not have a water conservation plan. The System is projected to have a water supply deficit of 19 ac-ft/yr in 2030 increasing to a deficit of 8 ac-ft/yr in 2080. A location map is included as Attachment A.

Evaluated Strategies

Four alternative strategies were considered to meet the City of Big Sandy's water supply shortages as summarized in the following table. Advanced conservation was not considered because the city's supply does not meet TCEQ requirements. Water reuse was not considered because the system does not have a sewer collection system. Surface water alternatives were omitted since there is not a supply source within close proximity to the system and surface water treatment is not economically feasible for a system of this size. A groundwater worksheet is included as Attachment B.

Recommendations

The recommended strategy for the City of Big Sandy to meet their projected deficit of 20 ac-ft/yr in 2040 and 8 ac-ft/yr in 2080 would be to construct one additional water well similar to their existing wells prior to 2030. The recommended supply source will be the Carrizo Wilcox Aquifer in Upshur County. One well with a rated capacity of 80 gpm would provide approximately 43 ac-ft/yr. The Carrizo Wilcox Aquifer in Upshur County is projected to have a more than ample supply availability to meet the needs of the City of Big Sandy for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.17.2 East Mountain Water System

Description/Discussion of Needs

The City of East Mountain is located in the southern portion Upshur County and serves the incorporated area of the City. The City reported 777 residential connections. The population is projected to decrease from 1,124 people in 2030 to 1,081 people in 2080. The System is included as a WUG. in Upshur County. The system's current water supply consists of three water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is 460 GPM, or 247 ac-ft/yr. The system is bounded on the north and east by the Pritchett WSC and on south by the Sabine River and on the west by the Fouke WSC. The System does not have a water conservation plan. The System is projected to have a water supply deficit of 175 ac-ft/yr in 2030, decreasing to a deficit of 163 ac-ft/yr in 2080. A location map is included as Attachment A.

Evaluated Strategies

Four alternative strategies were considered to meet the City of East Mountain's water supply shortages as summarized in the following table. Advanced conservation was not considered because the city's supply does not meet TCEQ requirements. Water reuse was not considered because the system does not have a sewer collection system. A Surface water purchase contract through the City of Longview will be utilized to solve the water shortage.

Recommendations

The recommended strategy for the City of East Mountain to meet their projected deficit of 175 ac-ft/yr in 2030 and 163 ac-ft/yr in 2080 would be to purchase surface water from the City of Longview.

5.3.17.3 Upshur County Manufacturing

Description/Discussion of Needs

The Manufacturing WUG in Upshur County has a demand that is projected to be increasing from 85 ac-ft/yr in 2030 to 101 ac-ft/yr in 2080. Manufacturing in Upshur County has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer. The total rated available supply from these sources is 926 ac-ft/yr. Manufacturing in Upshur County is projected to have a water supply deficit of 79 ac-ft/yr in 2030 increasing to a deficit of 95 ac-ft/yr in 2080.

Evaluated Strategies

Three alternative strategies were considered to meet the Upshur County Manufacturing water supply shortages. Advanced conservation and water reuse was not determined to be feasible because operational procedures for the existing mines is not available. Surface water alternatives were omitted since the deficiency is not significant enough to warrant surface supply. Groundwater wells in the Carrizo-Wilcox Aquifer (Cypress Creek River Basin) were identified as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for the Upshur County Manufacturing to meet their projected deficit of 79 ac-ft/yr in 2030 and 95 ac-ft/yr in 2080 would be to construct one additional water well in the area just prior to each decade as the deficits occur. The recommended supply source will be the Carrizo Wilcox Aquifer in Upshur County. One well with rated capacity of 100 gpm would provide approximately 161 ac-ft/yr. The Carrizo Wilcox Aquifer in Upshur County is projected to have a more than ample supply availability to meet the needs of the Manufacturing in Upshur County for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.18 Van Zandt County

5.3.18.1 The City of Canton

The City of Canton provides water service in Van Zandt County. The city's population is projected to be 5,415 by 2030 and increasing to 8,644 by 2080. The City of Canton utilizes groundwater from the Carrizo-Wilcox aquifer, and surface water from Mill Creek Reservoir and a run of river water right for water supplies. The City of Canton is not projected to have a shortage during the planning period.

Description/Discussion of Needs

In 2008, the Canton City council authorized the appropriation of $70,000 to prepare a long-term water plan. The project evaluated four (4) reservoir sites in Van Zandt County. Two of the four proved to be feasible from a technical standpoint. The City spent an additional $30,000 in 2009 and 2010 to address questions and provide additional information requested by the committee members. In addition to these two long-term strategies, two additional water wells were included to satisfy short-term needs. These two additional wells have been completed. Additional groundwater supply is a potentially feasible strategy. Water reuse is a potentially feasible water supply strategy, as the City currently has a water rights application pending at the TCEQ for the authorization of indirect reuse. At the previous request of the City of Canton, the construction of an additional water well by 2020 was identified as a feasible strategy because the City of Canton is planning on developing additional groundwater supply to supplement existing supplies. Also at the request of the City, a potential new reservoir on Grand Saline Creek was also considered as a feasible strategy for the City.

Evaluated Strategies

At the request of the City of Canton, the construction of an additional water well by 2020 was identified as a feasible strategy because the City of Canton is planning on developing additional groundwater supply to supplement existing supplies. Costing analyses for this strategy are based on the amount of requested supply, although no need was identified for the present round of planning.

New Reservoir on Grand Saline Creek – The City has identified a feasible strategy to meet future water supply needs as being the construction of a new 1,845 acre (24,980 ac-ft) reservoir on Grand Saline Creek, a tributary of Sabine River. This reservoir project was originally described in a 2008 report from Gary Burton Engineering, Inc. to the City of Canton, entitled Long-Term Water Study Surface Water Supply. The 2008 report identified the project site, reservoir surface area, drainage area, and estimated construction costs for the reservoir, intake structure, transmission pipeline, and water treatment plant expansion.

The construction costs associated with the new reservoir, raw water transmission line, and water treatment plant expansion are based on calculations from the UCM. For the 2026 planning process, the reservoir has been modeled in the Sabine River WAM (Run 3), subject to SB 3 environmental flow criteria at a junior priority date, and modeled considering the full demand of existing water rights in the Sabine River Basin. The results of this WAM analysis indicate the project has a firm yield of 1,440 ac-ft per year. The project is estimated to yield 1,440 ac-ft/yr of supply by constructing a new 24,980 ac-ft reservoir and 14" pipeline to Canton's WTP and expanding the WTP, for a total project cost of $63 million with an annual cost of $3.9 million and a unit cost for the additional supply of $2,152 per ac-ft. with debt service and $265 per ac-ft without debt service.

Recommendations

The recommended strategy for the City of Canton is to construct by 2020 an additional water well similar to existing wells in the area. The recommended supply source will be the Carrizo-Wilcox Aquifer in the Sabine Basin in Van Zandt County. The Carrizo-Wilcox Aquifer in Van Zandt County is projected to have sufficient supply availability to provide this supply for the planning period.

A second recommended water conservation strategy option is the utilization of both direct and indirect water reuse. The City of Canton has submitted an application to the TCEQ to secure a water right for indirect reuse and may also seek to secure an authorization for direct reuse. These recommendations are based upon current NETRWPG population projections for the City of Canton.

Because of substantial disagreement over future population and water demands, the City has requested the following alternate strategy:

> The strategy to meet future needs "is with surface water from a proposed reservoir on Grand Saline Creek. The City of Canton has provided to NETRWPG resolutions from three other cities in Van Zandt County supporting the reservoir project. This show of support indicates that a regional surface water reservoir could possibly replace the groundwater strategies for other Van Zandt County public water supplies with projected deficits. However, due to the time typically required to obtain the necessary permits to impound surface water, the City plans to construct one or two additional wells, or implement a reuse option in the interim to meet increasing demands due to population growth and the First Monday influence."

This alternative wording should be considered consistent with this plan in the event that population growth in the potential service area significantly exceeds current NETRWPG projections.

5.3.18.2 Edom WSC

Description/Discussion of Needs

Edom WSC provides water service in Van Zandt and Henderson Counties. The WUG population is projected to be 1,271 by 2030 and increases to 1,346 by 2080. Edom WSC supplies its customers with groundwater from the Carrizo-Wilcox aquifer with water wells in Van Zandt County. Edom WSC is projected to have a total deficit of 67 ac-ft/yr in 2030 and increasing to a deficit of 87 ac-ft/yr by 2080; the shortage projected to occur in Van Zandt County is 46 ac-ft/yr in 2030 increasing to 60 ac-ft/yr by 2080. The shortage in Henderson County is 21 ac-ft/yr in 2030, increasing to 27 ac-ft/yr in 2080.

Evaluated Strategies

Four alternative strategies were considered to meet the WSC's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Water reuse was not determined to be feasible because the WSC does not have a demand for non-potable water. Surface water was not determined to be feasible because the WSC does not currently have surface water treatment. Groundwater has been identified as a potential strategy for Edom WSC.

Recommendations

The recommended strategy for Edom WSC to meet their projected deficit of 67 ac-ft/yr in 2030 up to 87 ac-ft/yr in 2080 would be to construct three additional water wells similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Carrizo-Wilcox Aquifer in the Neches Basin in Van Zandt County. One well with rated capacity of 50 gpm each, pumping at an approximately depth of 560 ft., would provide approximately 27 ac-ft/yr each.

5.3.18.3 Little Hope Moore WSC

Description/Discussion of Needs

Little Hope Moore WSC provides water service in Van Zandt County. The WUG population is projected to be 478 by 2030 and increases to 1,745 by 2080. Little Hope Moore WSC supplies its customers with groundwater from the Carrizo-Wilcox aquifer in Van Zandt County. Little Hope Moore WSC is projected to have a total deficit of 12 ac-ft/yr in 2030 and increasing to a deficit of 48 ac-ft/yr by 2080.

Evaluated Strategies

Four alternative strategies were considered to meet the WSC's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Water reuse was not determined to be feasible because the WSC does not have a demand for non-potable water. Surface water was not determined to be cost effective because the WSC does not currently have surface water treatment. Groundwater has been identified as a potential strategy for Little Hope Moore WSC.

Recommendations

The recommended strategy for Little Hope Moore WSC to meet their projected deficit of 12 ac-ft/yr in 2030 and 48 ac-ft/yr in 2080 would be to construct an additional water well similar to their existing wells. The recommended supply source will be the Carrizo-Wilcox Aquifer in the Neches Basin in Van Zandt County. One well with rated capacity of 50 gpm each, pumping at an approximately depth of 560 ft., would provide approximately 27 ac-ft/yr each.

5.3.18.4 Van Zandt County Manufacturing

Description/Discussion of Needs

The Manufacturing WUG in Van Zandt County has a demand that is projected to increase from 556 ac-ft/yr in 2030 to 667 ac-ft/yr by 2080. Manufacturing in Van Zandt County is supplied by groundwater from the Carrizo-Wilcox Aquifer, purchased groundwater from Grand Saline, and surface water from run-of-river permits on the Sabine River, a permit for diversion from Lake Tawakoni. A deficit of 344 ac-ft/yr is projected to occur in 2030, increasing to 453 ac-ft/yr by 2080.

Evaluated Strategies

Six Eight alternative strategies were considered to meet the Van Zandt County Manufacturing WUG's water supply shortages. Advanced water conservation for manufacturing was considered in this planning effort to reduce overall demands; however, it does not resolve all identified needs. The use of reuse water from nearby municipalities was not determined to be feasible at present. Surface water was not determined to be a viable alternative to meet projected demands because no supplies are readily available in the proximity of the identified needs. Groundwater has been identified as a potential source of water for manufacturing in Van Zandt County. In addition, groundwater supplies can be contracted from City of Grand Saline and Golden WSC. ty

Recommendations

The recommended strategy for Manufacturing in Van Zandt County is implementation of advanced water conservation (via industrial water audits) by 2030. Implementation of this water management strategy is estimated to conserve up to 67 ac-ft/yr (i.e. 10 percent of projected demand). Additionally, it is recommended that by 2030 the Manufacturing WUG in Van Zandt County construct an additional six water wells. The recommended supply source will be the Carrizo-Wilcox Aquifer in the Trinity River Basin in Van Zandt County. Six wells with rated capacities of 75 gpm each would provide up to approximately 504 ac-ft/yr. The Carrizo-Wilcox Aquifer in Van Zandt County is not projected to have sufficient supply availability to provide this supply throughout the planning period.

5.3.18.5 Livestock in Van Zandt County

Description/Discussion of Needs

The Livestock WUG in Van Zandt County has a demand that is projected to remain constant at 1,934 ac-ft/yr throughout the planning period. This WUG is currently supplied by groundwater from the Carrizo-Wilcox Aquifer and local livestock supplies from the Neches, Sabine, and Trinity River Basins. The total available supply is projected to range from 1,776 ac-ft/yr in 2030 to 1,771 ac-ft/yr in 2080, resulting in a projected deficit of 158 ac-ft/yr in 2030, increasing slightly to 163 ac-ft/yr by 2080.

Evaluated Strategies

Three alternative strategies were considered to meet the Van Zandt County Livestock WUG's water supply shortages. Groundwater from the Carrizo-Wilcox and Queen City aquifers has been identified as a potential source of water for irrigation in Van Zandt. Surface water has been evaluated as a potential water source.

Recommendations

The recommended strategy for Irrigation in Van Zandt County is to construct by 2030 two additional water wells similar to existing wells in the area. The recommended supply source will be the Queen City Aquifer in the Neches River Basin in Van Zandt County. Two wells with rated capacity of 150 gpm would provide the needed 163 ac-ft/yr. The Queen City Aquifer in Van Zandt County is projected to have sufficient supply availability to provide this supply for the planning period.

5.3.18.6 R-P-M WSC

Description/Discussion of Needs

R-P-M WSC provides water service in Van Zandt, Henderson and Smith Counties. The WUG population is projected to be 2,099 by 2030 and decreases to 1,951by 2080. R-P-M WSC supplies its customers with groundwater from the Carrizo-Wilcox and Queen City aquifers with five water wells in Van Zandt County. R-P-M WSC is projected to have a total deficit of 21 ac-ft/yr in 2030 decreasing to a deficit of 14 ac-ft/yr by 2080; the shortage projected to occur in Van Zandt County is 21 ac-ft/yr in 2030 decreasing to 14 ac-ft/yr by 2080. The shortages in Henderson County and Smith County are 0 ac-ft/yr from 2030 to 2080. - --

Evaluated Strategies

Four alternative strategies were considered to meet the WSC's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. However, the Region I RWPG did identify demand reduction as a feasible strategy. Water reuse was not determined to be feasible because the WSC does not have a demand for non-potable water. Surface water was not determined to be feasible because the WSC does not currently have surface water treatment. Groundwater has been identified as a potential strategy for R-P-M WSC.

Recommendations

The recommended strategy for R-P-M WSC to meet their projected deficit of 21 ac-ft/yr in 2030 and 14 ac-ft/yr in 2080 would be to construct nine additional water wells similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Carrizo-Wilcox Aquifer in the Neches Basin in Van Zandt County. Nine wells with rated capacity of 50 gpm each, pumping at an approximately depth of 560 ft., would provide approximately 27 ac-ft/yr each.

5.3.19 Wood County

5.3.19.1 Sabine River Authority Strategy

Sabine River Authority (SRA) seeks to augment available surface water supplies for SRA customers downstream of Lake Fork with groundwater so that upstream surface water supplies can be utilized for upstream customer demands. This strategy entails the development and construction of a 18,500 ac-ft/yr well field in Wood County and transmission pipe from the well field to the Sabine River for discharge and bed and banks transport and pickup by downstream SRA customers such as Henderson, Kilgore and Longview, utilizing potentially available supply from the Carrizo-Wilcox Aquifer, Sabine River Basin.

The Wood County Well Field would be designed to provide up to 18,500 ac-ft of water per year from the Carrizo-Wilcox Aquifer by an estimated total of 20 wells with peak production capacity of 600 gpm. A single well with a peak capacity of 600 gpm could provide up to 968 ac-ft per year of water per well, with three (3) contingency wells for a total of 23 wells. The Carrizo-Wilcox Aquifer in Wood County, in the Sabine River Basin, is projected to be MAG limited with a MAG limited supply of approximately 2,900 ac-ft/yr. Water from the well field would be pumped to the Sabine River via a 36" diameter pipeline and discharged into the Sabine River for bed and banks transport to downstream customers.

Given significant present uncertainty regarding the extent of participation in this strategy and lack of details regarding the specific infrastructure necessary to meet actual participant water demands, it should be recognized that the strategy as represented herein is a planning-level characterization. Variations as to the specific developers and users of this project, as well as variations in the characteristics of the project's infrastructure, should be considered consistent with this water management strategy for the purposes of the 2026 Region D Plan. The NETRWPG supports additional study of this regionalization water management strategy, and such studies or technical evaluations should also be considered consistent for the purposes of the 2026 Region D Plan. Participation in this strategy would be on a voluntary basis.

5.3.19.2 Liberty Utilities Silverleaf Water

Description/Discussion of Needs

The Liberty Utilities Silverleaf Water system is located in the south central portion of Wood County and serves the unincorporated area of the County north of the City of Hawkins. The population is projected to increase from 3,319 persons in 2030 to 4,159 persons in 2080. The WSC is included as a W.U.G. in Wood County. The system's current water supply consists of eleven water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is approximately 631 GPM, or 1,018 ac-ft/yr. The system is bounded on the south and west by Fouke WSC, on the east by the Pritchett WSC. The System does not have a water conservation plan. The System has a demand that is projected to increase from 877 ac-ft/yr in 2030 to 1,099 ac-ft/year in 2080.

Evaluated Strategies

Four alternative strategies were considered to meet the WSC's water supply shortages as summarized in the following table. Advanced conservation was not considered because the per capita use per day was below the 140 gpcpd threshold set by the planning group. Water reuse was not considered because the system does not have a central sewer collection system. Surface water alternatives were omitted since there is not a supply source within close proximity to the system and surface water treatment is not economically feasible for a system of this size.

Recommendations

The recommended strategy for the Liberty Utilities Silverleaf Water to meet their projected deficit of -38 ac-ft/yr in 2070 and deficit of 81 ac-ft/yr in 2080 would be to construct an additional water well similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Queen City Aquifer in Wood County. One well with rated capacity of 100 gpm would provide approximately 161 ac-ft/yr. The Queen City Aquifer in Wood County is projected to have a more than ample supply availability to meet the needs of Liberty Utilities Silverleaf Water WSC for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.3.19.3 Wood County Mining

Description/Discussion of Needs

The Mining WUG in Wood County has a projected water demand that increases slightly from 347 ac-ft/yr in 2030 to 353 ac-ft/yr by 2080. The primary water supply source for this WUG is groundwater from the Queen City Aquifer, which is expected to provide between 309 ac-ft/yr in 2030 and 328 ac-ft/yr in 2080. This results in an initial supply deficit of 38 ac-ft/yr in 2030, which gradually decreases to 25 ac-ft/yr by 2080 due to minor increases in available supply.

Evaluated Strategies

Multiple strategies were considered to address the projected shortages for the Mining WUG in Wood County. Water conservation measures were reviewed but were determined to have limited applicability in mining operations. Additionally, the feasibility of developing new water wells in Queen City and Sabine Aquifers was assessed as a long-term solution to supplement existing supplies.

Recommendations

To mitigate the projected shortages, it is recommended to drill new water wells in the Queen City and Sabine Aquifers, which are expected to provide up to 38 ac-ft/yr starting in 2030. Water loss reduction is considered as a potential option, with a projected reduction of 53 ac-ft/yr in 2030, increasing to 54 ac-ft/yr by 2040 and beyond. These strategies will help eliminate the projected shortages and provide additional surplus throughout the planning period. After implementation, the Mining WUG in Wood County is expected to have an available surplus of 53 ac-ft/yr in 2030, increasing to 67 ac-ft/yr by 2080.

5.3.19.4 Wood County Manufacturing

Description/Discussion of Needs

The Manufacturing WUG in Wood County has a demand that is projected to be increasing from 2,912 ac-ft/yr in 2030 to 3,493 ac-ft/yr in 2080. Manufacturing in Wood County has a current water supply from Carrizo-Wilcox Aquifer. The total rated available supply from this source is 1,502 ac-ft/yr. Manufacturing in Wood County is projected to have a water supply deficit of 1,410 ac-ft/yr in 2030 increasing to a deficit of 1,991 ac-ft/yr in 2080.

Evaluated Strategies

Four alternative strategies were considered to meet the Wood County Manufacturing water supply shortages. Advanced conservation and water reuse was not determined to be feasible because operational procedures for the existing mines are not available. Surface water alternatives were determined to be infeasible as there is not a cost-effective surface water supply source within close proximity to the county with available supply. Groundwater wells in the Queen City Aquifer (Sabine River Basin) were identified as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for the Wood County Manufacturing to meet their projected deficit of 1,410 ac-ft/yr in 2030 and 1,991 ac-ft/yr in 2080 would be to construct ten additional water wells similar to other wells in the area just prior to each decade as the deficits occur. The recommended supply source will be the Queen City Aquifer in Wood County. Ten wells with rated capacity of 100 gpm each would provide approximately 161 ac-ft/yr each or 1,610 ac-ft/yr. The Queen City Aquifer in Wood County is projected to have more than ample supply availability to meet the needs of the Manufacturing in Wood County for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a reevaluation completed.

5.4 WWP and WUG Seller Strategies

Presented herein are recommended strategies for WWPs and WUG Sellers, as shown in Table 5.15. The recommended strategies herein represent strategies that WWPs and WUG sellers are recommended to employ to meet projected needs for customers. As noted previously, strategies entailing the voluntary reallocation of supply have been identified to more efficiently utilize existing supplies that have been determined, for the purposes of the Regional Water Planning process, to be contracted to a present WUG in excess of the projected demands for that WUG. The recommended reallocations are projected to provide sufficient supply to meet identified needs for customers of the WWP/WUG seller. These recommendations are for the voluntary reallocation of supply. No entity should be required to participate. Also presented herein, for ease of reference, is an aggregation of all recommended strategies related to a given WWP or WUG Seller, as shown in Table 5.16. If a recommendation is made for a WUG to engage with either a WWP or WUG Seller, these recommended strategies are presented within this table by WWP/WUG Seller.

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Table 5.15 WWP/MWP and WUG Seller Strategies

County	Entity (WUG Basin)	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (If Applicable)	Supply Source			
		2030	2040	2050	2060	2070	2080				Ground-water	Surface Water	County	Basin
Hopkins	Cash SUD	0	0	0	0	-28	-35	Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	-	North Texas MWD	-	Marvin Nichols Lake/Reservoir	Reservoir	Sulphur
		0	0	1	1	1	1							
Hopkins	Cash SUD	0	0	0	0	-28	-35	NTMWD - Additional Measures to Access Full Lavon Yield	-	North Texas MWD	-	North Texas MWD Lake/Reservoir System	Reservoir	Trinity
		1	2	0	1	8	8							
Hopkins	Cash SUD	0	0	0	0	-28	-35	NTMWD - Interim Upper Sabine Basin	-	North Texas MWD	-	Fork Lake/Reservoir	Reservoir	Sabine
		0	0	0	0	0	0							
Hopkins	Cash SUD	0	0	0	0	-28	-35	NTMWD - Interim Upper Sabine Basin	-	North Texas MWD	-	Tawakoni Lake/Reservoir	Reservoir	Sabine
		0	0	0	0	0	0							
Hopkins	Cash SUD	0	0	0	0	-28	-35	NTMWD - Lake of The Pines (Cypress Basin Supplies)	-	North Texas MWD	-	O' the Pines Lake/Reservoir	Reservoir	Cypress
		0	0	0	0	0	0							
Hopkins	Cash SUD	0	0	0	0	-28	-35	NTMWD - lake of the Pines (Manufacturing Morris)	-	North Texas MWD	-	O' the Pines Lake/Reservoir	Reservoir	Cypress
		0	0	0	0	0	0							
Hopkins	Cash SUD	0	0	0	0	-28	-35	NTMWD - Sabine Creek Reuse	-	North Texas MWD	-	Indirect Reuse	Van Zandt	Sabine
		0	0	0	0	0	0							
Hopkins	Cash SUD	0	0	0	0	-28	-35	NTMWD - Texoma Blending	-	North Texas MWD	-	North Texas MWD Lake/Reservoir System	Reservoir	Trinity
		0	0	1	1	1	1							
Hunt	Cash SUD	0	0	0	0	-272	-579	Advanced Water Conservation (Cash SUD)	-		-			
		0	1	1	0	0	0							
Hunt	Cash SUD	0	0	0	0	-272	-579	Increase Existing Contract (Cash SUD)	-	North Texas MWD	-	North Texas MWD Lake/Reservoir System	Reservoir	Trinity
		416	568	642	471	337	337							
Hunt	Cash SUD	0	0	0	0	-272	-579	Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	-	North Texas MWD	-	Marvin Nichols Lake/Reservoir	Reservoir	Sulphur
		0	0	248	296	257	257							
Hunt	Cash SUD	0	0	0	0	-272	-579	NTMWD - Additional Lavon Watershed Reuse	-	North Texas MWD	-	Indirect Reuse	Collin	Trinity
		0	0	19	46	60	60							
Hunt	Cash SUD	0	0	0	0	-272	-579	NTMWD - Additional Measures to Access Full Lavon Yield	-	North Texas MWD	-	North Texas MWD Lake/Reservoir System	Reservoir	Trinity
		226	282	195	229	109	109							
Hunt	Cash SUD	0	0	0	0	-272	-579	NTMWD - Expanded Wetland Reuse	-	North Texas MWD	-	Indirect Reuse	Collin	Trinity
		15	23	20	28	27	27							
Hunt	Cash SUD	0	0	0	0	-272	-579	NTMWD - Expanded Wetland Reuse	-	North Texas MWD	-	Indirect Reuse	Kaufman	Trinity
		1	17	16	27	32	32							
Hunt	Cash SUD	0	0	0	0	-272	-579	NTMWD - Interim Upper Sabine Basin	-	North Texas MWD	-	Fork Lake/Reservoir	Reservoir	Sabine
		0	0	0	0	0	0							
Hunt	Cash SUD	0	0	0	0	-272	-579	NTMWD - Interim Upper Sabine Basin	-	North Texas MWD	-	Tawakoni Lake/Reservoir	Reservoir	Sabine
		0	0	0	0	0	0							

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County	Entity (WUG Basin)	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (If Applicable)	Supply Source			
		2030	2040	2050	2060	2070	2080				Ground-water	Surface Water	County	Basin
Hunt	Cash SUD	0	0	0	0	-272	-579	NTMWD - Lake of The Pines (Cypress Basin Supplies)	-	North Texas MWD	-	O' the Pines Lake/Reservoir	Reservoir	Cypress
		0	0	0	0	0	0							
Hunt	Cash SUD	0	0	0	0	-272	-579	NTMWD - lake of the Pines (Manufacturing Morris)	-	North Texas MWD	-	O' the Pines Lake/Reservoir	Reservoir	Cypress
		0	0	0	0	0	0							
Hunt	Cash SUD	0	0	0	0	-272	-579	NTMWD - Sabine Creek Reuse	-	North Texas MWD	-	Indirect Reuse	Van Zandt	Sabine
		0	0	0	0	0	0							
Hunt	Cash SUD	0	0	0	0	-272	-579	NTMWD - Texoma Blending	-	North Texas MWD	-	North Texas MWD Lake/Reservoir System	Reservoir	Trinity
		0	92	148	176	175	175							
Hunt	Cash SUD	0	0	0	0	-272	-579	Wright Patman Reallocation for NTMWD AND TRWD	-	North Texas MWD	-	Wright Patman Lake/Reservoir	Reservoir	Sulphur
		0	0	0	0	88	88							
Rains	Cash SUD	0	0	0	0	-133	-163	Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	-	North Texas MWD	-	Marvin Nichols Lake/Reservoir	Reservoir	Sulphur
		0	0	6	6	4	4							
Rains	Cash SUD	0	0	0	0	-133	-163	NTMWD - Additional Lavon Watershed Reuse	-	North Texas MWD	-	Indirect Reuse	Collin	Trinity
		0	0	0	1	1	1							
Rains	Cash SUD	0	0	0	0	-133	-163	NTMWD - Additional Measures to Access Full Lavon Yield	-	North Texas MWD	-	North Texas MWD Lake/Reservoir System	Reservoir	Trinity
		8	9	6	5	46	46							
Rains	Cash SUD	0	0	0	0	-133	-163	NTMWD - Expanded Wetland Reuse	-	North Texas MWD	-	Indirect Reuse	Collin	Trinity
		0	1	1	1	0	0							
Rains	Cash SUD	0	0	0	0	-133	-163	NTMWD - Expanded Wetland Reuse	-	North Texas MWD	-	Indirect Reuse	Kaufman	Trinity
		0	0	0	1	1	1							
Rains	Cash SUD	0	0	0	0	-133	-163	NTMWD - Interim Upper Sabine Basin	-	North Texas MWD	-	Fork Lake/Reservoir	Reservoir	Sabine
		0	0	0	0	0	0							
Rains	Cash SUD	0	0	0	0	-133	-163	NTMWD - Interim Upper Sabine Basin	-	North Texas MWD	-	Tawakoni Lake/Reservoir	Reservoir	Sabine
		0	0	0	0	0	0							
Rains	Cash SUD	0	0	0	0	-133	-163	NTMWD - Lake of The Pines (Cypress Basin Supplies)	-	North Texas MWD	-	O' the Pines Lake/Reservoir	Reservoir	Cypress
		0	0	0	0	0	0							
Rains	Cash SUD	0	0	0	0	-133	-163	NTMWD - lake of the Pines (Manufacturing Morris)	-	North Texas MWD	-	O' the Pines Lake/Reservoir	Reservoir	Cypress
		0	0	0	0	0	0							
Rains	Cash SUD	0	0	0	0	-133	-163	NTMWD - Sabine Creek Reuse	-	North Texas MWD	-	Indirect Reuse	Van Zandt	Sabine
		0	0	0	0	0	0							
Rains	Cash SUD	0	0	0	0	-133	-163	NTMWD - Texoma Blending	-	North Texas MWD	-	North Texas MWD Lake/Reservoir System	Reservoir	Trinity
		0	2	3	3	3	3							
Rains	Cash SUD	0	0	0	0	-133	-163	Wright Patman Reallocation for NTMWD AND TRWD	-	North Texas MWD	-	Wright Patman Lake/Reservoir	Reservoir	Sulphur
		0	0	0	0	1	1							
Hunt	Greenville	-12,829	-15,468	-17,138	-18,569	-20,046	-21,296	Advanced Water Conservation (Greenville)	-	-	-	-	-	-
		1,668	4,040	6,716	9,517	12,562	13,572							

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County	Entity (WUG Basin)	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (If Applicable)	Supply Source			
		2030	2040	2050	2060	2070	2080				Ground-water	Surface Water	County	Basin
Hunt	Greenville	-12,829 631	-15,468 709	-17,138 754	-18,569 792	-20,046 831	-21,296 869	Greenville Water Loss Reduction	-	-	-	-	-	-
Hunt	Greenville	-12,829 12,571	-15,468 12,571	-17,138 12,571	-18,569 12,571	-20,046 12,571	-21,296 12,571	New WTP Greenville	-	-	-	Tawakoni Lake/Reservoir	Reservoir	Sabine
Hunt	Greenville	-12,829 455	-15,468 455	-17,138 455	-18,569 455	-20,046 455	-21,296 455	Voluntary Reallocation of Hunt Manufacturing Surplus (Greenville, Tawakoni)	-	-	-	Tawakoni Lake/Reservoir	Reservoir	Sabine
Bowie	Hooks	-317 317	-313 313	-310 310	-305 305	-301 301	-296 296	Riverbend Strategy	-	Riverbend Water Resources District	-	Wright Patman Lake/Reservoir	Reservoir	Sulphur
Bowie	Riverbend Water Resources District	-211 211	-209 209	-206 206	-203 203	-200 200	-196 196	Riverbend Strategy	-	Riverbend Water Resources District	-	Wright Patman Lake/Reservoir	Reservoir	Sulphur
Bowie	Riverbend Water Resources District	-169 169	-166 166	-165 165	-162 162	-159 159	-157 157	Riverbend Strategy	-	Riverbend Water Resources District	-	Wright Patman Lake/Reservoir	Reservoir	Sulphur
Bowie	Texarkana	-840 840	-832 832	-825 825	-813 813	-802 802	-790 790	Riverbend Strategy	-	Riverbend Water Resources District	-	Wright Patman Lake/Reservoir	Reservoir	Sulphur
Bowie	Texarkana	-5,929 5,929	-5,870 5,870	-5,824 5,824	-5,741 5,741	-5,657 5,657	-5,572 5,572	Riverbend Strategy	-	Riverbend Water Resources District	-	Wright Patman Lake/Reservoir	Reservoir	Sulphur

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Table 5.16 Recommended Customer Strategies by WWP/WUG Seller

Entity	Strategy	2030	2040	2050	2060	2070	2080
NETMWD Total		**154**	**171**	**207**	**253**	**310**	**310**
Harleton WSC	Increase Existing Contract (Harleton, Cypress)	74	91	127	173	230	230
Holly Springs WSC	Increase Existing Contract (Holly Springs, Cypress)	80	80	80	80	80	80
NTMWD Total		**686**	**1,023**	**1,348**	**1,344**	**1,216**	**1,218**
Cash SUD	Advanced Water Conservation (Cash SUD)	0	1	1	0	0	0
Cash SUD	Conservation - Cash SUD	0	1	2	3	5	7
Cash SUD	Conservation, Water Loss Control - Cash SUD	1	1	0	0	0	0
Cash SUD	Increase Existing Contract (Cash SUD)	416	568	642	471	337	337
Cash SUD	Region C NTMWD Firm up existing contracts	269	452	703	870	874	874
Greenville Total		**15,325**	**17,775**	**20,496**	**23,335**	**26,419**	**27,467**
Greenville	Advanced Water Conservation (Greenville)	1,668	4,040	6,716	9,517	12,562	13,572
Greenville	New WTP Greenville	12,571	12,571	12,571	12,571	12,571	12,571
Greenville	Voluntary Reallocation of Hunt Manufacturing Surplus (Greenville, Tawakoni)	455	455	455	455	455	455
Greenville	Greenville Water Loss Reduction	631	709	754	792	831	869
Kilgore Total		**10**	**19**	**21**	**25**	**28**	**32**
Kilgore	Kilgore - Municipal Conservation	10	19	21	25	28	32
Lamar County WSD Total		**821**	**829**	**841**	**851**	**861**	**861**
County-Other Lamar	Increase Existing Contract	204	212	224	234	244	244
Livestock, Lamar	Lamar Livestock Pipeline and Contract with Lamar Co WSD	617	617	617	617	617	617
Mount Pleasant Total		**1,003**	**880**	**890**	**1,149**	**1,279**	**1,279**
Manufacturing Titus	Increase Existing Contract	1,003	880	890	1,149	1,279	1,279
Paris Total		**1,468**	**1,468**	**1,468**	**1,468**	**1,468**	**1,468**
Irrigation Lamar	Pat Mayse Raw Water Pipeline	1,468	1,468	1,468	1,468	1,468	1,468
Hooks Total		**260**	**274**	**291**	**310**	**329**	**349**
Burns Redbank WSC	Riverbend Strategy	260	274	291	310	329	349
Riverbend Water Resources District Total		46,729	72,915	79,480	87,544	95,613	97,226
Riverbend Water Resources District	Riverbend Strategy	380	375	371	365	359	353
Atlanta	Riverbend Strategy Cass County	1,075	1,135	1,209	1,206	1,206	1,206

Entity	Strategy	2030	2040	2050	2060	2070	2080
County-Other, Cass	Riverbend Strategy Cass County	44	44	44	44	44	44
Texarkana	Riverbend Strategy	6,769	6,702	6,649	6,554	6,459	6,362
Central Bowie County WSC	Riverbend Strategy	769	769	776	783	790	797
De Kalb	Riverbend Strategy	266	263	261	257	254	250
Hooks	Riverbend Strategy	317	313	310	305	301	296
Macedonia Eylau MUD 1	Riverbend Strategy	710	705	698	688	677	666
Manufacturing, Bowie	Riverbend Strategy	33,545	59,867	66,446	74,669	82,893	84,666
Maud	Riverbend Strategy	164	162	161	158	156	153
Nash	Riverbend Strategy	314	309	306	302	297	292
New Boston	Riverbend Strategy	1,390	1,297	1,285	1,265	1,245	1,225
Redwater	Riverbend Strategy	337	333	329	323	317	311
Wake Village	Riverbend Strategy	649	641	635	625	615	605
Sabine River Authority Total		**2,652**	**2,659**	**2,664**	**2,641**	**3,569**	**3,536**
MacBee SUD	Increase Contract	0	0	0	0	967	968
Sabine River Authority	Sabine River Authority Strategy - Wood County GW	1,686	1,693	1,699	1,687	1,665	1,646
Longview	Sabine River Authority Strategy - Wood County GW	966	966	965	954	937	922
Kilgore	Sabine River Authority Strategy - Wood County GW	720	727	734	733	728	724
Sulphur Springs Total		**0**	**0**	**12**	**47**	**112**	**112**
Brinker WSC	Increase Existing Contract (Brinker WSC, Sulphur)	0	0	12	47	83	83
Martin Springs WSC	Increase Existing Contract (Martin Springs)	0	0	0	0	29	29

5.5 Unmet Needs

Unmet needs have been identified in the North East Texas Region for the purposes of the 2026 Region D Plan, as presented in Table 5.17 below. Detailed analyses of the strategy evaluations for these entities can be found in Appendix C5-7. A discussion of these unmet needs is provided below, with the following entities' needs reflecting portions of the WUG located outside the region.

Table 5.17 Unmet Needs in the 2026 North East Texas Regional Water Plan

WUG Name	2030	2040	2050	2060	2070	2080
B H P WSC	0	-53	-79	-61	-34	-91
Caddo Basin SUD	-164	-650	-1116	-1358	-1362	-1648
Cash SUD	0	0	0	0	-132	-282
East Mountain Water System	-241	-210	-175	-138	-130	-127
Hickory Creek SUD	-61	-117	-185	-261	-349	-448
Irrigation, Harrison	-150	-156	-161	-172	-178	-184
Irrigation, Hopkins	-3373	-3373	-3373	-3373	-3373	-3373
Irrigation, Lamar	-3223	-3223	-3223	-3223	-3223	-3223
Irrigation, Rains	-3	-3	-3	-3	-3	-3
Irrigation, Red River	-1231	-1231	-1230	-1230	-1230	-1230
Lindale Rural WSC	0	0	0	-22	-89	-156
Livestock, Lamar	-83	-83	-83	-83	-83	-83
MacBee SUD	0	0	0	-5	0	-38
Manufacturing, Camp	-38	-39	-41	-43	-45	-47
Manufacturing, Gregg	0	0	0	0	-44	-105
Manufacturing, Upshur	-48	-50	-51	-53	-54	-57
Mining, Harrison	-1151	-1183	-1216	-1302	-1333	-1383
Pine Ridge WSC	0	0	0	0	-5	-29
Poetry WSC	-29	-103	-150	-251	-435	-575
Scottsville	-41	0	0	0	0	0
Sharon WSC	-4	-4	-4	-4	-4	-4
Steam-Electric Power, Titus	0	-1198	-2458	-3143	-4433	-5693
Western Cass WSC	-11	-11	-11	-11	-11	-11
Winona	0	0	-2	-11	-20	-29

5.5.1 B H P WSC

BHP WSC is projected to have unmet water needs from 2040-2080. To address shortages, the recommended strategy is to increase the existing contract with the North Texas Municipal Water District (NTMWD). However, this strategy is contingent upon the implementation of Region C's recommended strategies for NTMWD.

Despite this planned approach, the strategy alone is not sufficient to fully meet BHP WSC's projected water demands. Additional water management strategies will need to be explored to ensure a reliable water supply. Future considerations may include securing alternative water sources, enhancing conservation efforts, or expanding infrastructure capacity. Moving forward, the Regional Water Planning Group will continue to evaluate and refine strategies to address these unmet needs.

5.5.2 Cash SUD

Cash SUD is projected to experience unmet water needs beginning in 2070, with deficits reaching 132 ac-ft/yr and increasing to 282 ac-ft/yr by 2080.

To address these shortages, the recommended strategy is to increase the existing contract with the North Texas Municipal Water District (NTMWD). However, this strategy is contingent upon the successful implementation of Region C's recommended strategies for NTMWD.

While this approach provides an avenue for additional water supply, it may not fully address potential future shortfalls. The RWPG will continue evaluating alternative supply options and long-term strategies to ensure reliable water availability for Cash SUD.

5.5.3 Caddo Basin SUD

Caddo Basin SUD is projected to experience significant unmet water needs from 2030 through 2080, with deficits starting at 164 ac-ft/yr in 2030 and increasing to 1,648 ac-ft/yr by 2080. To address shortages, the recommended strategies include increasing the existing contract with NTMWD and implementing conservation measures. While these strategies provide additional water supply, they are not sufficient to fully cover the projected deficits in earlier decades. The persistent shortfalls indicate that additional measures may be necessary to ensure a reliable water supply for the region.

The RWPG will continue to assess and refine strategies to alleviate these unmet needs. Moving forward, alternative supply options, infrastructure expansions, and enhanced conservation efforts will be explored to help bridge the supply-demand gap and secure long-term water reliability for Caddo Basin SUD.

5.5.4 East Mountain Water System

East Mountain Water System is projected to experience unmet water needs throughout the planning period, starting with a deficit of 241 ac-ft/yr in 2030 and decreasing to 127 ac-ft/yr by 2080. The declining trend indicates that conservation efforts and supply optimization may help alleviate shortages over time. To address this, the RWPG recommends conservation efforts aimed at reducing water usage to a goal of 140 gpcd.

While conservation efforts can help reduce demand, the projected supply from these strategies is not sufficient to fully meet East Mountain Water System's needs, especially in the earlier years. The ongoing deficits highlight the need for further strategies to ensure reliable water supply in the long term.

The RWPG will continue to assess and refine additional strategies, including exploring alternative supply options, expanding infrastructure, and implementing further conservation measures, to alleviate these unmet needs and secure a sustainable water future for East Mountain Water System.

5.5.5 Hickory Creek SUD

Hickory Creek SUD is projected to have growing unmet water needs from 2030 through 2080, with shortages increasing from 61 ac-ft/yr in 2030 to 448 ac-ft/yr by 2080. The rising trend suggests that proactive planning and additional water supply strategies will be necessary.

In addition to water loss reduction, the RWPG emphasizes the importance of water conservation to further alleviate demand. Currently, Hickory Creek SUD's water usage is 149 gpcd, exceeding the target of 140 gpcd. Despite these combined efforts—water loss reduction and conservation measures—Hickory Creek SUD will continue to face unmet needs throughout the planning period.

As a result, the RWPG will continue to assess and evaluate additional strategies to address these deficits. Ongoing monitoring and adjustments to water management strategies will be essential, and the RWPG will consider further recommendations, including exploring additional sources of supply, such as the development of new wells or regional partnerships, to ensure the long-term sustainability and reliability of the water supply for Hickory Creek SUD.

5.5.6 Irrigation, Harrison

Irrigation water users in Harrison County are projected to experience unmet water needs from 2030 through 2080, with deficits starting at 150 ac-ft/yr in 2030 and increasing to 184 ac-ft/yr by 2080.

To address shortages, the recommended strategies include drilling new wells in the Queen City Aquifer within the Cypress and Sabine basins. These groundwater sources are expected to provide an additional 525 ac-ft/yr of supply in 2030, gradually decreasing to 491 ac-ft/yr by 2080.

While these strategies help alleviate the deficits, they may not fully address long-term water reliability challenges. The RWPG will continue to evaluate alternative supply options, optimize groundwater use, and explore conservation measures to support sustainable irrigation needs in Harrison County.

5.5.7 Irrigation, Hopkins

Irrigation water users in Hopkins County are projected to experience substantial unmet water needs from 2030 through 2080, with a persistent deficit of 3,373 ac-ft/yr across all decades. To address shortages, the recommended strategies focus on drilling new wells in the Carrizo-Wilcox Aquifer across the Sabine and Sulphur basins. These groundwater sources are expected to provide an additional 414 ac-ft/yr of supply per decade.

While these strategies contribute to mitigating water shortages, they are insufficient to fully meet the projected irrigation demands. The RWPG will continue to assess additional supply options, infrastructure expansions, and conservation measures to enhance water reliability for irrigation users in Hopkins County.

5.5.8 Irrigation, Lamar

Irrigation water users in Lamar County face a significant and consistent water shortage of 3,223 ac-ft/yr per decade from 2030 through 2080. To address shortages, the recommended strategy includes the development of a raw water pipeline from Pat Mayse Lake. This strategy is expected to provide an additional 1,468 ac-ft/yr of surface water supply per decade.

Despite this additional supply, a substantial deficit remains, indicating the need for further measures to fully meet irrigation demands. Additional water management strategies, conservation efforts, and infrastructure improvements may be necessary to enhance long-term water reliability for agricultural users in Lamar County.

5.5.9 Irrigation, Rains

Irrigation, Rains is projected to have a consistent unmet water need of 3 ac-ft/yr annually from 2030 through 2080. Currently, no strategies have been recommended to address this shortfall. Given the stable and ongoing deficits, it is important to explore potential solutions, including alternative water sources, infrastructure improvements, or conservation measures, to address these unmet needs. The RWPG will continue to assess and refine strategies to ensure a reliable water supply for Irrigation, Rains in the future.

5.5.10 Irrigation, Red River

Irrigation water users in the Red River region are projected to face significant unmet water needs from 2030 through 2080, with deficits consistently reaching 1,230 ac-ft/yr per decade. To address shortages, the recommended strategy involves drilling new wells in the Nacatoch Aquifer, providing an additional 1,450 ac-ft/yr of groundwater supply annually, expected to meet demand consistently through the decades.

Additionally, an alternative strategy includes drilling wells in the Trinity Aquifer, which would provide 97 ac-ft/yr of groundwater supply annually. While this strategy offers some supplemental water supply, it is considered an alternative and not the primary solution. Although these strategies provide a significant water supply, they are not sufficient to fully cover the projected deficits for the region, especially in the later decades. Therefore, the RWPG will continue to explore other potential groundwater resources, surface water options, and conservation measures to secure a reliable water supply for irrigation users in the Red River region..

5.5.11 Lindale Rural WSC

Lindale Rural WSC is projected to experience unmet water needs from 2030 through 2080, with deficits starting at 0 ac-ft/yr in 2030 and growing to 156 ac-ft/yr by 2080. To address shortages, the recommended strategy is to implement water loss reduction measures within the service area, which includes conservation efforts aimed at reducing water losses. The two specific conservation strategies proposed involve mitigating water loss in both the Sabine and Neches basins, where Lindale Rural WSC serves. The water loss reduction strategies in the Sabine basin are expected to reduce demand by 221 ac-ft/yr in 2030, increasing to 300 ac-ft/yr by 2080. Similarly, water loss reduction efforts in the Neches basin are projected to reduce demand by 67 ac-ft/yr in 2030, increasing to 84 ac-ft/yr by 2080. These reductions help mitigate some of the growing supply deficits for Lindale Rural WSC.

While these conservation strategies provide significant demand reduction, they will not be enough to fully address the long-term needs. The persistent shortfalls indicate that further actions may be required, such as exploring alternative water supplies or increasing infrastructure capacity. The RWPG will continue to explore additional strategies, including infrastructure enhancements and supplemental water sources, to help secure a sustainable water supply for Lindale Rural WSC moving forward.

5.5.12 Livestock, Lamar

Livestock, Lamar is currently facing consistent unmet water needs, with a deficit of 83 ac-ft/yr per year projected from 2030 to 2080. To address these ongoing needs, the recommended strategy is to implement the Lamar Livestock Pipeline and establish a contract with Lamar County Water Supply District (WSD). This strategy utilizes water from Pat Mayse Lake/Reservoir, a surface water reservoir located in the Red River Basin.

The Lamar Livestock Pipeline would provide a reliable source of fresh water from Pat Mayse Reservoir, ensuring a stable water supply for the livestock needs in the area. The projected supply from this strategy is 617 ac-ft/yr per year, consistent across the planning decades (2030-2080), which helps cover the existing deficit in Livestock, Lamar's water demand.

While this strategy is expected to meet the projected demands, the RWPG will continue exploring additional measures to secure further water resources, ensuring the long-term sustainability of the water supply for Livestock, Lamar.

5.5.13 MacBee SUD

MacBee SUD is projected to experience minimal unmet water needs, with a slight deficit of 5 ac-ft/yr in 2060, and a larger shortfall of 38 ac-ft/yr in 2080. The recommended strategy is to increase the existing contract between MacBee SUD and the Sabine River Authority (SRA). This strategy aims to provide additional water supply through the expanded contract, ensuring that MacBee SUD can meet its future demands.

While the increased contract is expected to help alleviate the water supply deficits, further assessment may be necessary to ensure a consistent and reliable water source for MacBee SUD as the demand grows. The RWPG will continue exploring options for increasing water supply and enhancing the reliability of water resources for the region.

5.5.14 Manufacturing, Camp

Manufacturing, Camp is expected to experience a steady increase in unmet water needs, with deficits ranging from 38 ac-ft/yr in 2030 to 47 ac-ft/yr by 2080. The recommended strategy is Advanced Water Conservation (Manufacturing Camp), focusing on water use reduction through demand management practices. This strategy involves implementing advanced water conservation techniques aimed at reducing water consumption and improving efficiency.

While the conservation measures are projected to provide some relief to the deficits, the scale of the unmet needs suggests that additional measures may be needed to fully address future water demands. The RWPG will continue exploring further conservation strategies and other supply-side measures to ensure long-term water sustainability for Manufacturing, Camp.

5.5.15 Manufacturing, Gregg

Manufacturing, Gregg is projected to experience a growing unmet need, with deficits reaching 44 ac-ft/yr by 2070 and 105 ac-ft/yr by 2080. The recommended strategy is Advanced Water Conservation, which focuses on reducing water usage through industrial conservation measures. This strategy aims to implement advanced water conservation practices to mitigate the water supply shortfall over time.

The recommended conservation strategy is expected to gradually reduce the unmet needs, with projected reductions in water demand starting in 2040 and continuing to 2080. However, the persistent deficits in the later decades indicate that additional supply-side strategies may be necessary to fully meet the long-term water demands of Manufacturing, Gregg. The RWPG will continue exploring further conservation initiatives and other potential strategies to ensure a sustainable water supply for the region.

5.5.16 Manufacturing, Upshur

The Manufacturing, Upshur WUG is projected to experience increasing unmet needs, with deficits ranging from 48 ac-ft/yr in 2030 to 57 ac-ft/yr in 2080. To address shortages, two recommended strategies are Advanced Water Conservation and Drill New Wells (Manufacturing Upshur, Queen City, Cypress).

The Drill New Wells strategy involves tapping into the Queen City Aquifer to provide a consistent water supply to meet future demands. This approach is expected to provide 161 ac-ft/yr per year from 2030 to 2080, significantly alleviating the shortfall. Additionally, the Advanced Water Conservation strategy aims to implement water use reduction measures, with incremental demand reductions projected over the next several decades. Although the conservation efforts will gradually reduce the unmet needs, additional supply-side measures, such as drilling new wells, will be crucial to achieving a fully sustainable water supply.

The RWPG will continue exploring both supply and demand-side strategies to ensure that the long-term water needs of Manufacturing, Upshur are met while maintaining water sustainability in the region.

5.5.17 Mining, Harrison

Mining, Harrison is projected to experience significant unmet water needs from 2030 through 2080, with deficits starting at 1,151 ac-ft/yr in 2030 and increasing to 1,383 ac-ft/yr by 2080. To address shortages, the recommended strategies involve drilling new wells targeting the Queen City Aquifer in two distinct areas. The first strategy, focused on the Cypress basin, is expected to provide a consistent additional supply of 332 ac-ft/yr each planning period. The second strategy, targeting the Sabine basin, is projected to contribute 369 ac-ft/yr in 2030, gradually decreasing to 67 ac-ft/yr by 2080.

While these strategies provide additional water supply, they are not sufficient to fully cover the projected deficits in earlier and later decades. The persistent shortfalls indicate that additional measures may be necessary to ensure a reliable water supply for mining operations in Harrison County. The RWPG will continue exploring further options, including alternative water sources, infrastructure enhancements, and conservation measures, to secure long-term water reliability for Mining, Harrison.

5.5.18 Pine Ridge WSC

Pine Ridge WSC is expected to experience a slight water deficit starting in 2070, with a projected shortfall of 5 ac-ft/yr, which increases to 29 ac-ft/yr by 2080. Currently, no water management strategies (WMS) are recommended to address these shortages. Given the relatively small scale of the deficits, it is important for Pine Ridge WSC to continue monitoring water supply trends and consider potential future strategies, such as conservation measures or contracts with neighboring systems, to ensure adequate water supply in the coming decades. The RWPG will continue to assess the situation and explore potential solutions as needs evolve.

5.5.19 Poetry WSC

Poetry WSC is facing increasing water deficits over the decades, starting at a shortfall of 29 ac-ft/yr in 2030 and escalating to 575 ac-ft/yr by 2080. To address these deficits, the recommended WMS for Poetry WSC includes increasing their contract with NTMWD, which is contingent on the recommended Region C strategies for NTMWD. Additionally, advanced conservation measures have been recommended to help reduce water usage and alleviate some of the shortfalls. However, even with these strategies, the projected needs may still exceed the available supply in the later years.

The RWPG will continue to evaluate the effectiveness of these strategies and assess other potential solutions, such as exploring alternative water sources, enhancing infrastructure, and implementing further conservation measures. As the situation evolves, the RWPG will remain focused on refining strategies to ensure that Poetry WSC has a sustainable and reliable water supply to meet its future demands.

5.5.20 Scottsville

Scottsville is projected to experience a gradual increase in water supply over time. Starting with a deficit of 41 ac-ft/yr in 2030, the unmet needs begin to improve, and by 2080, the system is projected to have a surplus of 82 ac-ft/yr. The recommended WMS for Scottsville includes drilling new wells in the Queen City aquifer and Cypress Basin, which will provide additional water supply to meet the growing demand. Additionally, the RWPG recommends conservation measures to reduce water usage from the current 235 gpcd to a goal of 140 gpcd. These conservation efforts will further contribute to alleviating unmet needs over the planning period.

Despite the projected improvements in supply, the RWPG will continue to assess the effectiveness of the WMS and explore alternative strategies to ensure long-term water sustainability for Scottsville. Ongoing evaluations may include further infrastructure enhancements, continued water conservation efforts, and the exploration of other supplemental water sources. Through these ongoing efforts, the RWPG will strive to ensure that Scottsville's water supply is reliable and sufficient to meet future demands.

5.5.21 Sharon WSC

Sharon WSC is facing a consistent shortfall of 4 ac-ft/yr per year, which is expected to remain unchanged through 2080. However, no specific WMS have been recommended at this stage. The RWPG will continue to evaluate the situation and monitor for any changes in demand or supply. Potential conservation efforts or system expansions may be explored as the need arises.

5.5.22 Steam-Electric Power, Titus

The Steam-Electric Power sector in Titus is facing significant projected deficits, beginning at 1,198 ac-ft/yr in 2040 and escalating to 5,693 ac-ft/yr by 2080. However, no specific WMS have been recommended for this sector at this time. The RWPG will continue to assess the situation and prioritize strategies that can address the growing demands, potentially including alternative water sources and conservation measures.

5.5.23 Western Cass WSC

Western Cass WSC is consistently facing a shortfall of 11 ac-ft/yr per year, which remains steady from 2030 through 2080. The most recent water loss audit report indicates a water loss of approximately 42.62%, which significantly impacts the water supply for the system. To address the shortages, the RWPG recommends the implementation of water loss mitigation strategies. These strategies are projected to reduce water loss and help mitigate the deficits over time. The recommended strategy, "Water Loss Reduction – Western Cass WSC," aims to gradually reduce water loss, with supply improvements anticipated to be 83 ac-ft/yr in 2030, decreasing over time to 64 ac-ft/yr by 2080. Despite these efforts, Western Cass WSC’s unmet needs will persist.

The RWPG will continue to monitor the progress of these water loss reduction efforts and explore additional solutions as necessary to ensure the long-term sustainability of Western Cass WSC's water supply.

5.5.24 Winona

Winona is expected to experience a gradual increase in water shortfalls, beginning at 0 ac-ft/yr in 2030 and reaching 29 ac-ft/yr by 2080. The recommended WMS is to drill new wells in Winona, the Carrizo-Wilcox aquifer, and the Sabine system to help offset these shortfalls.

In addition, a recent water loss audit report reveals a significant water loss of approximately 54.27%, prompting the RWPG to recommend water loss mitigation measures. This dual approach—combining new well drilling with targeted water loss mitigation—aims to enhance the overall water supply reliability and ensure a sustainable future for Winona. Despite these efforts, Winona’s unmet needs will persist, and the RWPG will continue to assess further strategies and solutions to ensure that Winona's water supply is reliable and sustainable in the long term. These ongoing evaluations will be crucial in identifying additional measures to address the system’s deficits and ensure the community's future water security.

5.6 Alternative Water Management Strategies

TAC §357.35(b) states in part,

> *“The RWP may include alternative WMSs evaluated by the processes described in §357.34 of this title.”*

Further guidance with regard to Alternative Water Management Strategies is provided in TAC §357.35(g)(3), wherein it states:

> *“Fully evaluated Alternative WMSs and WMSPs included in the adopted RWP shall be presented together in one place in the RWP.”*

The NETRWPG recognizes that a wide variety of proposals could be brought before TCEQ and TWDB. It is also recognized that given the inherent uncertainty within the regional water planning process, plans that anticipate the potential for change as future water supply projects develop offer an improved capability to support water providers.

Included herein are Alternative Water Management Strategies that have been fully evaluated per the aforementioned guidelines. These Alternative Water Management Strategies have been adopted by the NETRWPG so that, in the future, as plans develop and change, they may form the basis for further considerations for potential modifications to the 2026 Region D Plan. Such modifications, per requirement, would need to go through a formal major, or minor, amendment process by the NETRWPG. The Alternative Water Management Strategies are not to be construed as being Recommended Water Management Strategies for the purposes of the 2026 Region D Plan.

A total of nine (9) Alternative Water Management Strategies have been developed for twenty-seven (27) WUGs. One Alternative Water Management Strategy (Wood County Pipeline) representing possible regionalization includes twenty-two (22) Water Management Strategy Projects for potential customers with identified needs. A tabulation of all the Alternative Water Management Strategies is presented in Table 5.18 below. A detailed summarization of the identified Alternative Water Management Strategies is presented in Appendix C5-11 to this chapter.

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Table 5.18 Alternative Water Management Strategies

County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (if applicable)	Supply Source				
		2030	2040	2050	2060	2070	2080				Groundwater	Surface Water	County	Basin	Total Capital Cost ($)
Red River	Clarksville - Unassigned Water Volumes	-	-	-	-	-	-	Dimple Reservoir				Dimple Lake/Reservoir	Reservoir	Red	-
		5097	5097	5097	5097	5097	5097								
Cass	Queen City	0	0	0	0	0	0	Alt Riverbend Strategy Cass	New 2.5 MGD Package WTP And Transmission Line, Riverbend WMS, And Voluntary Reallocation (Cass Manufacturing)	Riverbend Water Resources District		Wright Patman Lake/Reservoir	Reservoir	Sulphur	-
		251	244	243	243	243	243								
Gregg	Kilgore	0	0	0	0	0	0	Alternative Sabine River Authority Strategy - Wood County GW			Carrizo-Wilcox Aquifer		Wood	Sabine	-
		4,595	4,641	4,690	4,738	4,788	4,842								
Gregg	Longview	0	0	0	0	0	0	Alternative Sabine River Authority Strategy - Wood County GW			Carrizo-Wilcox Aquifer		Wood	Sabine	-
		5,963	5,944	5,938	5,907	5,876	5,852								
Harrison	Longview	0	0	0	0	0	0	Alternative Sabine River Authority Strategy - Wood County GW			Carrizo-Wilcox Aquifer		Wood	Sabine	-
		203	222	228	259	290	314								
Hopkins	Brinker WSC	97	122	130	143	157	171	Alt Drill New Wells (Brinker WSC)			Carrizo-Wilcox Aquifer		Hopkins	Sulphur	$1,405,000
		0	0	12	47	83	83								
Hunt	Celeste	14	19	24	28	32	35	New Contract with Greenville and Pipeline to Celeste				Tawakoni Lake/Reservoir	Reservoir	Sabine	-
		0	0	0	0	87	87								
Red River	Clarksville	252	179	106	49	0	0	Alt Clarksville Treated Pipeline Pat Mayse Water		Lamar County WSD		Pat Mayse Lake/Reservoir	Reservoir	Red	$12,255,000
		303	303	303	303	303	303								
Red River	Clarksville	252	179	106	49	0	0	Dimple Reservoir				Dimple Lake/Reservoir	Reservoir	Red	$38,489,000
		303	303	303	303	303	303								
Red River	Clarksville	252	179	106	49	0	0	Riverbend Strategy	Contract With Riverbend WRD And Treated Water Pipeline To DEKALB	Riverbend Water Resources District		Wright Patman Lake/Reservoir	Reservoir	Sulphur	$11,702,000

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County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (if applicable)	Supply Source				
		2030	2040	2050	2060	2070	2080				Groundwater	Surface Water	County	Basin	Total Capital Cost ($)
		303	303	303	303	303	303								
Red River	Irrigation, Red River	212	212	212	212	212	212	Alt Drill New Wells (Irrigation Red River, Trinity Aquifer, Sulphur)			Trinity Aquifer		Red River	Sulphur	$425,000
		97	97	97	97	97	97								
Van Zandt	Canton	0	0	0	0	197	400	Alt Canton Grand Saline Reservoir			Grand Saline Lake/Reservoi r		Reservoir	Sabine	$45,373,000
		1,440	1,440	1,440	1,440	1,440	1,440								
Van Zandt	Manufacturing, Van Zandt	344	365	380	400	433	453	Increase Existing Contract (Manufacturing Van Zandt from Grand Saline Surplus)			Carrizo-Wilcox Aquifer		Van Zandt	Sabine	-
		0	0	0	0	0	72								

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The following are condensed summaries of the identified Alternative Water Management Strategies. More detailed descriptions of the analysis of these strategies, including costs and figures, are presented in Appendix C5-11.

5.6.1 Bowie County

No Alternative Water Management Strategies have been identified for entities within Bowie County.

5.6.2 Camp County

No Alternative Water Management Strategies have been identified for entities within Camp County.

5.6.3 Cass County

5.6.3.1 The City of Queen City (including Cass Manufacturing)

Description/Discussion of Needs

The City of Queen City provides water service in Cass County. The City's population is projected to be 1,296 in 2030 and 1,158 in the year 2080. The City primarily utilizes groundwater supply from the Carrizo-Wilcox Aquifer, although it has the capability to use water supply from the City of Texarkana from Lake Wright Patman that it has used in the past. The City is not expected to have shortages as sufficient groundwater supplies are projected over the 2030 – 2080 planning period. However, the City's full demands have been considered in evaluation of strategies for the purposes of the 2026 Region D Plan as the City's demands were included as part of the evaluation of strategies within the Riverbend WRD's Regional Water Master Plan.

Evaluated Strategies

There were five alternative strategies considered to meet the City's water supply shortages as summarized in the table above. Advanced conservation was not determined to be feasible because the per capita use per day would be less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. The existing groundwater supply is sufficient to meet the City's needs, and is expected to continue to meet projected future demands for the City. Voluntary reallocation of manufacturing supply was identified in order to account for the fact that the Riverbend WRD Regional Master Plan indicates that supply could be provided via diversion of supply for GPI at Lake Wright Patman, a part of the Cass Manufacturing WUG, thus the amount for voluntary reallocation does not affect the 120,000 ac-ft/yr of contracted supply between Texarkana and GPI. Further, a request was submitted by Riverbend Water Resources District to consider a new 2.5 MGD package water treatment plant and transmission line for supply from Wright Patman Reservoir. Thus, a new contract with Texarkana/Riverbend has been considered herein.

Identification of Alternative Strategy

The alternative WMS identified for the City of Queen City is for a new contract surface water purchase from Texarkana/Riverbend WRD contingent upon voluntary reallocation of supply from Cass Manufacturing and Riverbend WRD's recommended strategy for a new 2.5 MGD package water treatment plant and transmission line.

5.6.4 Delta County

No Alternative Water Management Strategies have been identified for entities within Delta County.

5.6.5 Franklin County

No Alternative Water Management Strategies have been identified for entities within Franklin County.

5.6.6 Gregg County

No Alternative Water Management Strategies have been identified for entities within Gregg County.

5.6.7 Harrison County

No Alternative Water Management Strategies have been identified for entities within Harrison County.

5.6.8 Hopkins County

5.6.8.1 Brinker WSC

Description/Discussion of Needs

Brinker WSC provides water service in Hopkins County. It is projected that the users in WUG will have a shortage in 2030. The WUG population is projected to be 2,591 by 2030 and increases to 3,066 by 2080. The WSC utilizes groundwater from the Carrizo-Wilcox aquifer and has a contract for water supply with City of Sulphur Springs for 77 ac-ft/yr. Brinker WSC is projected to have a deficit of 97 ac-ft in 2030, increasing to a deficit of 171 ac-ft by 2080.

Evaluated Strategies

Five alternative strategies considered to meet the WSC's water supply shortages. Advanced conservation was not selected because the WUGs overall supply is not projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Additional use of groundwater has been identified as a likely source of water for Brinker WSC in Hopkins County; however, projected needs exceed the availability of groundwater in the Sulphur basin based on the modeled available groundwater (MAG) estimates and review of available information from a local hydrogeological assessment. Purchase of additional surface water from Sulphur Springs Lake under the existing contract from the City of Sulphur Springs was also considered.

Identification of Alternative Strategy

The identified alternative water management strategy for Brinker WSC to meet their projected deficit of 97 ac-ft/yr in 2030 and 171 ac-ft/yr in 2080 would be to construct three additional water wells similar to their existing wells just prior to 2050. The recommended supply source will be the Carrizo-Wilcox Aquifer in the Sulphur Basin in Hopkins County. One well with rated capacity of 75 gpm would provide approximately 40 ac-ft/yr each. However, The Carrizo-Wilcox Aquifer is projected to have insufficient supply availability to meet the needs of Brinker WSC throughout the planning period.

5.6.9 Hunt County

5.6.9.1 City of Celeste

Description/Discussion of Needs

The City of Celeste is a small public water supply located in northwest Hunt County. The system is projected to serve 826 people in 2030 and 996 people by the year 2080. The current sources of supply are two wells into the Woodbine Aquifer with production capacities of 150 gpm and 200 gpm. The City provides water to its own customers in the Sabine River Basin and is projected to have a water supply deficit of 14 ac-ft/yr in 2030 increasing to 35 ac-ft/yr by 2080.

Evaluated Strategies

Multiple alternative strategies were considered to meet Celeste's water supply shortages. Advanced conservation was not selected since per capita use is less than 140 gpcd. The purchase of surface water from the City of Greenville and construction of a treated water pipeline was identified as a potentially feasible strategy and evaluated. Additional supplies from the City of Greenville would be contingent upon City of Greenville water strategies. Pumping additional groundwater from the Woodbine Aquifer was also considered as an alternative for this entity. There is sufficient source availability in the Woodbine Aquifer through 2080, but if this alternative were to be implemented availability would be insufficient by 2070, which would necessitate a smaller contract and infrastructure for treated supply from the City of Greenville by 2070. Such an approach would be contingent upon recommended seller strategies for the City of Greenville.

Identification of Alternative Strategy

The identified alternative water management strategy for City of Celeste is to obtain a new contract with the City of Greenville for treated water supply and construct a treated water pipeline with necessary infrastructure to convey this amount from the City of Greenville's system to the City of Celeste. This strategy is contingent upon the recommended seller strategies for the City of Greenville. Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

5.6.10 Lamar County

No Alternative Water Management Strategies have been identified for entities within Lamar County.

5.6.11 Marion County

No Alternative Water Management Strategies have been identified for entities within Marion County.

5.6.12 Morris County

No Alternative Water Management Strategies have been identified for entities within Morris County.

5.6.13 Rains County

No Alternative Water Management Strategies have been identified for entities within Rains County.

5.6.14 Red River County

5.6.14.1 City of Clarksville

Description/Discussion of Needs

The City of Clarksville is located in Red River County. The system is projected to serve 2,483 people in 2030, decreasing to 1,206 in 2080. The current sources of supply are wells into the Blossom Aquifer, mixed with surface water from Langford Lake. Water quality issues with the groundwater (TDS) and surface water (turbidity) necessitate mixing of the supplies to meet Texas drinking water standards. The groundwater has over 1,000 ppm of dissolved solids including high levels of sodium, sulfate, and chloride. The city of Clarksville has a projected surplus of 10 ac-ft/yr in 2070 and 69 ac-ft/yr in 2080. The City provides water to its own customers in the Sulphur basin and is projected to have a water supply deficit of 252 ac-ft/yr in 2030, and 49 ac-ft/yr in 2060, due to sedimentation issues in Langford Lake. As the surface water supply for the City diminishes, the capability to mix the surface supply with the groundwater supply commensurately diminishes as well. Thus, as the surface supply diminishes, so too does the capability to utilize the City's existing groundwater supply. As noted in a 4 October 2013 memorandum from the City's consultant, Murray, Thomas & Griffin, Inc. (MTG):

> *"Clarksville has no available surface water when a water level of 417.0 (2006 low water level) and a sediment level at 415.0 (2013 lake bottom) are considered. Each of these conditions has occurred during the past ten years. The surface water is necessary to address total volume needs as well as for blending with the ground water."*

For the current 2026 Regional Plan, the City's water supply is solely from groundwater, thus the estimated deficit is reflective of the current groundwater production and treatment capacity without mixing of surface water. The system does have a water conservation and drought management plan in place.

Evaluated Strategies

Advanced conservation was not selected because Clarksville's supply would not be projected to meet TCEQ regulatory minimums. Furthermore, a reduction in demand would not alleviate the aforementioned water quality issues with the City's projected supplies. There are no significant current water needs in Clarksville that could be met by water reuse. Additional groundwater pumping from the Blossom Aquifer in the Sulphur River Basin and Reverse Osmosis treatment of all of the City's existing groundwater supplies has also been considered. The City's existing surface water supply has been made unavailable due to sedimentation issues in Langford Lake, the City's sole existing surface water supply. The City has requested the consideration of multiple potential surface water strategies to meet Clarksville's water supply needs. Potentially feasible strategies evaluated include:

- Additional groundwater wells.
- Treated Water Pipeline to DeKalb – purchasing water from the City of Texarkana's available supply from Wright Patman Reservoir.
- Dredging of sediment from Langford Lake.

- Construction of a new surface water reservoir, Dimple Reservoir.
- Treated Water Pipeline to Detroit – purchasing water from the City of Paris (via Lamar County WSD) from Paris available supply.

Identification of Alternative Strategy

At present, considerable uncertainty exists in each of the identified feasible water management strategies for the City of Clarksville. The NETRWPG supports any efforts by the City of Clarksville to further study all potential strategies to identify the best approach for the City to meeting all its future water supply needs, and such a study should be considered consistent with the 2026 North East Texas Regional Water Plan.

Should development of a Treated Water Pipeline to the Riverbend WRD/City of Texarkana's system in De Kalb and contract to provide up to 303 ac-ft (ac-ft/yr) be determined to not be cost feasible, the City will need alternative strategies. To meet the City's projected deficit, identified alternative strategies for water supply include the study and development of one of the following options*:

- Construct and develop Dimple Reservoir to provide a maximum 5,400 ac-ft/yr to meet the City's projected deficit in 2030. This project has the capability to meet the City's identified needs, as well as developing a supply to be potentially utilized by other demands in the area.
- Retire Langford Lake and development of a new well field and associated RO treatment facilities.
- Contract with the Lamar County WSD for supply from the City of Paris, which includes the development of a Treated Water Pipeline tying into Lamar County WSD's system in Detroit, Texas, to provide 303 ac-ft/yr for the projected needs of the City of Clarksville, although the City of Clarksville has indicated their intent, if this strategy is implemented, to contract additional supply as necessary to meet their full projected demands. This strategy allows for the resumption of the City's utilization of existing groundwater supplies via mixing. This strategy is contingent upon the Lamar County WSD contracting for the necessary additional supply from the City of Paris.
- Contract with the Riverbend Water Resources District and construct a tie-in pipeline at the City of DeKalb for supplies contingent upon Riverbend Water Resources District's recommended WMSs.

  *Assuming that water from the Sulphur River is not available from an upper region reservoir.

Given Clarksville's geographic location, it will be necessary that Clarksville establish working relationships with the City of Texarkana, Riverbend Water Resources District, the Sulphur River Basin Authority and/or the Red River Basin Authority to develop any new reservoir and/or water supply strategy.

5.6.14.2 Red River County Irrigation

Description/Discussion

The Irrigation WUG in Red River County has a constant demand of 3,783 ac-ft/yr throughout the planning region. Irrigation in Red River County is projected to be supplied by existing surface water from run-of-river diversions from the Red and Sulphur Rivers. A constant deficit of 2,681 ac-ft/yr is projected to occur in 2030-2080 planning period.

Evaluated Strategies

Multiple alternative strategies were considered to meet the Red River County Irrigation WUG's water supply shortages. Advanced water conservation for irrigation practices were not determined to be feasible, as amounts potentially saved would not provide sufficient savings to meet the projected needs over the planning period. The use of reuse water from nearby municipalities is not feasible as it would not be effective to deliver reuse water to farm irrigation systems.

Groundwater was identified as a potential source of water for irrigation in Red River County. A local hydrogeologic assessment was performed by Region D to assess source groundwater availability, as there is no GCD located within the Region. Based on a relatively low average annual water level decline and the potential for high-productivity wells in the portion of the Nacatoch Aquifer located in the Sulphur River Basin in Red River County, it has been determined that the future projected needs can likely be met with additional irrigation wells. For the portion of the Trinity Aquifer located in the Sulphur River Basin in Red River County, the local hydrogeologic assessment did not identify sufficient available data to determine potential productivity; however, since there is little to no current production from this portion of the Trinity Aquifer, it has been determined that sufficient source availability is likely to meet the projected needs identified for the Irrigation WUG in Red River County.

Treated surface water purchased from Lamar County WSD was considered as a viable supplement to the additional groundwater in order to meet projected demands. Purchasing sufficient treated surface water from Lamar County WSD to meet the entirety of the need was also considered as a possible strategy. Purchasing raw water from the City of Paris has also been considered as a possible strategy, with a higher capital cost but an anticipated lower annual cost. The City's surface water permit for Pat Mayse Reservoir, as amended, allows for the interbasin transfer and use of water in both the Red and Sulphur River basins. However, the use of water via this permit would require a minor amendment to add irrigation as a permitted use.

Identification of Alternative Strategy

The identified alternative water management strategy for the Red River County Irrigation WUG to meet projected demands during the planning period is in addition to the recommended WMS, to drill one new well in the Trinity Aquifer, Sulphur Basin, Red River County, to meet the remaining unmet need of 1,231 ac-ft/yr in 2030 and 1,230 ac-ft/yr in 2080. The Region D analysis indicates that the 97 ac-ft/yr of need remaining after implementation of recommended strategies can be obtained from existing sources exceeding the MAG from the Trinity Aquifer, Sulphur Basin with one additional well rated at 75 gpm. This alternative strategy represents the more likely scenario for the WUG given the lack of a Groundwater Conservation District within the NETRWPA.

5.6.15 Smith County

No Alternative Water Management Strategies have been identified for entities within Smith County.

5.6.16 Titus County

No Alternative Water Management Strategies have been identified for entities within Titus County.

5.6.17 Upshur County

No Alternative Water Management Strategies have been identified for entities within Upshur County.

5.6.18 Van Zandt County

5.6.18.1 City of Canton

Description/Discussion of Needs

The City of Canton provides water service in Van Zandt County. The city's population is projected to be 5,415 by 2030 and increasing to 8,644 by 2080. The City of Canton utilizes groundwater from the Carrizo-Wilcox aquifer, and surface water from Mill Creek Reservoir. The City of Canton has surpluses from 2030-2060 but have projected shortages of 197 ac-ft/yr in 2070 and 400 ac-ft/yr in 2080 decade.

Evaluated Strategies

In 2008, the Canton City council authorized the appropriation of $70,000 to prepare a long-term water plan. The project evaluated four (4) reservoir sites in Van Zandt County. Two of the four proved to be feasible from a technical standpoint. The City spent an additional $30,000 in 2009 and 2010 to address questions and provide additional information requested by the committee members. In addition to these two long-term strategies, two additional water wells were included to satisfy short-term needs. These two additional wells have been completed. An additional groundwater supply might be a potentially feasible strategy. Water reuse is a potentially feasible water supply strategy, as the City currently has a water rights application pending at the TCEQ for the authorization of indirect reuse. At the request of the City of Canton, the construction of an additional water well by 2030 was identified as a feasible strategy because the City of Canton is planning on developing additional groundwater supply to supplement existing supplies. Also, at the request of the City, a potential new reservoir on Grand Saline Creek was also considered as a feasible strategy for the City.

Identification of Alternative Strategy

Because of substantial disagreement over future population and water demands, the City has requested the following alternate strategy:

> *The strategy to meet future needs "is with surface water from a proposed reservoir on Grand Saline Creek. The City of Canton has provided to NETRWPG resolutions from three other cities in Van Zandt County supporting the reservoir project. This show of support indicates that a regional surface water reservoir could possibly replace the groundwater strategies for other Van Zandt County public water supplies with projected deficits. However, due to the time typically required to obtain the necessary permits to impound surface water, the City plans to construct one or two additional wells, or implement a reuse option in the interim to meet increasing demands due to population growth and the First Monday influence." This alternative wording should be considered consistent with this plan in the event that population growth in the potential service area significantly exceeds current NETRWPG projections.*

This alternative strategy for the City of Canton is to construct by 2030 a new 1,845-acre (24,980 ac-ft) reservoir on Grand Saline Creek, a tributary of Sabine River, construct a 14" pipeline from the new reservoir's intake to Canton's WTP and expanding the WTP. The project is estimated to yield 1,440 ac-ft/yr of supply throughout the 2030-2080 planning period.

5.6.18.2 Van Zandt County Manufacturing

Description/Discussion of Needs

The Manufacturing WUG in Van Zandt County has a demand that is projected to increase from 556 ac-ft/yr in 2030 to 667 ac-ft/yr by 2080. Manufacturing in Van Zandt County is supplied by groundwater from the Carrizo-Wilcox Aquifer, purchased groundwater from Grand Saline, and surface water from run-of-river permits on the Sabine River, a permit for diversion from Lake Tawakoni. A deficit of 344 ac-ft/yr is projected to occur in 2030, increasing to 453 ac-ft/yr by 2080.

Evaluated Strategies

Six Eight alternative strategies were considered to meet the Van Zandt County Manufacturing WUG's water supply shortages. Advanced water conservation for manufacturing was considered in this planning effort to reduce overall demands; however, it does not resolve all identified needs. The use of reuse water from nearby municipalities was not determined to be feasible at present. Surface water was not determined to be a viable alternative to meet projected demands because no supplies are readily available in proximity of the identified needs. Groundwater has been identified as a potential source of water for manufacturing in Van Zandt County. In addition, groundwater supplies can be contracted from City of Grand Saline.

Identification of Alternative Strategy

The identified alternative strategy for Manufacturing in Van Zandt County is increasing the existing contract with Grand Saline. It is estimated to yield extra 72 ac-ft/yr of supply in 2080 decade.

5.6.19 Wood County

No Alternative Water Management Strategies have been identified for entities within Wood County.

CHAPTER 6 IMPACTS OF THE REGIONAL WATER PLAN, AND DESCRIPTION OF HOW THE REGIONAL WATER PLAN IS CONSISTENT WITH THE LONG-TERM PROTECTION OF THE STATE'S WATER, NATURAL, AND AGRICULTURAL RESOURCES, AND THE IMPACTS OF MARVIN NICHOLS I RESERVOIR PROPOSED BY REGION C IN PROTECTING THESE RESOURCES

31 TAC §357.40 requires that regional water plans describe various anticipated impacts of the Regional Water Plan (RWP), including potential impacts on water quality, navigation, and impacts of moving water from agricultural to rural areas. Also required is a description of how the RWP is consistent with the long term protection of Texas' water, agricultural, and natural resources, including the requirement that planning analyses and recommendations honor all existing water rights and contracts.

The primary purpose of this chapter is to describe the impacts of the 2026 North East Texas Regional Water Plan (NETRWP) and provide a description as to how this plan is consistent with the long term protection of the State's water resources, agricultural resources, and natural resources. This description will include a discussion of the goals of and proposals for restoration and protection of instream flows that are viewed as important to the region and how those goals and proposals are consistent with the long-term protection of Texas' water, agricultural, and natural resources.

Additionally, this chapter also addresses the potential impact of the Marvin Nichols I Reservoir on the long-term protection of the State's water resources, agricultural resources, and natural resources, and those of this Region. The Marvin Nichols I Reservoir is a proposed water management strategy of Region C in the 2022 State Water Plan. The Marvin Nichols I Reservoir, if constructed, would be located in the North East Texas Region, as would the mitigation land that would be required. It will also change the pattern of flow of the Sulphur River. Because of the resulting impacts of removing and degrading productive agricultural lands, it has been the position of the NETRWPG that inclusion of the Marvin Nichols I Reservoir, or any similarly located reservoir, is not consistent with the long-term protection of the State's water resources, agricultural resources, and natural resources, and those of Region D.

The NETRWPG takes the position for the 2026 regional water planning process that, from the information made available by Region C to Region D in late 2024, the Marvin Nichols Reservoir strategy does not satisfy the requirements of the current Texas Water Development Board (TWDB) rules to evaluate the impacts on state and regional agricultural, natural, and water resources. Moreover, the NETRWPG continues to oppose the Marvin Nichols reservoir strategy on the basis of the impacts described within this chapter and in Chapter 8 of this Plan.

6.1 Impacts of Water Management Strategies on Key Water Quality Parameters in the State

The NETRWPG has identified 76 Water User Groups (WUGs) with shortages which will require strategies in this plan. There have been 10 water management strategies developed that simply extend or increase existing water purchase contracts, and will not require capital expenditure or new sources of supply. Shortages for 49 entities will be resolved with additional groundwater supplies represented in 78 recommended strategies. Shortages for 8 entities will be partially resolved with Advanced Water Conservation strategies. Shortages for 54 entities will be partially resolved with Water Loss Reduction strategies. There is one (1) instance of recommended voluntary reallocations of existing supplies, recommended to Wholesale Water Provider (WWP) and WUG sellers in the Region to meet projected customer needs (see Chapter 5).

Per 31 TAC §358.3(19), the development of this plan was guided by the principal that the designated water quality and related water uses as shown in the state water quality management plan shall be improved or maintained.

Chapter 357.40(b)(5) of the regional water planning guidelines provide that the plan shall include, "a description of the impacts of the RWP regarding major impacts of recommended water management strategies on key parameters of water quality." The strategies recommended herein are primarily to address shortages in municipal water suppliers. Municipal water suppliers are governed by regulations of TCEQ, primarily Chapter 290 of Title 30 of the Texas Administrative Code. Key parameters of water quality are therefore those regulated by the Texas Commission on Environmental Quality (TCEQ), and are summarized in Tables 6.1 through 6.4.

Table 6.1 Parameters of Water Quality – Inorganic Compounds

Contaminant	Max Contaminant Level (MCL) (mg/L)
ANTIMONY	0.006
ARSENIC	0.010
ASBESTOS	7 million fibers/L (> than 10μm)
BARIUM	2.0
BERYLLIUM	0.004
CADMIUM	0.005
CHROMIUM	0.1
CYANIDE	0.2 (as free Cyanide)
FLUORIDE	4.0
MERCURY	0.002
NITRATE	10 (as Nitrogen)
NITRITE	1 (as Nitrogen)
NITRATE & NITRITE (TOTAL)	10 (as (Nitrogen)
SELENIUM	0.05
THALLIUM	0.002

Table 6.2 Parameters of Water Quality – Synthetic Organic Compounds

Contaminant	MCL (mg/L)
ALACHLOR	0.002
ATRAZINE	0.003
BENZOPYRENE	0.0002
CARBOFURAN	0.04
CHLORDANE	0.002
DALAPON	0.2
DIBROMOCHLOROPROPANE	0.0002
DI(2-ETHYLHEXYL)ADIPATE	0.4
DI(2-THEYLHEXYL)PHTHALATE	0.006
DINOSEB	0.007
DIQUAT	0.02
ENDOTHALL	0.1
ENDRIN	0.002
ETHYLENE DIBROMIDE	0.00005
GLYPHOSATE	0.7
HEPTACHLOR	0.0004
HEPTACHLOR EPOXIDE	0.0002
HEXACHLOROBENZENE	0.001
HEXACHLOROCYCLOPENTADIENE	0.05
LINDANE	0.0002
METHOXYCHLOR	0.04
OXAMYL (VYDATE)	0.2
PENTACHLOROPHENOL	0.001
PICLORAM	0.5
POLYCHLORINATED BIPHENYLS (PCB)	0.0005
SIMAZINE	0.004
TOXAPHENE	0.003
2,3,7,8-TCDD (DIOXIN)	3×10^{-8}
2,4,5-TP	0.05
2,4-D	0.07

Table 6.3 Parameters of Water Quality – Volatile Organic Compounds

Contaminant	MCL (mg/L)
1,1-DICHLOROETHYLENE	0.007
1,1,1-TRICHLOROETHANE	0.2
1,1,2-TRICHLOROETHANE	0.005
1,2-DICHLOROETHANE	0.005
1,2-DICHLOROPROPANE	0.005
1,2,4-TRICHLOROBENZENE	0.07
BENZENE	0.005
CARBON TETRACHLORIDE	0.005
CIS-1,2-DICHLOROETHYLENE	0.07
DICHLOROMETHANE	0.005
ETHYLBENZENE	0.7
MONOCHLOROBENZENE	0.1
O-DICHLOROBENZENE	0.6
PARA-DICHLOROBENZENE	0.075
STYRENE	0.1
TETRACHLOROETHYLENE	0.005
TOLUENE	1.0
TRANS-1,2-DICHLOROETHYLENE	0.1
TRICHLOROETHYLENE	0.005
VINYL CHLORIDE	0.002
XYLENES (TOTAL)	10.0

Table 6.4 Parameters of Water Quality – Secondary Contaminant Levels

Contaminant	Level (mg/l except where otherwise stated)
ALUMINUM	0.05 to 0.2
CHLORIDE	300
COLOR	15 color units
COPPER	1.0
CORROSIVITY	Non-corrosive
FLUORIDE	2.0
FOAMING AGENTS	0.5
HYDROGEN SULFIDE	0.05
IRON	0.3
MANGANESE	0.05
ODOR	3 Threshold Odor Number
PH	>7.0
SILVER	0.1
SULFATE	300
TOTAL DISSOLVED SOLIDS	1,000
ZINC	5.0

6.1.1 WMS Characterization and Water Quality Considerations

The 78 strategies utilizing groundwater involve the drilling of additional wells by smaller systems, generally in the 50 to 200 gpm production range. Spacing between wells is typically recommended to be around ½ mile, to avoid interference between wells. This recommended distance can vary, dependent upon the hydrologic properties of the aquifer. Drilling of a well of this size, properly spaced and properly completed to public well standards should typically have no impact on surrounding water quality, provided the additional pumping does not overdraft the aquifer. Each of the region's aquifers has been assessed in Chapter 3, using the capacities of the aquifer determined to be adequate by the TWDB and the NETRWPG (via identified Modeled Available Groundwater (MAG) amounts, and local hydrogeologic assessments) to accommodate the additional pumping. Should overdrafting occur, or should wells not be properly completed, degradation of water quality in the aquifer could occur. Possible sources would include brine intrusion from lower levels of the aquifer, or breakthrough from upper, poorly separated strata.

The 10 surface water strategies for entities with actual shortages, involving increasing contractual supplies from existing, adequate surface impoundments should result in no measurable change in water quality in the existing impoundments. The additional supplies needed are summarized in Table 6.5.

Table 6.5 WUGs Needing Contractual Supply (New, Renewed, Increased Contracts)

WUG	Reservoir	Reservoir Capacity	2080 Strategy Volume	% of Permitted Capacity
BRINKER WSC	Lake Sulphur Springs	11,550	83	0.7%
CASH SUD	NTMWD		337	
CELESTE	Lake Tawakoni	221,310	87	
COUNTY-OTHER LAMAR	Pat Mayse Lake	59,670	244	0.4%
HARLETON WSC	Lake O' The Pines	149,000	230	0.2%
HOLLY SPRINGS WSC	Lake O' The Pines	149,000	80	0.1%
MACBEE SUD	SRA		996	
MANUFACTURING TITUS	Lake Bob Sandlin	60,430	1,279	2.1%
MANUFACTURING VAN ZANDT	Groundwater		72	
MARTIN SPRINGS WSC	Chapman Lake/Reservoir	67,673	29	0.0%

There are five strategies related to the expansion and/or replacement of a WUG's Water Treatment Plants and raw water intakes and/or reuse. These strategies include recommendations for the Riverbend Water Resources District and its Member Entities' development of a new raw water intake, pump station, pipeline, and WTP along with a new 2.5 MGD package WTP and transmission line, new WTP for the City of Greenville, RO treatment for City of Clarksville groundwater, and several tie-in pipelines to existing supplies. These strategies are not anticipated to result in measurable changes in the water quality of existing impoundments.

There are thus four (4) surface water strategies (for 4 WUGs) involving the movement of water within the North East Texas Region. These four strategies are summarized in Table 6.6. Each of the strategies are recommended for the purposes of the 2026 Region D Plan, consistent with required statutes and TWDB guidelines; however, it is recognized that in each of these instances the WUGs have the legal ability to access available groundwater supplies possibly in excess of the present MAG amounts, as there are no groundwater conservation districts within the region. Such approaches would necessitate local hydrogeologic investigations performed as necessary for the given circumstance.

Table 6.6 Recommended Strategies for WUGs Moving Surface Water Supplies

WUG	Strategy	Source	2080 WMS Amount (ac-ft/yr)	Total WMS Demand on Source (ac-ft/yr)	Source Capacity (ac-ft/yr)	% WMS Demand on Source (ac-ft/yr)
IRRIGATION, LAMAR COUNTY	Pat Mayse Raw Water Pipeline	Lake Pat Mayse	1,468	1,468	59,670	2.5%
LIVESTOCK, LAMAR COUNTY	Livestock Water Pipeline	Lake Pat Mayse	617	617	59,670	1.0%

By the end of the 50 year planning period, the regional needs related to these strategies will total 2,085 ac-ft per year. The percentage of supplies recommended for annual withdrawal represent less than 3.5% of the available capacity of the reservoirs being utilized. The largest percentage is for Lamar County Irrigation, a substantial component of which has been under development. While it is anticipated that the detailed environmental and water quality studies will be performed by the project sponsors during the development of each project, for planning purposes the annual withdrawal of the reservoir contents in terms of overall capacity can be considered minimal.

6.1.1.1 Pat Mayse Raw Water Pipeline

Projected demands for Lamar County irrigation indicate a near-term need for additional supply to meet the identified needs for this WUG. The recommended strategy for the Lamar County Irrigation WUG to meet projected demands over the planning period is to purchase raw water from Pat Mayse Reservoir through the Lamar County WSD. The recommended raw water pipeline is a 14 inch pipeline connecting to the City's existing raw water intake system for supply from Pat Mayse Reservoir.

The recommended strategy lies within the Sulphur River Basin. Nearby waterbodies include Auds Creek, Bakers Branch, and several tributaries to the Sulphur River. Lake Pat Mayse is listed for excessive algal growth but the surrounding tributaries are not listed in the 2022 303(d) list. A planning level water quality evaluation has been performed to evaluate and summarize the characteristics of select water quality parameters, for potential use for agricultural purposes. Data from the TCEQ SWQM database were utilized to assess a spectrum of water quality parameters at (or approximate to) the sources of supply currently and recommended to be utilized by the Lamar County Irrigation WUG.

The results of this comparative analysis suggest that for planning purposes, the water quality characteristics of the parameters analyzed for Pat Mayse Lake appear to be within the range of water quality conditions suitable for irrigation purposes, as shown in Table 6.7.

Table 6.7 Summary Water Quality Evaluation of Pat Mayse Lake for Irrigation

Water Quality Parameter	Pat Mayse at Intake (SWQM Station 16343)				Comparison Value for Irrigation	Suitability for Irrigation
	Avg	Min	Max	Count		
SPECIFIC CONDUCTANCE, FIELD (US/CM @ 25C)	141	100	214	915	<250	Excellent
TOTAL DISSOLVED SOLIDS (MG/L)	99	75	132	51	<175	Excellent
CHLORIDE (MG/L AS CL)	6.1	1.0	22.0	79	<350	No yield loss
SODIUM (MG/L AS NA)	6.7	5.6	8.5	6	<10	Low sodium hazard

6.1.1.2 Livestock Water Pipeline to Pat Mayse

Projected demands for Lamar County livestock indicate a near-term need for additional supply to meet the identified needs for this WUG. The recommended strategy for the Lamar County Irrigation WUG to meet projected demands over the planning period is to purchase raw water from Pat Mayse Reservoir through the Lamar County WSD. The recommended raw water pipeline is a 8 inch pipeline connecting to the City's existing system for supply from Pat Mayse Reservoir.

The recommended strategy lies within the Sulphur River Basin. Nearby waterbodies include Auds Creek, Bakers Branch, and several tributaries to the Sulphur River. Lake Pat Mayse is listed for excessive algal growth but the surrounding tributaries are not listed in the 2022 303(d) list . A planning level water quality evaluation has been performed to evaluate and summarize the characteristics of select water quality parameters, for potential use for agricultural purposes. Data from the TCEQ SWQM database were utilized to assess a spectrum of water quality parameters at (or approximate to) the sources of supply currently and recommended to be utilized by the Lamar County Livestock WUG.

The results of this comparative analysis suggest that for planning purposes, the water quality characteristics of the parameters analyzed for Pat Mayse Lake appear to be within the range of water quality conditions suitable for livestock purposes, as shown in Table 6.8.

Table 6.8 Summary Water Quality Evaluation of Pat Mayse Lake for Livestock

Water Quality Parameter	Pat Mayse at Intake (SWQM Station 16343)				Comparison Value for Livestock	Suitability for Irrigation
	Avg	Min	Max	Count		
SPECIFIC CONDUCTANCE, FIELD (US/CM @ 25C)	141	100	214	915	<250	Excellent
TOTAL DISSOLVED SOLIDS (MG/L)	99	75	132	51	<1,000	Low levels cause no serious harm
CHLORIDE (MG/L AS CL)	6.1	1.0	22.0	79	<350	No yield loss
SODIUM (MG/L AS NA)	6.7	5.6	8.5	6	<10	Low sodium hazard

6.2 Impacts of Moving Water from Rural and Agricultural Areas

TAC §357.34 rules require that the plan include an analysis of the impacts of strategies which move water from rural and agricultural areas. As previously noted, a total of 158 strategies were identified for 76 entities in the NETRWPA. There are 78 strategies involving the drilling of wells for use in the immediate vicinity of the well. There are 10 strategies involving contractual movements of surface water which taken from a reservoir (or run-of-river supply source) within the same proximity as the WUG. There are 8 Advanced Water Conservation Strategies, 54 water loss reduction strategies, 1 strategy entailing the voluntary reallocation of existing supplies, and 5 strategies involving the expansion of an existing water treatment plant, development of new water treatment plant, pipeline, and/or the development of new raw water intakes to utilize existing surface water supplies.

There are two (2) strategies recommending the movement of surface water supplies within the North East Texas Region, as denoted in Table 6.9 below.

Table 6.9 Recommended Strategies for WUGs Moving Surface Water Supplies

WUG	County of Use	Reservoir	County of Origin
LAMAR COUNTY IRRIGATION	Lamar	Pat Mayse Reservoir	Lamar
LAMAR COUNTY LIVESTOCK	Lamar	Pat Mayse Reservoir	Lamar

These recommended strategies move water either between rural areas, or from urban to rural areas.

6.3 Socioeconomic Impacts of Unmet Needs

The Texas Administrative Code (31 TAC §357.40(a)) requires that regional water plans 'include a quantitative description of the socioeconomic impacts of not meeting the identified water needs' in the planning area for water users. In previous rounds of planning, TWDB has developed a methodology to conduct this analysis and performed the analysis for the RWPGs, if requested. This assessment will be included in its entirety in Appendix C6-5 upon receipt from the TWDB for the purposes of the final NETRWP.

Table 6.10 Summary of Socioeconomic Impact Analysis of Region D

Regional Economic Impacts						
Income losses ($ millions)*						
Job losses						
Financial Transfer Impacts						
Tax losses on production and imports ($ millions)*						
Water trucking costs ($ millions)*						
Utility revenue losses ($ millions)*						
Utility tax revenue losses ($ millions)*						
Social Impacts						
Consumer surplus losses ($ millions)*						
Population losses						
School enrollment losses						

6.3.1 Municipal Needs Unmet

For a water management strategy or project to meet needs within the context of regional water planning, a project must be potentially feasible while not over-allocating a water source. The 2026 Region D RWP reflects realistic, economically viable strategies and projects with online dates that take into account lack of action to date. This includes consideration of a strategy's feasibility in the real-world regulatory and water management context, noting the capability for WUGs to feasibly obtain supply beyond what is identified as available for the purposes of regional water planning.

It is appropriate, therefore, that the plans reflect the resulting unmet municipal needs that may arise because of such considerations. Such needs may arise that, in the event of drought, could only be addressed through drought restrictions – until such time that a project can be brought online. In the 2026 Region D RWP, relatively small amounts of needs remain unmet for a number of municipal and non-municipal water user groups because potentially feasible water management strategies and projects cannot come online by the decade in which the need arises, or a strategy may not realistically be feasible within the regional planning context, but outside of that context (such as in a region with no GCDs to regulate pumping), a strategy might be feasible but not capable of being recommended by the NETRWPG. The unmet needs identified for WUGs in Region D are shown in Appendix C5-21 and summarized in Appendix C5-22.

For a regional water plan to be approved by the TWDB with any unmet municipal needs, Texas Administrative Code 357.50(j)(1-3) states that the regional water planning group includes adequate justification, including the following requirements:

> *"(1) documents that the RWPG considered all potentially feasible WMSs, including Drought Management WMSs and contains an explanation why additional conservation and/or Drought Management WMSs were not recommended to address the need;"*

All potentially feasible WMSs and WMSPs were considered to meet the needs identified herein, including drought management WMSs. The NETRWPG identified no additional potentially feasible strategies that could be cost-effectively implemented for these municipal WUGs beyond those recommended herein. The NETRWPG has already recommended advanced water conservation for WUGs with baseline GPCDs higher than their associated targets as water conservation is likely a cheaper alternative for many WUGs than acquiring new supplies.

The NETRWPG does not recommend Drought Management as a recommended water management strategy to meet needs. Drought management measures reduce water demands during times of drought, and do not make more efficient use of existing resources. Applying drought management measures is equivalent to not meeting the projected water demands, per the explanation provided in Chapter 7, and the BGRWPG prefers to show the needs projected for municipal WUGs as not being met during a drought equivalent to the drought of record rather than artificially showing them as met by reducing demands during drought.

Further, the NETRWPG incorporated into its adopted process for identifying recommended water management strategies the assessment of feasibility as described by the TWDB for identifying infeasible strategies from the 2021 Region D RWP. This step was incorporated to further avoid recommending infeasible strategies in future plans. As such, if a WUG or WWP has not taken sufficient steps to make a project reasonably feasible of providing water by the online decade identified within the Plan, then a strategy may have been considered but deemed infeasible for recommendation, thus leaving an unmet need (unless another feasible strategy were identified). The NETRWPG prefers to show the needs projected for municipal WUGs as not being met during a drought equivalent to the drought of record rather than artificially showing them as met by recommending an infeasible strategy.

> *"(2) describes how, in the event of a repeat of the Drought of Record, the municipal WUGs associated with the unmet need shall ensure the public health, safety, and welfare in each Planning Decade that has an unmet need; and"*

While the NETRWPG does not recommend Drought Management as a water management strategy nor infeasible strategies to meet projected needs for municipal WUGs, the NETRWPG recognizes that drought management measures will be implemented by utilities as outlined in their individual Drought Contingency Plans. These measures can prolong supply and reduce impacts to communities by limiting water use to only essential water uses in order to protect public health, safety and welfare. If Drought Management or infeasible strategies were to be recommended, this could provide a false sense of security that "needs are met", when, in actuality, projected water demands would not be met. In the event of a drought worse than the drought of record, this approach could further imperil a community because the benefits of drought management have already been realized in the plan and there are no additional management strategies that can be employed in response to the drought.

> *"(3) explains whether there may be occasion, prior to development of the next IPP, to amend the RWP to address all or a portion of the unmet need."*

For unmet needs in 2030, there will be limited opportunity or need to amend the 2026 Plan prior to development of the next initially prepared plan to address the unmet municipal needs. The 2026 Region D RWP identifies unmet municipal needs in numerous planning decades. Any amendments would have to be accomplished and include strategies that would come online prior to 2030, which is 4 years after the adoption of the 2026 RWP. Therefore, the identification of those strategies by the NETRWPG is unlikely. However, entities in Region D can either contact the NETRWPG for additional assistance or develop their own strategies to meet their needs.

For unmet needs identified for later decades in the planning period, there will be the opportunity, prior to the development of the next initially prepared plan, to amend the 2026 Plan to address all or a portion of the unmet municipal need.

6.3.2 Non-Municipal Needs Unmet

The NETRWPG has opted to leave certain projected needs unmet for some county-aggregated non-municipal WUGs in the 2026 Region D RWP for the following reasons.

- Irrigation
  - No economically viable supply can be developed.

6.4 Impacts of Marvin Nichols I Reservoir proposed by Region C in Protecting Region D Resources

While not a strategy of the NETRWPG, it should be noted that Region C may propose construction of Marvin Nichols Reservoir in the NETRWPA. Transfer of water from Marvin Nichols to the Dallas Ft. Worth Metroplex would constitute the moving of water from rural and agricultural areas. The impact of this project, particularly on the timber industry, has been the focus of previous studies. All studies not prepared on behalf of the proponents of Marvin Nichols Reservoir, including studies and reviews by independent government agencies including the U.S. Department of Interior, Texas Parks and Wildlife Department, U.S. Fish and Wildlife Service, and the Texas Forest Service, have indicated substantial negative impacts to the timber industry in Region D. Potential impacts of the Marvin Nichols project are further discussed later in this chapter.

6.5 Consistency with the Protection of Water Resources

The 2026 Region D Plan protects water contracts, option agreements, and special water resources. This Plan was developed to meet the Region's near and long-term needs during the drought of record (DOR). Water Availability Models (WAM) and Groundwater Availability Models (GAM) were employed, where available, to determine supplies available to the Region during the DOR. The NETRWPG determined that if any studies of Droughts Worse than the Drought of Record (DWDOR) were performed, they would be identified and considered within the Plan; however, no such studies were identified. The WAM and this plan recognize and honor all existing water rights and water contracts. Surface water availability is based on the assumption that all senior downstream water rights are being fully utilized.

The water resources in the North East Texas Region include six river basins providing surface water and six aquifers providing groundwater. The four major river basins within the NETRWPA boundaries include the Cypress Creek Basin, the Red River Basin, the Sabine River Basin, and the Sulphur River Basin (minor portions of the region are within the Trinity and Neches watersheds as well). The respective boundaries of these basins are depicted in Figure 1.2, in Chapter 1. The Region's groundwater resources include, primarily, the Carrizo-Wilcox Aquifer, the Trinity Aquifer, the Queen City Aquifer, the Nacatoch Aquifer, the Blossom Aquifer, and the Woodbine Aquifer. Lesser amounts of water are also available from localized shallow aquifers and springs.

Surface water accounts for the majority of the total water use in the region. Of the estimated supplies in the Sulphur River Basin, 86 percent of the water used is surface water; in the Cypress Creek Basin, 89 percent of the water used is surface water; and in the Sabine River Basin, 82 percent of the need is met by surface water. In the portion of the Red River Basin in the region, 98 percent of the water supply used is surface water. Surface water sources (Table 1.6 Existing Reservoirs, Chapter 1) include 10 reservoirs in the Cypress Creek Basin, 2 in the Red River Basin, 11 in the Sabine River Basin, and 11 in the Sulphur River Basin. There are no planned additional reservoirs by the NETRWPG other than Prairie Creek Reservoir. Currently, the majority of the available surface water supply in NETRWPA comes from the Sabine River Basin.

The Carrizo-Wilcox Aquifer is the most important groundwater resource in the NETRWPA, accounting for a total of 84% of the available groundwater. Recent groundwater level observations indicate there are significant water level declines in the Carrizo-Wilcox Aquifer in Smith and Cass Counties. The City of Tyler has made significant investments to reduce their dependency on groundwater in Smith County.

Recommended strategies must minimize threats to the region's sources of water over the planning period to be consistent with the long-term protection of water resources. The water management strategies identified herein 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. Descriptions of the major strategies and the ways in which they minimize threats include the following:

- **Water Conservation.** Strategies for water conservation were evaluated for all WUG's with a per capita water use of at least 140 gpcpd. The NETRWPA is a mostly rural region with numerous rural water supply systems, which typically have lower per capita uses. This plan includes significant savings in water demands due to the implementation of plumbing codes. These demand savings will result in conservation of the existing surface and groundwater supply resources. New plumbing codes promote water conservation, which benefits the State's water resources by reducing the volume of water necessary to support human activity.

- **Direct/Indirect Reuse.** The City of Longview, located in Gregg County, has contracted with a power generating facility to reuse a portion of the wastewater discharge generated by the City. Treated wastewater is pumped directly from the wastewater plant and is utilized for cooling water in a power generation plant in Harrison County. Secondly, the City of Canton is currently seeking an indirect reuse permit to more fully utilize its available resources. Reuse reduces the dependence on ground or surface water sources by more fully utilizing the resource once it has been withdrawn before returning it to the surface water system.
- **Expanded Use of Surface Water Resources.** One purpose of the Water Availability Model (WAM) development, a part of the regional planning process, is to assess how the increased use of surface water resources will impact the Region's water resources. The WAMs developed for the NETRWPA indicate adequate availability of surface water in the region. This strategy includes the voluntary reallocation of surface water supplies, in order to optimally utilize existing, reliable supplies.
- **Expanded Use of Groundwater.** This strategy has generally been recommended for entities with sufficient groundwater source availability to meet needs, but currently without adequate infrastructure (i.e., well capacity). Groundwater availability reported in the plan is largely based on the long-term sustainability of the aquifer as defined by the development of MAG amounts, although there are several instances where the RWPG performed local hydrogeologic assessments to identify acceptable sustainable source availability (see Chapter 3 for more details on this process). No strategies are recommended to use water above the acceptable sustainable level defined by these amounts.1

A summary of the evaluation of water management strategies is presented in Table 6.11, as well as in Appendix C6-1.

6.6 Consistency with Protection of Agricultural Resources

Agriculture is a significant contributor to local economies in the NETRWPA. Irrigation is a critical component of successful agriculture operations in the region. Irrigation plays a significant role in numerous nurseries in the Sabine Basin and numerous row crop operations in the Red River Basin. Many dairy and beef cattle operations utilize groundwater from the Carrizo-Wilcox and Queen City Aquifers.

The WAMs indicate adequate availability of surface water to meet the projected irrigation demands for the entire planning period in all but a single case. Where insufficient reliabilities have been identified, water management strategies have been developed in accordance with TWDB guidelines to provide adequate supplies to meet identified agricultural needs.

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[1] Although no strategies are recommended to exceed the available groundwater supplies defined herein, it is noted that no regulatory authority (such as a groundwater conservation district) exists within the North East Texas Regional Water Planning Area (NETRWPA). Thus, water users within this area retain the legal right to develop groundwater supplies potentially in excess of those amounts identified.

The single instance of an agricultural unmet need is for the Irrigation WUG within Red River County. The construction of raw water pipelines to available surface supplies was not considered cost effective, and groundwater availability in Red River County is restricted by the use of Modeled Available Groundwater (MAG) limits employed for the purpose of the 2026 planning process. Given there is no regulatory entity to enforce such limitations within Region D, the reality is that agricultural entities in the county would likely continue to develop groundwater supplies. Thus, a recommended strategy was identified for the Red River County Irrigation WUG to drill new wells in the portions of the Nacatoch Aquifer in Red River County. However, the approved availability assessment did not identify sufficient groundwater supplies to meet the entire projected need. To reflect the reality of no Groundwater Conservation Districts in Region D, an alternative water management strategy has been identified for the purposes of the 2026 Region D Plan reflecting the likely acquisition of additional available groundwater supply beyond the MAG limitation.

Each WMS has been incorporated into GIS and plotted along with the most recent available data from the National Land Cover Database (NLCD 2016), providing spatial reference and descriptive, quantitative data for characteristics of the land surface in the region. These data were overlaid for each project to develop a quantified estimation of acreages of various land coverage types (e.g. developed, deciduous forest, cultivated crops, …). For wetlands, data from the National Wetlands Inventory database have been similarly employed to identify potential acreages of impacted wetlands from various strategies. A summary of the evaluations of potential impacts from the recommended WMSs is presented in Table 6.11. Table 6.12 presents an index associating the acreages impacted for a given WMS to a ranked score of 1-5, with 5 representing greatest impact. The acreages for each WMS and the respective resultant index ranking for each WMS are incorporated into Table 6.11, as shown below. Overall environmental impacts are then calculated based on the scoring from each of the environmental factors, focusing upon the quantified total and wetlands acreages impacted.

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Table 6.11 Summary of Evaluation of Water Management Strategies

County	Entity	Strategy	Quantity (Ac-Ft/Yr) #	Start Decade	Reliability *(1-5)	Cost ($/Ac-Ft) $	Impacts of Strategy on: Environmental Factors (Acres)	Env. Factors **(1-5)	Agricultural Resources/ Rural Areas (Acres)	Agricultural Resources/ Rural Areas **(1-5)	Other Natural Resources **(1-5)	Key Water Quality Parameters **(1-5)	Political Feasibility **(1-5)
Bowie	Burns Redbank WSC	Riverbend Strategy	349	2030	1	$483	N/A	1	N/A	1	1	1	1
Bowie	Central Bowie County WSC	Riverbend Strategy	122	2030	1	$482	N/A	1	N/A	1	1	1	1
Bowie	De Kalb	Riverbend Strategy	48	2030	1	$242	N/A	1	N/A	1	1	1	1
Bowie	Hooks	Riverbend Strategy	317	2030	1	$242	N/A	1	N/A	1	1	1	1
Bowie	Irrigation, Bowie	Drill New Wells (Irrigation Bowie, Carrizo-Wilcox, Sulphur)	1,102	2030	1	$902	17	1	17	2	1	1	2
Bowie	Irrigation, Bowie	Drill New Wells (Irrigation Bowie, Nacatoch, Red)	1,882	2030	1	$1,296	7	1	2	1	1	1	1
Bowie	Macedonia Eylau MUD 1	Riverbend Strategy	710	2030	1	$483	N/A	1	N/A	1	1	1	1
Bowie	Manufacturing, Bowie	Riverbend Strategy	100,742	2030	1	$482	N/A	1	N/A	1	1	1	1
Bowie	Manufacturing, Bowie	Advanced Water Conservation (Manufacturing Bowie)	204	2030	1	$0	N/A	1	N/A	1	1	1	1
Bowie	Maud	Riverbend Strategy	164	2030	1	$242	N/A	1	N/A	1	1	1	1
Bowie	Nash	Riverbend Strategy	314	2030	1	$242	N/A	1	N/A	1	1	1	1
Bowie	New Boston	Riverbend Strategy	428	2030	1	$243	N/A	1	N/A	1	1	1	1
Bowie	Redwater	Riverbend Strategy	337	2030	1	$243	N/A	1	N/A	1	1	1	1
Bowie	Riverbend Water Resources District	Riverbend Strategy	211	2030	1	$1,390	46	1	0	1	1	1	1
Bowie	Texarkana	Riverbend Strategy	840	2030	1	$243	N/A	1	N/A	1	1	1	1
Bowie	Wake Village	Riverbend Strategy	649	2030	1	$242	N/A	1	N/A	1	1	1	1
Camp	Livestock, Camp	Drill New Wells (Livestock, Camp, Queen City, Cypress)	594	2030	1	$123	1	1	1	1	1	1	1
Cass	Atlanta	Riverbend Strategy Cass County	1,208	2030	1	$242	N/A	1	N/A	1	1	1	1
Cass	County-Other, Cass	Drill New Wells (County Other, Cass, Carrizo, Cypress)	323	2030	1	$514	1	1	0	1	1	1	1
Cass	County-Other, Cass	Drill New Wells (County Other, Cass, Carrizo, Sulphur)	216	2030	1	$528	1	1	0	1	1	1	1
Cass	County-Other, Cass	Riverbend Strategy Cass County	44	2030	1	$483	N/A	1	N/A	1	1	1	1
Cass	Holly Springs WSC	Increase Existing Contract (Holly Springs, Cypress)	50	2030	1	$1,629	N/A	1	N/A	1	1	1	1
Cass	Livestock, Cass	Drill New Wells (Livestock, Cass, Queen City, Cypress)	968	2030	1	$111	1	1	1	1	1	1	1
Cass	Livestock, Cass	Drill New Wells (Livestock, Cass, Queen City, Sulphur)	280	2030	1	$111	1	1	1	1	1	1	1
Cass	Riverbend Water Resources District	New 2.5 MGD Package WTP and Transmission Line	1,493	2030	1	$1,812	18	1	1	1	1	1	1
Delta	Livestock, Delta	Drill New Wells (Livestock, Delta, Nacatoch, Sulphur)	250	2030	1	$1,134	1	1	1	1	1	1	1
Delta	North Hunt SUD	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine)	192	2030	1	$1,927	1	1	1	1	1	1	1
Franklin	Livestock, Franklin	Drill New Wells (Livestock, Franklin, Carrizo, Cypress)	805	2030	1	$111	1	1	1	1	1	1	1
Franklin	Livestock, Franklin	Drill New Wells (Livestock, Franklin, Carrizo, Sulphur)	37	2030	1	$111	1	1	1	1	1	1	1
Gregg	Kilgore	Sabine River Authority Strategy - Wood County GW	734	2030	1	$12,492	57	2	0	1	1	1	3
Gregg	Longview	Sabine River Authority Strategy - Wood County GW	934	2030	1	$12,492	57	2	0	1	1	1	3

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County	Entity	Strategy	Quantity (Ac-Ft/Yr) #	Start Decade	Reliability *(1-5)	Cost ($/Ac-Ft) $	Impacts of Strategy on: Environmental Factors (Acres)	Env. Factors **(1-5)	Agricultural Resources/ Rural Areas (Acres)	Agricultural Resources/ Rural Areas **(1-5)	Other Natural Resources **(1-5)	Key Water Quality Parameters **(1-5)	Political Feasibility **(1-5)
Gregg	Mining, Gregg	Drill New Wells (Mining Gregg, Carrizo-Wilcox, Sabine)	27	2030	1	$370	1	1	1	1	1	1	1
Gregg	Starrville-Friendship WSC	Drill New Wells (Starrville Friendship, Carrizo, Sabine)	31	2030	1	$574	1	1	1	1	1	1	1
Harrison	Harleton WSC	Increase Existing Contract (Harleton, Cypress)	174	2030	1	$652	N/A	1	N/A	1	1	1	1
Harrison	Irrigation, Harrison	Drill New Wells (Irrigation Harrison, Queen City, Cypress)	484	2030	1	$120	1	1	1	1	1	1	1
Harrison	Irrigation, Harrison	Drill New Wells (Irrigation Harrison, Queen City , Sabine)	41	2030	1	$118	1	1	1	1	1	1	1
Harrison	Leigh WSC	Drill New Wells (Leigh, Queen City, Cypress)	133	2040	1	$981	1	1	0	1	1	1	1
Harrison	Longview	Sabine River Authority Strategy - Wood County GW	934	2030	1	$12,492	57	2	0	1	1	1	3
Harrison	Mining, Harrison	Drill New Wells (Mining Harrison, Queen City, Cypress)	332	2030	1	$117	1	1	0	1	1	1	1
Harrison	Mining, Harrison	Drill New Wells (Mining Harrison, Queen City, Sabine)	369	2060	1	$126	1	1	0	1	1	1	1
Harrison	North Harrison WSC	Drill New Wells (North Harrison, Queen City, Cypress)	54	2030	1	$130	1	1	0	1	1	1	1
Harrison	Scottsville	Drill New Wells (Scottsville, Queen City, Cypress)	53	2030	1	$716	1	1	0	1	1	1	1
Harrison	Waskom	Drill New Wells (Waskom, Queen City, Cypress)	324	2030	1	$602	1	1	0	1	1	1	1
Hopkins	Brinker WSC	Increase Existing Contract (Brinker WSC, Sulphur)	83	2050	1	$1,176	N/A	1	N/A	1	1	1	1
Hopkins	Cumby	Drill New Wells (Cumby, Nacatoch, Hopkins, Sabine)	81	2030	1	$2,690	2	1	0	1	1	1	1
Hopkins	Irrigation, Hopkins	Drill New Wells (Irrigation Hopkins, Carrizo-Wilcox, Sabine)	423	2040	1	$3,198	5	1	5	1	1	1	1
Hopkins	Irrigation, Hopkins	Drill New Wells (Irrigation Hopkins, Carrizo-Wilcox, Sulphur)	43	2030	1	$759	15	1	12	2	1	1	1
Hopkins	Livestock, Hopkins	Drill New Wells (Livestock, Hopkins, Carrizo, Sulphur)	13	2030	1	$995	18	1	6	1	1	1	1
Hopkins	Martin Springs WSC	Increase Existing Contract (Martin Springs)	27	2070	1	$1,176	N/A	1	N/A	1	1	1	1
Hopkins	Miller Grove WSC	Drill New Wells (Miller Grove WSC, Hopkins, Carrizo-Wilcox, Sulphur)	67	2030	1	$2,363	2	1	0	1	1	1	1
Hopkins	Mining, Hopkins	Drill New Wells (Mining Hopkins, Hopkins, Carrizo, Sulphur)	2	2030	1	$901	10	1	0	1	1	1	1
Hunt	Caddo Basin SUD	Advanced Water Conservation (Caddo Basin SUD)	15	2030	1	$770	N/A	1	N/A	1	1	1	1
Hunt	Cash SUD	Advanced Water Conservation (Cash SUD)	1	2030	1	$770	N/A	1	N/A	1	1	1	1
Hunt	Cash SUD	Increase Existing Contract (Cash SUD)	642	2030	1	$2,198	N/A	1	N/A	1	1	1	1
Hunt	Celeste	Drill New Wells (Celeste, Woodbine, Trinity)	35	2030	1	$2,288	1	1	1	1	1	1	1
Hunt	Greenville	Advanced Water Conservation (Greenville)	13,572	2030	1	$684	N/A	1	N/A	1	1	1	1
Hunt	Greenville	Greenville Water Loss Reduction	869	2030	1	$0	N/A	1	N/A	1	1	1	1
Hunt	Greenville	New WTP Greenville	12,571	2030	1	$2,887	8	1	1	1	1	1	1
Hunt	Greenville	Voluntary Reallocation of Hunt Manufacturing Surplus (Greenville, Tawakoni)	455	2030	1	$237	N/A	1	N/A	1	1	1	1
Hunt	Irrigation, Hunt	Drill New Wells (Irrigation Hunt, Nacatoch, Sabine)	151	2070	1	$1,396	34	1	1	1	1	1	1
Hunt	Livestock, Hunt	Drill New Well (Livestock, Hunt, Trinity, Sabine)	0	2060	1	$0	N/A	1	N/A	1	1	1	1
Hunt	MacBee SUD	Increase Contract - MacBee SUD to SRA	19	2070	1	$1,500	N/A	1	N/A	1	1	1	1
Hunt	North Hunt SUD	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine)	8	2030	1	$1,927	28	1	14	1	1	1	1
Hunt	Poetry WSC	Advanced Water Conservation (Poetry WSC)	7	2030	1	$770	N/A	1	N/A	1	1	1	1

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County	Entity	Strategy	Quantity (Ac-Ft/Yr) #	Start Decade	Reliability *(1-5)	Cost ($/Ac-Ft) $	Impacts of Strategy on: Environmental Factors (Acres)	Env. Factors **(1-5)	Agricultural Resources/ Rural Areas (Acres)	Agricultural Resources/ Rural Areas **(1-5)	Other Natural Resources **(1-5)	Key Water Quality Parameters **(1-5)	Political Feasibility **(1-5)
Hunt	Texas A&M University Commerce	Texas A&M University - Commerce - Drill New Wells (Hunt, Nacatoch Aquifer, Sabine Basin)	276	2030	1	$1,771	8	1	1	1	1	1	1
Lamar	County-Other, Lamar	Increase Existing Contract (County-Other Lamar)	131	2030	1	$1,629	N/A	1	N/A	1	1	1	1
Lamar	Irrigation, Lamar	Pat Mayse Raw Water Pipeline (Irrigation Lamar)	1,140	2030	1	$897	50	1	8	1	1	1	1
Lamar	Livestock, Lamar	Lamar Livestock Pipeline and Contract with Lamar Co WSD	617	2030	1	$3,626	50	1	6	1	1	1	1
Marion	Harleton WSC	Increase Existing Contract (Harleton, Cypress)	174	2030	1	$652	N/A	1	N/A	1	1	1	1
Marion	Mining, Marion	Drill New Wells (Mining Marion, Queen City, Cypress)	645	2030	1	$121	1	0	1	1	1	1	1
Morris	Holly Springs WSC	Increase Existing Contract (Holly Springs, Cypress)	50	2030	1	$0	N/A	1	N/A	1	1	1	1
Morris	Livestock, Morris	Drill New Wells (Livestock, Morris, Queen City, Cypress)	3	2030	1	$121	1	1	1	1	1	1	1
Morris	Livestock, Morris	Drill New Wells (Livestock, Morris, Queen City, Sulphur)	2	2030	1	$97	1	1	1	1	1	1	1
Rains	Miller Grove WSC	Drill New Wells (Miller Grove WSC, Hopkins, Carrizo-Wilcox, Sulphur)	67	2030	1	$2,363	1	1	1	1	1	1	1
Red River	Clarksville	Drill New Wells with RO Treatment (Clarksville, Blossom)	388	2020	1	$4,312	25	2	1	1	1	3	3
Red River	Irrigation, Red River	Drill New Wells (Irrigation, Red River, Nacatoch, Sulphur) Existing Availability	1,451	2020	1	$831	1	1	1	1	1	1	1
Red River	Livestock, Red River	Drill New Wells (Livestock, Red River, Blossom, Red)	11	2020	1	$3,636	1	1	1	1	1	1	1
Red River	Livestock, Red River	Drill New Wells (Livestock, Red River, Trinity Aquifer, Sulphur) Existing Availability	65	2020	1	$1,207	5	1	1	1	1	1	1
Smith	Crystal Systems Texas	Drill New Wells (Crystal Systems Inc, Carrizo, Sabine)	538	2040	1	$429	1	1	0	1	1	1	1
Smith	Crystal Systems Texas	Drill New Wells (Crystal Systems Inc, Carrizo, Neches)	538	2040	1	$429	1	1	0	1	1	1	1
Smith	East Texas MUD	Drill New Wells (Smith County MUD 1, Queen City, Sabine)	648	2030	1	$537	7	1	2	1	1	1	1
Smith	Lindale	Drill New Wells (Lindale, Carrizo, Neches)	1,932	2040	1	$370	18	1	6	1	1	1	1
Smith	R P M WSC	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches)	0	2030	1	$0	1	1	0	1	1	1	1
Smith	Star Mountain WSC	Drill New Wells (Star Mountain, Queen City, Sabine)	216	2030	1	$611	1	1	0	1	1	1	1
Smith	Starrville-Friendship WSC	Drill New Wells (Starrville Friendship, Carrizo, Sabine)	31	2060	1	$574	1	1	0	1	1	1	1
Smith	Winona	Drill New Wells (Winona, Carrizo-Wilcox, Sabine)	108	2050	1	$611	1	1	0	1	1	1	1
Titus	Livestock, Titus	Drill New Wells (Livestock, Titus, Carrizo, Cypress)	560	2030	1	$1,437	1	1	0	1	1	1	1
Titus	Livestock, Titus	Drill New Wells (Livestock, Titus, Carrizo, Sulphur)	459	2030	1	$796	1	1	0	1	1	1	1
Titus	Manufacturing, Titus	Advanced Water Conservation (Manufacturing Titus, Cypress)	415	2030	1	$0	N/A	1	N/A	1	1	1	1
Titus	Manufacturing, Titus	Increase Existing Contract (Manufacturing Titus from Mt Pleasant Surplus)	1,279	2030	1	$782	N/A	1	N/A	1	1	1	1
Upshur	Big Sandy	Drill New Well (Big Sandy, Carrizo, Sabine, Upshur)	85	2030	1	$0	1	1	0	1	1	1	1
Upshur	Gilmer	Drill New Wells (Gilmer, Carrizo, Cypress)	110	2030	1	$319	1	1	0	1	1	1	1
Upshur	Livestock, Upshur	Drill New Wells (Livestock, Upshur, Queen City, Cypress)	161	2030	1	$106	1	1	0	1	1	1	1
Upshur	Livestock, Upshur	Drill New Wells (Livestock, Upshur, Queen City, Sabine)	161	2030	1	$106	1	1	0	1	1	1	1
Upshur	Manufacturing, Upshur	Drill New Wells (Manufacturing Upshur, Queen City, Cypress)	161	2030	1	$106	1	1	0	1	1	1	1

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County	Entity	Strategy	Quantity (Ac-Ft/Yr) #	Start Decade	Reliability *(1-5)	Cost ($/Ac-Ft) $	Impacts of Strategy on: Environmental Factors (Acres)	Env. Factors **(1-5)	Agricultural Resources/ Rural Areas (Acres)	Agricultural Resources/ Rural Areas **(1-5)	Other Natural Resources **(1-5)	Key Water Quality Parameters **(1-5)	Political Feasibility **(1-5)
Van Zandt	Canton	Canton Reuse	255	2070	1	$8,125	81	2	46	3	1	1	2
Van Zandt	Canton	Drill New Wells (Canton, Carrizo-Wilcox, Sabine)	145	2080	1	$1,400	1	1	0	1	1	1	1
Van Zandt	Edom WSC	Drill New Wells (Edom WSC, Van Zandt, Carrizo, Neches)	60	2030	1	$2,931	3	1	1	1	1	1	1
Van Zandt	Little Hope Moore WSC	Drill New Well (Little Hope Moore WSC, Van Zandt, Carrizo, Neches)	17	2030	1	$2,588	1	1	0	1	1	1	1
Van Zandt	Livestock, Van Zandt	Drill New Wells (Livestock Van Zandt, Queen City, Neches)	90	2030	1	$1,479	1	1	1	1	1	1	1
Van Zandt	MacBee SUD	Increase Contract - MacBee SUD to SRA	19	2030	1	$1,500	N/A	1	N/A	1	1	1	1
Van Zandt	Manufacturing, Van Zandt	Advanced Water Conservation (Manufacturing Van Zandt)	75	2030	1	$0	N/A	1	N/A	1	1	1	1
Van Zandt	Manufacturing, Van Zandt	Drill New Wells (Manufacturing Van Zandt, Carrizo-Wilcox, Trinity)	386	2030	1	$1,549	1	1	1	1	1	1	1
Van Zandt	Myrtle Springs WSC	Myrtle Springs WSC - Drill New Wells (Van Zandt, Carrizo-Wilcox Aquifer, Sabine Basin)	102	2030	1	$1,524	1	1	1	1	1	1	1
Van Zandt	R P M WSC	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches)	217	2040	1	$981	12	1	4	1	1	1	1
Wood	Livestock, Wood	Drill New Wells (Livestock, Wood, Queen City, Sabine)	1,129	2030	1	$111	1	1	1	1	1	1	1
Wood	Manufacturing, Wood	Advanced Conservation - Manufacturing Wood Co	349	2030	1	$0	1	1	1	1	1	1	1
Wood	Manufacturing, Wood	Drill New Wells (Manufacturing, Wood, Queen City, Sabine)	1,991	2030	1	$78	N/A	1	N/A	1	1	1	1
Wood	Mining, Wood	Drill New Wells (Mining, Wood, Queen City Sabine)	38	2030	1	$0	1	1	0	1	1	1	1

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Table 6.12 Ranked Index of Impacted Acreages

Acreage	Rank
0 - 10	1
11 - 20	2
21 - 50	3
50 -100	4
> 100	5

New well sites have a minimal environmental impact due the size and location of the sites. Texas Commission on Environmental Quality Rule 290.41(c)(1) prevents well sites from being located in an area subject to flooding therefore they are located away from environmentally sensitive flood and wetland areas. A completed well head occupies an 8'x8' space or 0.0015 acres. Most well sites are fenced at 25'x25' or 0.014 acres. Given the small size of well sites and the location, the agricultural and environmental impacts from these strategies have been assumed negligible.

While the NETRWPG has not had time or resources to consider the full range of options it might propose to protect and enhance the agricultural resources of the region, and, thus, the state, by protecting or enhancing instream flow considerations, the NETRWPG has identified studies that provide a basis for including voluntary goals and proposals for such efforts in the Sulphur and Cypress basins. These studies are discussed below and in Chapter 8.

6.6.1 Timber Resources

Much of the eastern portion of the NETRWPA is heavily forested and timber is an important economic resource for the region. There are no strategies recommended by the NETRWPG that would have a significant impact on timber resources.

6.7 Consistency with Protection of Natural Resources

The NETRWP contains many natural resources that must be considered in water planning. Some of the natural resources include a wide diversity of fish and wildlife species, including some rare, threatened or endangered species. The natural resources of the region also include: local, state, and federal parks and public lands; significant habitat for wildlife; and important energy/mineral reserves. The 2026 NETRWP is consistent with the long-term protection of these resources. A summary of the environmental assessment of the recommended water management strategies is presented in Table 6.13.

Each Water Management Strategy (WMS) has been incorporated into GIS and plotted along with the most recent available data from the National Land Cover Database (NLCD 2016), providing spatial reference and descriptive, quantitative data for characteristics of the land surface in the region. These data were overlaid for each project to develop a quantified estimation of acreages of various land coverage types (e.g. developed, deciduous forest, cultivated crops). For wetlands, data from the United States Fish and Wildlife Service (USFWS) National Wetlands Inventory database have been similarly employed in GIS to identify potential acreages of impacted wetlands from various strategies. Although it is expected that wetlands would be avoided if possible in the implementation of a strategy, the estimates herein are conservative in the sense that no avoidance has been included into the calculation of potential acreage impacted. The index presented in Table 6.12 has been applied to acreages for each WMS and the respective index ranking for each WMS impact on environmental factors have been incorporated into Table 6.13, as shown below. A summary of the environmental assessment of recommended strategies is presented in Appendix C6-2.

For the purposes of this plan, it has been assumed in Table 6.17 that strategies not necessitating the implementation of significant long-term infrastructure and thus relatively small associated impacted acreages (e.g., conservation, contractual, or groundwater wells), would have minimal impacts on environmental needs and cultural resources, and are thus ranked 1. Calculated estimates of acreages for strategies contemplating the implementation of infrastructure were evaluated using Table 6.14 and determined to have a slightly larger impact (2), but remaining minimal due to the fact that the implementation of each WMS project would include permitting activities that would require minimal impacts to environmental and cultural resources. As there are no bays or estuaries within Region D, the characterization of potential impacts from Region D recommended strategies to bays and estuaries have been assumed to not be applicable (N/A).

Following is a brief discussion of the consistency of the plan with protection of natural resources.

6.7.1 Threatened/Endangered Species

A list of species of special concern, including threatened or endangered species, located within the NETRWPA is contained in Table 6.14, which lists the counties within the NETRWPA which could potentially have an impact on endangered species related to the development of the source. Contractual shortages were considered to have insignificant or no impact. Included are 9 species of birds, 3 mammals, 4 reptiles, 7 fish, 3 plants, and 6 mollusks. Species of interest in the NETRWPA that are likely to be further studied in the future include the alligator snapping turtle and the Louisiana pigtoe.

A significant number of strategies identified in the NETRWPA include development of additional groundwater supplies (wells). There should be no significant impact on threatened and endangered species as a result of these strategies. Although none of the water management strategies evaluated for the 2026 Plan is expected to adversely impact any of the listed species, additional assessment should be performed in the planning stages of specific projects to ensure protection of endangered and threatened species.

As discussed above, the NETRWPG is developing steps as part of its water planning process to protect and enhance the water, agricultural and natural resources of the region, and, thus, those of the state. As was discussed in the 2016 Region D Plan, work in the Cypress basin on instream flows has shown the opportunity to protect and enhance instream flows in several major stream segments in that river basin. Experimentation and monitoring done since the 2011 Region D Plan indicates that the flow regimes recommended for the Cypress basin can provide the ecological benefits that formed the bases of the voluntary regimes. For example, changes in release patterns from Lake O' the Pines, and experimental reintroduction of paddlefish to the Caddo Lake watershed appears to be a success, not only allowing recovery of a state listed threatened species, but also improving habitat for other fish in the basin.

Similar summaries of the evaluations of potential impacts from identified Alternative WMSs and the environmental assessment of those Alternative WMSs are presented in Appendix C6-3 and Appendix C6-4, respectively.

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Table 6.13 Summary of Environmental Assessment

County	Entity	Strategy	Total Acres Impacted (Acres)	Environmental Factors									
				Total Acres Impacted (1-5)	Wetland Acres (Acres)	Wetland Acres (1-5)	Envir Water Needs (1-5)	Habitat (1-5)	Threat and Endangered Species #	Cultural Resources (1-5)	Bays & Estuaries (1-5)	Envir Water Quality (1-5)	Overall Environmental Impacts (1-5)
Bowie	Burns Redbank WSC	Riverbend Strategy	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Bowie	Central Bowie County WSC	Riverbend Strategy	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Bowie	De Kalb	Riverbend Strategy	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Bowie	Hooks	Riverbend Strategy	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Bowie	Irrigation, Bowie	Drill New Wells (Irrigation Bowie, Carrizo-Wilcox, Sulphur)	17	2	0.11	1	1	1	14	1	N/A	1	1
Bowie	Irrigation, Bowie	Drill New Wells (Irrigation Bowie, Nacatoch, Red)	7	1	0.22	1	1	1	14	1	N/A	1	1
Bowie	Macedonia Eylau MUD 1	Riverbend Strategy	N/A	1	0.22	1	1	1	14	1	N/A	1	1
Bowie	Manufacturing, Bowie	Riverbend Strategy	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Bowie	Manufacturing, Bowie	Advanced Water Conservation (Manufacturing Bowie)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Bowie	Maud	Riverbend Strategy	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Bowie	Nash	Riverbend Strategy	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Bowie	New Boston	Riverbend Strategy	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Bowie	Redwater	Riverbend Strategy	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Bowie	Riverbend Water Resources District	Riverbend Strategy	46	3	2	1	1	2	14	2	N/A	1	1
Bowie	Texarkana	Riverbend Strategy	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Bowie	Wake Village	Riverbend Strategy	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Camp	Livestock, Camp	Drill New Wells (Livestock, Camp, Queen City, Cypress)	1	1	0.075	1	1	1	11	1	N/A	1	1
Cass	Atlanta	Riverbend Strategy Cass County	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Cass	County-Other, Cass	Drill New Wells (County Other, Cass, Carrizo, Cypress)	1	1	0.08	1	1	1	14	1	N/A	1	1
Cass	County-Other, Cass	Drill New Wells (County Other, Cass, Carrizo, Sulphur)	1	1	0.08	1	1	1	14	1	N/A	1	1
Cass	County-Other, Cass	Riverbend Strategy Cass County	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Cass	Holly Springs WSC	Increase Existing Contract (Holly Springs, Cypress)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Cass	Livestock, Cass	Drill New Wells (Livestock, Cass, Queen City, Cypress)	1	1	0.08	1	1	1	14	1	N/A	1	1
Cass	Livestock, Cass	Drill New Wells (Livestock, Cass, Queen City, Sulphur)	1	1	0.08	1	1	1	14	1	N/A	1	1
Cass	Riverbend Water Resources District	New 2.5 MGD Package WTP and Transmission Line	18	2	2	1	1	2	14	2	N/A	1	1
Delta	Livestock, Delta	Drill New Wells (Livestock, Delta, Nacatoch, Sulphur)	1	1	0.066	1	1	1	9	1	N/A	1	1
Delta	North Hunt SUD	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine)	1	1	0.066	1	1	1	9	1	N/A	1	1
Franklin	Livestock, Franklin	Drill New Wells (Livestock, Franklin, Carrizo, Cypress)	1	1	0.066	1	1	1	13	1	N/A	1	1
Franklin	Livestock, Franklin	Drill New Wells (Livestock, Franklin, Carrizo, Sulphur)	1	1	0.066	1	1	1	13	1	N/A	1	1
Gregg	Kilgore	Sabine River Authority Strategy - Wood County GW	57	4	0.066	2	1	2	18	1	N/A	1	2
Gregg	Longview	Sabine River Authority Strategy - Wood County GW	57	4	0.066	2	1	2	18	1	N/A	1	2
Gregg	Mining, Gregg	Drill New Wells (Mining Gregg, Carrizo-Wilcox, Sabine)	1	1	0.066	1	1	1	18	1	N/A	1	1
Gregg	Starrville-Friendship WSC	Drill New Wells (Starrville Friendship, Carrizo, Sabine)	1	1	0.066	1	1	1	18	1	N/A	1	1
Harrison	Harleton WSC	Increase Existing Contract (Harleton, Cypress)	N/A	1	N/A	1	1	1	23	1	N/A	1	1

County	Entity	Strategy	Total Acres Impacted (Acres)	Environmental Factors									
				Total Acres Impacted (1-5)	Wetland Acres (Acres)	Wetland Acres (1-5)	Envir Water Needs (1-5)	Habitat (1-5)	Threat and Endangered Species #	Cultural Resources (1-5)	Bays & Estuaries (1-5)	Envir Water Quality (1-5)	Overall Environmental Impacts (1-5)
Harrison	Irrigation, Harrison	Drill New Wells (Irrigation Harrison, Queen City, Cypress)	1	1	0.09	1	1	1	23	1	N/A	1	1
Harrison	Irrigation, Harrison	Drill New Wells (Irrigation Harrison, Queen City , Sabine)	1	1	0.09	1	1	1	23	1	N/A	1	1
Harrison	Leigh WSC	Drill New Wells (Leigh, Queen City, Cypress)	1	1	0.09	1	1	1	23	1	N/A	1	1
Harrison	Longview	Sabine River Authority Strategy - Wood County GW	57	4	0.066	2	1	2	23	1	N/A	1	2
Harrison	Mining, Harrison	Drill New Wells (Mining Harrison, Queen City, Cypress)	1	1	0.09	1	1	1	23	1	N/A	1	1
Harrison	Mining, Harrison	Drill New Wells (Mining Harrison, Queen City, Sabine)	1	1	0.09	1	1	1	23	1	N/A	1	1
Harrison	North Harrison WSC	Drill New Wells (North Harrison, Queen City, Cypress)	1	1	0.09	1	1	1	23	1	N/A	1	1
Harrison	Scottsville	Drill New Wells (Scottsville, Queen City, Cypress)	1	1	0.09	1	1	1	23	1	N/A	1	1
Harrison	Waskom	Drill New Wells (Waskom, Queen City, Cypress)	1	1	0.09	1	1	1	23	1	N/A	1	1
Hopkins	Brinker WSC	Increase Existing Contract (Brinker WSC, Sulphur)	N/A	1	N/A	1	1	1	11	1	N/A	1	1
Hopkins	Cumby	Drill New Wells (Cumby, Nacatoch, Hopkins, Sabine)	2	1	0.02	1	1	1	11	1	N/A	1	1
Hopkins	Irrigation, Hopkins	Drill New Wells (Irrigation Hopkins, Carrizo-Wilcox, Sabine)	5	1	0.03	1	1	1	11	1	N/A	1	1
Hopkins	Irrigation, Hopkins	Drill New Wells (Irrigation Hopkins, Carrizo-Wilcox, Sulphur)	15	2	0.03	1	1	1	11	1	N/A	1	1
Hopkins	Livestock, Hopkins	Drill New Wells (Livestock, Hopkins, Carrizo, Sulphur)	18	2	0.03	1	1	1	11	1	N/A	1	1
Hopkins	Martin Springs WSC	Increase Existing Contract (Martin Springs)	N/A	1	N/A	1	1	1	11	1	N/A	1	1
Hopkins	Miller Grove WSC	Drill New Wells (Miller Grove WSC, Hopkins, Carrizo-Wilcox, Sulphur)	2	1	0.03	1	1	1	11	1	N/A	1	1
Hopkins	Mining, Hopkins	Drill New Wells (Mining Hopkins, Hopkins, Carrizo, Sulphur)	10	1	0.03	1	1	1	11	1	N/A	1	1
Hunt	Caddo Basin SUD	Advanced Water Conservation (Caddo Basin SUD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Hunt	Cash SUD	Advanced Water Conservation (Cash SUD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Hunt	Cash SUD	Increase Existing Contract (Cash SUD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Hunt	Celeste	Drill New Wells (Celeste, Woodbine, Trinity)	4	1	0.01	1	1	1	14	1	N/A	1	1
Hunt	Greenville	Advanced Water Conservation (Greenville)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Hunt	Greenville	Greenville Water Loss Reduction	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Hunt	Greenville	New WTP Greenville	8	1	0	1	1	2	14	2	N/A	1	1
Hunt	Greenville	Voluntary Reallocation of Hunt Manufacturing Surplus (Greenville, Tawakoni)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Hunt	Irrigation, Hunt	Drill New Wells (Irrigation Hunt, Nacatoch, Sabine)	5	1	0.13	1	1	1	14	1	N/A	1	1
Hunt	Livestock, Hunt	Drill New Well (Livestock, Hunt, Trinity, Sabine)	1	1	N/A	1	1	1	14	1	N/A	1	1
Hunt	MacBee SUD	Increase Contract - MacBee SUD to SRA	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Hunt	North Hunt SUD	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine)	5	1	0.13	1	1	1	14	1	N/A	1	1
Hunt	Poetry WSC	Advanced Water Conservation (Poetry WSC)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Hunt	Texas A&M University Commerce	Texas A&M University - Commerce - Drill New Wells (Hunt, Nacatoch Aquifer, Sabine Basin)	5	1	0.13	1	1	1	14	1	N/A	1	1
Lamar	County-Other, Lamar	Increase Existing Contract (County-Other Lamar)	N/A	1	N/A	1	1	1	14	1	N/A	1	1

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County	Entity	Strategy	Total Acres Impacted (Acres)	Environmental Factors										
				Total Acres Impacted (1-5)	Wetland Acres (Acres)	Wetland Acres (1-5)	Envir Water Needs (1-5)	Habitat (1-5)	Threat and Endangered Species #	Cultural Resources (1-5)	Bays & Estuaries (1-5)	Envir Water Quality (1-5)	Overall Environmental Impacts (1-5)
Lamar	Irrigation, Lamar	Pat Mayse Raw Water Pipeline (Irrigation Lamar)	50	3	0.2	1	1	2	14	2	N/A	1	1
Lamar	Livestock, Lamar	Lamar Livestock Pipeline and Contract with Lamar Co WSD	50	3	0.2	1	1	2	14	2	N/A	1	1
Marion	Harleton WSC	Increase Existing Contract (Harleton, Cypress)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
Marion	Mining, Marion	Drill New Wells (Mining Marion, Queen City, Cypress)	1	1	0.17	1	1	1	15	1	N/A	1	0
Morris	Holly Springs WSC	Increase Existing Contract (Holly Springs, Cypress)	N/A	1	N/A	1	1	1	12	1	N/A	1	1
Morris	Livestock, Morris	Drill New Wells (Livestock, Morris, Queen City, Cypress)	1	1	0.17	1	1	1	12	1	N/A	1	1
Morris	Livestock, Morris	Drill New Wells (Livestock, Morris, Queen City, Sulphur)	1	1	0.17	1	1	1	12	1	N/A	1	1
Rains	Miller Grove WSC	Drill New Wells (Miller Grove WSC, Hopkins, Carrizo-Wilcox, Sulphur)	1	1	0.17	1	1	1	0	1	N/A	1	1
Red River	Clarksville	Drill New Wells with RO Treatment (Clarksville, Blossom)	25	3	1	1	1	1	14	1	N/A	1	2
Red River	Irrigation, Red River	Drill New Wells (Irrigation, Red River, Nacatoch, Sulphur) Existing Availability	1	1	0.04	1	1	1	14	1	N/A	1	1
Red River	Livestock, Red River	Drill New Wells (Livestock, Red River, Blossom, Red)	1	1	0.04	1	1	1	14	1	N/A	1	1
Red River	Livestock, Red River	Drill New Wells (Livestock, Red River, Trinity Aquifer, Sulphur) Existing Availability	5	1	0.04	1	1	1	14	1	N/A	1	1
Smith	Crystal Systems Texas	Drill New Wells (Crystal Systems Inc, Carrizo, Sabine)	1	1	0.08	1	1	1	16	1	N/A	1	1
Smith	Crystal Systems Texas	Drill New Wells (Crystal Systems Inc, Carrizo, Neches)	1	1	0.08	1	1	1	16	1	N/A	1	1
Smith	East Texas MUD	Drill New Wells (Smith County MUD 1, Queen City, Sabine)	1	1	0.08	1	1	1	16	1	N/A	1	1
Smith	Lindale	Drill New Wells (Lindale, Carrizo, Neches)	18	2	0.08	1	1	1	16	1	N/A	1	1
Smith	R P M WSC	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches)	1	1	0.08	1	1	1	16	1	N/A	1	1
Smith	Star Mountain WSC	Drill New Wells (Star Mountain, Queen City, Sabine)	1	1	0.08	1	1	1	16	1	N/A	1	1
Smith	Starrville-Friendship WSC	Drill New Wells (Starrville Friendship, Carrizo, Sabine)	1	1	0.08	1	1	1	16	1	N/A	1	1
Smith	Winona	Drill New Wells (Winona, Carrizo-Wilcox, Sabine)	1	1	0.08	1	1	1	16	1	N/A	1	1
Titus	Livestock, Titus	Drill New Wells (Livestock, Titus, Carrizo, Cypress)	1	1	0.1	1	1	1	12	1	N/A	1	1
Titus	Livestock, Titus	Drill New Wells (Livestock, Titus, Carrizo, Sulphur)	1	1	0.1	1	1	1	12	1	N/A	1	1
Titus	Manufacturing, Titus	Advanced Water Conservation (Manufacturing Titus, Cypress)	N/A	1	N/A	1	1	1	12	1	N/A	1	1
Titus	Manufacturing, Titus	Increase Existing Contract (Manufacturing Titus from Mt Pleasant Surplus)	N/A	1	N/A	1	1	1	12	1	N/A	1	1
Upshur	Big Sandy	Drill New Well (Big Sandy, Carrizo, Sabine, Upshur)	1	1	0.07	1	1	1	16	1	N/A	1	1
Upshur	Gilmer	Drill New Wells (Gilmer, Carrizo, Cypress)	1	1	0.07	1	1	1	16	1	N/A	1	1
Upshur	Livestock, Upshur	Drill New Wells (Livestock, Upshur, Queen City, Cypress)	1	1	0.07	1	1	1	16	1	N/A	1	1
Upshur	Livestock, Upshur	Drill New Wells (Livestock, Upshur, Queen City, Sabine)	1	1	0.07	1	1	1	16	1	N/A	1	1
Upshur	Manufacturing, Upshur	Drill New Wells (Manufacturing Upshur, Queen City, Cypress)	1	1	0.07	1	1	1	16	1	N/A	1	1
Van Zandt	Canton	Canton Reuse	81	4	1.62	1	1	1	0	1	N/A	1	2
Van Zandt	Canton	Drill New Wells (Canton, Carrizo-Wilcox, Sabine)	1	1	0.06	1	1	1	17	1	N/A	1	1

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County	Entity	Strategy	Total Acres Impacted (Acres)	Environmental Factors									
				Total Acres Impacted (1-5)	Wetland Acres (Acres)	Wetland Acres (1-5)	Envir Water Needs (1-5)	Habitat (1-5)	Threat and Endangered Species #	Cultural Resources (1-5)	Bays & Estuaries (1-5)	Envir Water Quality (1-5)	Overall Environmental Impacts (1-5)
Van Zandt	Edom WSC	Drill New Wells (Edom WSC, Van Zandt, Carrizo, Neches)	3	1	0.06	1	1	1	17	1	N/A	1	1
Van Zandt	Little Hope Moore WSC	Drill New Well (Little Hope Moore WSC, Van Zandt, Carrizo, Neches)	1	1	0.05	1	1	1	17	1	N/A	1	1
Van Zandt	Livestock, Van Zandt	Drill New Wells (Livestock Van Zandt, Queen City, Neches)	1	1	0.05	1	1	1	17	1	N/A	1	1
Van Zandt	MacBee SUD	Increase Contract - MacBee SUD to SRA	N/A	1	N/A	1	1	1	17	1	N/A	1	1
Van Zandt	Manufacturing, Van Zandt	Advanced Water Conservation (Manufacturing Van Zandt)	N/A	1	N/A	1	1	1	17	1	N/A	1	1
Van Zandt	Manufacturing, Van Zandt	Drill New Wells (Manufacturing Van Zandt, Carrizo-Wilcox, Trinity)	N/A	1	N/A	1	1	1	17	1	N/A	1	1
Van Zandt	Myrtle Springs WSC	Myrtle Springs WSC - Drill New Wells (Van Zandt, Carrizo-Wilcox Aquifer, Sabine Basin)	1	1	0.05	1	1	1	17	1	N/A	1	1
Van Zandt	R P M WSC	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches)	12	2	0.05	1	1	1	17	1	N/A	1	1
Wood	Livestock, Wood	Drill New Wells (Livestock, Wood, Queen City, Sabine)	1	1	0.07	1	1	1	17	1	N/A	1	1
Wood	Manufacturing, Wood	Advanced Conservation - Manufacturing Wood Co	N/A	1	N/A	1	1	1	18	1	N/A	1	1
Wood	Manufacturing, Wood	Drill New Wells (Manufacturing, Wood, Queen City, Sabine)	1	1	0.07	1	1	1	17	1	N/A	1	1
Wood	Mining, Wood	Drill New Wells (Mining, Wood, Queen City Sabine)	1	1	0.07	1	1	1	18	1	N/A	1	1

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Table 6.14 Summary of Endangered and Threatened Species within the North East Texas Region

Species	Bowie	Camp	Cass	Delta	Franklin	Gregg	Harrison	Hopkins	Hunt	Lamar	Marion	Morris	Rains	Red River	Smith	Titus	Upshur	Van Zandt	Wood
Birds																			
Bachman's sparrow	1	1	1		1	1	1				1	1		1	1	1	1		1
Black Rail				1	1			1	1	1			1	1				1	1
Interior least tern	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Piping plover	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Rufa Red Knot				1				1	1	1			1					1	
Swallow-tailed kite	1	1	1		1	1	1				1	1		1	1	1	1	1	1
White-faced ibis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Wood stork	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Zone-tailed hawk													1						
Fish																			
Blackside darter	1		1				1				1								
Blue sucker						1													
Bluehead shiner			1				1				1								
Chub shiner	1									1									
Paddlefish	1		1		1		1	1		1	1	1		1		1			
Shovelnose sturgeon	1									1				1					
Western creek chubsucker	1						1												1
Insects																			
American burying beetle										1				1					
Mammals																			
Black bear	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Louisiana black bear							1												
Rafinesque's big-eared bat			1			1	1				1								
Mollusks																			
Louisiana Pigtoe		1	1		1	1	1	1	1		1	1	1		1	1	1	1	1
Ouachita Rock Pocketbook										1				1					
Sandbank Pocketbook						1	1								1		1	1	1
Southern Hickorynut		1			1	1	1		1		1	1	1		1	1	1	1	1
Texas Heelsplitter						1	1		1				1		1		1	1	1
Texas Pigtoe						1	1		1				1		1		1	1	1
Plants																			
Earth fruit						1	1												
Neches River rose-mallow							1												
Small-headed pipewort																		1	
Reptiles																			
Alligator snapping turtle	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Louisiana pine snake															1		1		1
Northern scarlet snake		1	1			1	1		1		1	1			1		1	1	1
Texas horned lizard	1			1	1	1	1	1	1	1			1	1	1	1	1	1	1
GRAND TOTAL	**14**	**11**	**14**	**9**	**13**	**18**	**23**	**11**	**14**	**14**	**15**	**12**	**14**	**14**	**16**	**12**	**16**	**17**	**18**

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6.7.2 Navigation

As noted in Chapter 1, while the lack of perennial streams limits the viability of navigation projects in northeast Texas, there are several notable navigation projects either in the region or affected by streamflows from the region. None of the recommended water management strategies proffered herein are expected to exhibit impacts on navigation within the region. Conservation, groundwater wells, reuse, and contractual strategies will not impact navigation of surface waters, and the recommended surface water strategies considering development of infrastructure utilize existing surface water supplies and not affect navigation of streams in the region.

6.7.3 Parks and Public Lands

The NETRWPA contains numerous state parks, forests, and wildlife management areas. In addition, there are a number of city parks, recreational facilities, and public lands located throughout the region. None of the water management strategies evaluated for the 2026 NETRWP are expected to adversely impact parks or public land. The development of additional groundwater resources could ultimately reduce the reliance on water from surface water resources. Where possible, reducing the need for diversions from surface water sources may enhance recreational opportunities.

6.7.4 Energy Reserves

Numerous oil and gas wells are located within the NETRWPA, including the Hawkins Oil Field and the majority of the East Texas Oil Field. In addition, significant lignite coal resources can be found in the NETRWPA under portions of 15 counties. These resources represent an important economic base for the region. None of the water management strategies recommended by the NETRWPG are expected to significantly impact oil, natural gas, or coal production in the NETRWPA.

6.8 Consistency with State Water Planning Guidelines

To be considered consistent with long-term protection of the State's water, agricultural, and natural resources, the NETRWP must be determined to be in compliance with Texas Administrative Code (TAC) 31, Chapters 357.40, 357.41, 358.3(4) and (9).

The information, data evaluations, and recommendations included in Chapters 1 through 10 of the NETRWP collectively comply with these regulations.

6.9 Marvin Nichols I Reservoir and Impacts on Water Resources, Agricultural Resources and Natural Resources

Marvin Nichols I Reservoir was first included in the State Water Plan in 1968. More recently, it has been a recommended water management strategy for Region C in 2011, 2016, and 2021, and was included in the 2012, 2017, and 2022 State Water Plans. Marvin Nichols reservoir has also been included in Region C's drafts as a proposed water management strategy in previous rounds of planning. Since all proposals for Marvin Nichols reservoirs would be located exclusively in the North East Texas Region, and the impacts to agricultural and natural resources would be greatest in this Region, the NETRWPG feels it is important and necessary to review the impacts that any such Marvin Nichols reservoir would have to this area. This is particularly true since the spirit of Texas' regional water planning process includes a ground up, localized approach to the planning process. The discussion below will apply to the Marvin Nichols I/IA Reservoir, since it was included in the 2022 State Water Plan, but the approach applies to any proposed reservoir in the Sulphur River Basin.

Based on the reasons set forth below, it has been and continues to be the position of the NETRWPG that Marvin Nichols I Reservoir should not be included in any regional plans as a water management strategy and not be included in the 2027 State Water Plan as a water management strategy. The NETRWPG continues to oppose any Marvin Nichols type reservoir. The NETRWPG also has not yet seen an adequate evaluation by Region C of the impacts of such a reservoir on water, agricultural and natural resources of the state and on Region D. As noted in the 2021 Region C Water Plan, "[t]he total acreage that would be flooded if all recommended water management strategies from the 2021 Region C Water Plan were implemented is almost 131,000 acres, with almost half of that being from the proposed Marvin Nichols Reservoir." The NETRWPG supports its positions with both the facts set out in its previous 2011, 2016, and 2021 Region D Plans, including information provided again below that have come from evaluations of the needs for instream flows to protect flood plain forests that exist downstream of the proposed reservoir. It is the position of the NETRWPG that all proposals for Marvin Nichols reservoirs developed by Region C are based on the impoundment and use of water that NETRWPG needs to protect these downstream agricultural and natural resources.

At the time of publication of this Regional Water Plan, no agreement has been made between Regions C and D for the purposes of the 2026 Region D Plan.

6.9.1 Impacts on Agricultural Resources

Agriculture as a whole and timber in particular are vital and important industries throughout the NETRWPA, as illustrated in Chapter 1, Figure 1.11, wherein timber is listed in 12 of the 19 counties as a principal crop.

Estimates developed for the USACE and Sulphur River Basin Authority (SRBA 2013) reflect that Marvin Nichols I Reservoir would flood 66,103 acres, mainly in Red River County and including portions of Titus, Franklin, Delta, and Lamar Counties. Within that study, a high-level desktop analysis using available land coverage data from the TPWD Ecological Systems Classification, and EPA concluded that included in the flooded acreage would be 31,600 acres of forest lands, including an approximation of 10,156 acres of Priority 1 bottomland hardwoods potentially classified as waters of the U.S. (SRBA Environmental Evaluation Interim Report, Sulphur River Basin Comparative Assessment, 2014). Specifically to differentiate bottomland hardwood forest by that area potentially characterized as "waters of the U.S.," dubbed "Forested Wetland," an extra GIS filter was employed using the U.S. Fish and Wildlife Service National Wetlands Inventory data coverage.

While the SRBA study suggests that the amount of bottomland hardwood forest characterized as waters of the U.S., i.e., "Forested Wetland" potentially impacted by the proposed Marvin Nichols reservoir is 10,156 acres, the amount reported in the TWDB 2008 Reservoir Site Protection Study is reported as 26,309 acres (Table 5-37, pg. 100, utilizing a methodology performed by the Texas Parks and Wildlife Department, TPWD, described in Appendix C of that report). A possible reason for this significant difference may be the extra filtering noted above to differentiate between bottomland hardwood forest, and "Forested Wetland," which is used for their calculation of "waters of the U.S." While the difference in the overall acreage between the 2008 TWDB study and the more recent SRBA study is less than 2%, the reported difference in impacts on potentially mitigable bottomland hardwoods has decreased by approximately 16,153 acres, or more than 60%.

More recent analyses performed for the SRBA (as reported in Timberland and Agricultural Land Impact Assessment for Selected Water Resource Options in the Sulphur River Basin, SBG 2015) have indicated the impacted acreage from the Marvin Nichols Reservoir project to be 66,216 acres, assuming a reservoir elevation of 328 ft-NGVD. Additional information developed for the SRBA in early 2015 indicated that, "recent droughts had impacted the estimated firm yield of reservoirs within the Sulphur Basin to a greater extent than anticipated and that a larger scope of the Marvin Nichols project should be evaluated." This more recent study thus adopted a "more refined" approach to evaluate timber resources. The results indicated that approximately 42,019 acres of timber, 22,854 acres of agriculture, and 1,343 acres of "other" wildlife area would be impacted by the Marvin Nichols Reservoir project. The estimated value of these impacts totals approximately $28.3 million ($24.7 million timber value, $3.6 million agricultural value).

More recent draft information presented by the Region C RWPG at its meeting on September 30, 2024, indicates a surface area for Marvin Nichols Reservoir of 66,103 acres, with storage of 1,532,000 ac-ft of storage. This acreage is consistent with that previously reported in the 2021 Region C Water Plan. Within Appendix J of the 2021 Region C Plan, available data on land cover types potentially useful as agricultural resources were adapted from the *Environmental Evaluation Interim Report – Sulphur River Basin – Comparative Assessment*. Estimated amounts of inundated area were Timberlands (42,823 acres), Active/Potential Agricultural and Pasture Lands (18,947 acres), and Non-Agricultural Lands (4,333 acres). It is further noted therein that the "most significant impacts to agricultural resources relative to the resources of Region D and of Texas are on resources that could potentially be useful to the silviculture industry,", which is discussed in greater detail below.

Ultimately, these studies provide a useful example of the uncertainty underlying the planning-level characterization of the significance of impacts from the Marvin Nichols I Reservoir on the timber industry in the North East Texas Region, and the importance of field verification and further detailed analysis.

In addition to the timber and agricultural land lost as a result of the reservoir, mitigation requirements are anticipated to significantly impact agricultural resources. It has been acknowledged that mitigation is intended to offset impacts to natural resources, but may increase impacts to agricultural resources. The SRBA (2014) study of the Sulphur River Basin (specifically the Cost Rollup Report) concluded that approximately 47,060 acres would be necessary for mitigation. This methodology was based upon the application of a 2:1 ratio applied to the aforementioned calculated acreage of 23,530 acres of "water of the U.S." within the footprint of the proposed reservoir. This information was then incorporated into the 2016 Region C Water Plan.

The results of the SRBA Study were used as the basis for the 2014 analysis for Region C entitled, "Analysis and Quantification of the Impacts of the Marvin Nichols Reservoir Management Strategy on the Agricultural and Natural Resources of Region D and the State." This analysis compiled information developed during the SRBA study for use in the TWDB's conflict resolution process between Region C and Region D performed for the purposes of the 2016 regional water planning process.

Region D prepared a three-part response to the Region C RWPG's analysis. In the first part of this response, Trungale (2014) concluded that the impacts on priority bottomland hardwoods due to the reservoir and its impacts on flows would be significant:

> *"Development of the Marvin Nichols Reservoir project as proposed in the Region C water plan would permanently flood a large proportion of the last remaining intact bottomland hardwoods (BLH) in East Texas. It would also result in a massive reduction in flows remaining in the river downstream of the proposed reservoir project which would result in significant, likely catastrophic, harm to an even larger bottomland hardwood forest area. As the plan acknowledges "Marvin Nichols Reservoir will have significant environmental impacts." (Region C 2011, p 4D.11)"*

These bottomland hardwoods habitats are important natural resources that are dependent on maintenance of instream flows.

> *"Floodplains with BLH and other ecologically important habitats are one of most altered and imperiled ecosystems on Earth (Opperman et al. 2010). The unique importance of this BLH ecosystem is largely based on its extensive swamp communities sustained by an active regime of high and overbank flows. More than any other factor, the sustainability of ecosystem processes within floodplains depends upon the longitudinal and lateral hydrologic connections that would be severed by the proposed reservoir."*

Trungale (2014) further concluded based on analysis of modeling provided by Region C that operation of Marvin Nichols as proposed by the Region C Plan would not protect these important natural resources.

> *"As currently modeled, the proposed Marvin Nichols I reservoir will not provide sufficient frequency and duration of high and overbank flows to sustain downstream BLH forest….Analysis of results generated by the water availability modeling (WAM), developed to evaluate this reservoir project, indicate that the flows needed to maintain these forests would be severely diminished, if not entirely eliminated. The environmental flow requirements used to evaluate the Marvin Nichols Reservoir Water Supply Project are based on an approach developed in the 1990's called the "Consensus Criteria". Unlike the more recent environmental flow criteria developed as part of SB3, there are no requirements, under the consensus criteria, to pass any high flow pulse flows. The maximum pass through for the proposed Marvin Nichols Reservoir Project, as required by consensus criteria, would be 514 cfs in May and then only if the reservoir is greater than 80% full.*
>
> *The clearest problem with the Region C report is that it contains no analysis or quantification of downstream impacts. Data and methodologies to perform this type of analysis, even at a planning level, are readily available. In 2004, the TWDB and the U.S. Army Corps of Engineers (USACE) conducted a study on the Sulphur River (TWDB 2004). Direct observations and technical evaluations reported in this study indicate that flows in the range of 862 cfs (approximately 50,000 ACFT per month) are transitional between in-channel and overbank flow.*
>
> *An analysis of the outputs from the water availability model, developed by Region C to evaluate the Marvin Nichols project, show that under existing conditions, there is only one year, out of the 57-year record, in which flows did not exceed this threshold volume in at least one month. When the proposed reservoir is included in the simulation, this number jumps to 29 years (more than half of the time) when no overbank events occur. The longest duration of time in which no over bank event occur under the without project scenario is 16 months; the flow regime resulting from the proposed reservoir indicates that at two separate times in the record, the river would go 80 months (almost 7 years) without overbank flow events. These flow rates, based on the 7Q2 water quality target, are intended to sustain the river during brief, infrequent and severe droughts, but with the Marvin Nichols project as proposed and modeled by Region C, these extremely low flows would occur much more frequently."*

The impact of flow alteration due to the Marvin Nichols Reservoir on downstream forests does not appear to have been considered in those Region C analyses. These losses, as well as the losses within the reservoir footprint, represent a significant impact on natural resources in Region D. From Trungale (2014):

> *"The lack of seasonal flooding identified in the water availability results indicates BLH forests cannot be maintained downstream of the proposed Marvin Nichols reservoir. When the effect on flows and the loss of episodic inundation are added to the impacts resulting within the reservoir footprint, the impacts from the Proposed Marvin Nichols Reservoir Project are huge. In the Sulphur basin 44% of the Forested Wetland area and 17% of the Bottomland Hardwood Forests would be at significant risk. By completely ignoring the largest and most significant impacts to natural resources resulting from the Marvin Nichols Reservoir Water Supply project, the Region C report does not meet the requirements of the TWDB order."*

In a separate section of Region D's 2014 response to the 2014 Region C analysis, Sharon Mattox, Ph.D., J.D., concluded that the Region C report "fails to provide reasonable quantification of impacts." This report cites a major change in the means of determining mitigation, identifying that the U.S. Army Corps of Engineers and the U.S. EPA published their final rule, "Compensatory Mitigation for Losses of Aquatic Resources," better known as the "2008 Mitigation Rule." As noted in Mattox (2014):

> *"The policies and procedures laid out in the 2008 Mitigation Rule render it improper and utterly illogical to conduct an analysis of a future project based solely on historical information (even if Region C had gathered accurate and relevant historical data). Under well-developed tools and practices stemming from the 2008 Mitigation Rule, losses of functions and values are the emphasis and simple ratios are not the touchstone. If a ratio is used, that ratio should be in the range of 3:1 to 10:1."*

Mattox (2014) further notes:

> *"Initially, the Report estimates impacts only for the inundation area of the Reservoir itself – that is, the footprint of reservoir. The Report fails to estimate jurisdictional areas for the 2,751 acres of "ancillary facilities" recognized in the [2011] Region C Plan. The ancillary facilities must be part of the USACE permit, which must assess the complete project. In addition, the Report fails to include any estimates for lands used during the construction process. The estimate also fails to include any estimate of critical secondary impacts to waters of the U.S., which will also require mitigation if losses of waters of the U.S. result. One example of a secondary impact that would likely have a material impact is wetlands adjacent to the Sulphur River downstream of the proposed dam that will no longer be inundated by frequent flood events."*

Mattox (2014) summarizes the characterization of potential mitigation thusly:

> *"The 23,530 acre estimate of jurisdictional areas is not consistent even with the data on land coverage types… Based on my review of the EEIR-SRBCA, I would include the estimated acreages for bottomland hardwoods, forested wetlands, herbaceous wetlands, open water, and shrub wetland. In addition other habitat types identified … as subtypes under Grassland/Old Field, Shrubland, and Upland Forests that are not broken out but likely qualify as waters of the U.S., include Pineywoods: Bottomland Wet Prairie, Pineywoods: Small Stream and Riparian Wet Prairie, Pineywoods: Small Stream and Riparian Evergreen Successional Shrubland, and Pineywoods: Small Stream and Riparian Temporarily Flooded Mixed Forest.*
>
> *The total of only the habitat types listed Table 2 of the Report is 35,411 acres, which I believe to be a more realistic estimate of the number of acres that require mitigation, if one is limited to the numerical data provided in the Report. This number, however, still excludes the additional habitat types given above, which will also contain jurisdictional areas. It further excludes the small, but identifiable wetlands, streams, and other waters that are certainly present in other habitat categories. Although no data on these omitted waters is included, it would certainly increase the realistic minimum number of jurisdictional waters of the U.S. For planning purposes, an estimate of at least 40,000 jurisdictional acres is reasonable."*

Noting that historically, all required mitigation has occurred in the watershed of the reservoir, Mattox (2014) indicates that, "given that the watershed approach is a central focus of the 2008 rule, all mitigation required for the [Marvin Nichols I] strategy must certainly occur within Region D," ultimately opining:

> *"…[T]he mitigation required for the [Marvin Nichols I] strategy will require at least 3 times as much land as the acres of jurisdictional waters, and potentially much more. Any of the reasonable estimates suggest the mitigation land required for the [Marvin Nichols I] strategy will exceed 100,000 acres…"*

Another previous study by the Texas Parks and Wildlife Department (TPWD)/United States Fish and Wildlife Service (USFWS) concluded a minimum of 163,620 acres would be required for mitigation and that number could be as high as 648,578 acres. "The Economic Impact of the Proposed Marvin Nichols I Reservoir to the Northeast Texas Forest Industry" prepared by the Texas Forest Service dated August 2002 estimated that the total acres affected by Marvin Nichols I Reservoir could be as low as 258,000 acres or as high as 820,000 acres. "The Economic, Fiscal and Developmental Impacts of the Proposed Marvin Nichols Reservoir Project" dated March 2003 by Weinstein and Clower prepared for the SRBA stated a lower acreage loss, estimating agricultural land loss of 165,000 to 200,000 acres.

It is understood that the exact amount and location of the mitigation acreage is unknown. However, in analyzing impacts to agricultural and natural resources in the NETRWPG area, it is clear that vast amounts of agricultural acreage will be removed from production due to flooding and mitigation requirements associated with Marvin Nichols I Reservoir. These impacts are corroborated in "Table P.1: Summary of Evaluation of Water Management Strategies" as follows: "Agricultural Resources/Rural Areas" are rated high" and "Possible Third Party" are rated "high". Third Party impacts are considered to be social and economic impacts resulting from redistribution of water.

6.9.2 Impacts on Timber Industry

The Texas Forest Service Study dated August 2002 estimated that the forest industry and local economies would incur significant losses due to a substantial reduction in timber supply from the reservoir project and required mitigation. The study further detailed that manufacturing facilities such as paper mills located near the proposed site which are dependent on hardwood resources would be impacted the most. The NETRWPG has previously received oral and written commentary from Graphics Packaging International, (formerly International Paper Company), which operates a paper mill in Cass County, Texas, and from numerous other timber companies, logging contractors and related industries stating that Marvin Nichols I Reservoir and the mitigation associated with the project would place their industries in peril due to the loss of hardwood timber supplies.

The Texas Forest Service Study estimated forest industry losses based on three (3) separate mitigation options. The low end impacts were estimated to be an annual reduction of $51.18 million output, $21.89 million value-added, 417 jobs and $12.93 million labor income. The high end impacts were estimated to be annual loss of $163.91 million industry output, $70.10 million value-added, 1,334 jobs and $41.4 million labor income.

The Weinstein and Clower Study dated March 2003 estimated as much as 200,000 acres of agricultural land, including 150,000 acres of timberland, could be removed from production. However, the study opined that based on assessment U.S. Forest Service inventories, those inventories along with growth could offset the loss of timberland due to reservoir impoundment and mitigation. The study also indicated that the loss to the timber industry should be limited to additional transportation costs associated with assessing new regional sources of timber.

The Weinstein and Clower Study has been criticized on the following grounds:

1. The Weinstein and Clower Study used total U.S. Forest Service timber inventories throughout the region in arriving at its conclusion that the inventories together with the growth of those inventories would offset any losses due to reservoir impoundment and mitigation. It did not take into account that large amounts of this acreage is unharvestable because it is located in wildlife management areas, streamside management zones, parks, housing areas and other areas which cannot be harvested. In addition, it is well documented that hardwood acreage throughout Northeast Texas as well as the State as a whole is decreasing due to development, conversions of hardwood areas to production of pine plantation acreage, and inundation for water development projects. See "An Analysis of Bottomland Hardwood Areas" report to TWDB dated February, 1997.
2. The Weinstein and Clower Study fails to distinguish between timber inventories as a whole (which includes more pine than hardwood) and hardwood timber inventories. Many of the timber industries in Northeast Texas, such as paper mills and hardwood sawmills, are dependent upon a reliable and affordable supply of hardwood timber. Hardwood timber grows predominantly in bottomlands and thus would be more severely impacted by the reservoir project and required mitigation than other timber species.
3. The Weinstein and Clower Study acknowledges that transportation costs would be greater with Marvin Nichols I in place as timber companies would be required to purchase timber from farther distances. These additional costs would have a huge impact on the timber industry in Northeast Texas. Timber is a heavy product and the transportation cost of timber is a substantial factor, particularly taken in conjunction with the current high cost of fuel. The industries involved compete in a global market. Additional transportation costs and additional costs in obtaining raw materials will jeopardize their ability to compete in this global market. This is particularly important considering the number of manufacturing jobs already lost due to rising costs of manufacturing products in the United States.
4. The Weinstein and Clower Study used a mitigation factor of 1.54 to 1, citing that ratio as the mitigation required by the most recently developed reservoir in Texas. It is widely believed that the estimates by the TPW/USFWS Study and the TFS Study are more accurate estimates based on the detailed analysis of the actual acreage to be mitigated rather than a recent mitigation requirement from a totally different type of habitat. In addition, Cooper Lake in Northeast Texas had 5,900 acres of bottomland hardwood and required total mitigation of 31,980 acres throughout Northeast Texas.
5. Finally, additional skepticism of the Weinstein and Clower Study is based on the knowledge that funding for the Study came from Dallas-Fort Worth entities which would benefit from and utilize the water supplies from Marvin Nichols I Reservoir.

As noted previously, results from SBG (2015) developed for the SRBA indicated that approximately 42,019 acres of timber, 22,854 acres of agriculture, and 1,343 acres of "other" wildlife area would be impacted by the Marvin Nichols Reservoir project. The estimated value of these impacts totals approximately $28.3 million ($24.7 million timber value, $3.6 million agricultural value). The 2021 Region C Water Plan (Appendix J) similarly reported potential impacted acreage of timberland (composed of Bottomland Hardwood Forest, Forested Wetland, and Upland Forest cover types) to be approximately 42,823 acres. However, it is noted that both of these analyses focused upon the acreage potentially inundated within the reservoir, and did not include an analysis of acreage impacted by potential mitigation.

6.9.3 Impacts on Farming, Ranching and other Related Industries

The studies cited above deal only with the timber industry in Northeast Texas. Marvin Nichols I Reservoir and required mitigation would also impact areas which produce wheat, cotton, rice, milo, hay, soybean, and alfalfa. In addition, acreage currently being utilized for beef cattle, dairy cattle, poultry and hog production would be affected. The NETRWPG has received numerous oral and written comments from individuals involved in the production of these agricultural commodities, along with others in agribusiness industries, reflecting negative impacts from the potential development of Marvin Nichols I Reservoir.

6.9.4 Impacts on Natural Resources

Additional commentary has been previously received from the NETRWPG concerning negative impacts on natural resources such as lignite and oil and gas reserves located in and near the reservoir site. See Chapter 1 Figures 1.7 and 1.9 for maps of oil and gas as well as lignite resources. "Table G.3 Evaluation Matrix" as presented in the 2021 Region C Plan corroborates the negative impacts of Marvin Nichols (328') upon "Other Natural Resources" in its rating of 2 (out of 5). Additional concerns have been expressed from landowners regarding economic losses from hunting leases, grazing leases and timber sales. These impacts are again corroborated in the aforementioned table from the 2021 Region C Plan, rating the impacts of Marvin Nichols (328') upon Agricultural Resources/Rural Areas with a score of 1 (out of 5).

In addition, if Marvin Nichols I Reservoir is built the footprint will sit squarely on top of the outcrop of the Nacatoch Aquifer. Local residents report there are dozens of springs and thousands of sand boils. Man-made alterations include water wells, undocumented seismograph holes and unplugged oil wells. Residents' concern is that heavy metals settling to the bottom of the reservoir will contaminate the aquifer below.

6.9.5 Impacts on Environmental Factors

Region C's 2016 planning process provides a summation of significant negative environmental impacts in "Table P.4: Environmental Quantification Matrix." Marvin Nichols Reservoir would cause "High" habitat impacts, "Medium High" impacts to cultural resources, and "Medium" impacts to environmental water needs. "High" is the highest category for negative impacts given to any strategy. This includes 24,093 acres of wetlands impacted and 23 threatened/endangered species.

Although the NETRWPG opposes any Marvin Nichols type reservoir, the NETRWPG notes that other potentially feasible alternatives, such as reallocation of flood pool storage in Wright Patman Reservoir, do exist in the Sulphur River Basin. Evaluations considering the feasibility of this strategy have been performed as part of the aforementioned SRBA Sulphur River Basin Feasibility Study, an ongoing effort on the part of the USACE and SRBA to evaluate potential water supply alternatives in the Sulphur River Basin.

A modified WAM for the Sulphur River Basin, and conditions representing full demands of existing water rights with no discharges (i.e., Run 3), was used in that study to evaluate three reallocation scenarios with conservation elevations of 232.5 ft., 242.5 ft., and 252.5 ft. The results from these analyses conclude that the available firm supply from reallocation of Wright Patman reservoir ranges from 415,000 ac-ft/yr, to 730,400 ac-ft/yr, and up to 1,004,100 ac-ft/yr, depending upon the amount reallocated from flood storage[2]. It is noted, however, that more recent modeling reflecting updated hydrology has been adopted by TCEQ that decreases these amounts due to impacts from a more recent drought of record in the Sulphur River Basin.

Analyses of potential unit costs of alternative water supplies from the Sulphur River Basin are presented within the *Cost Rollup Report – Final* for the SRBA study. Through a series of planning level analyses, the study identified 12 alternatives having unit costs under $650 per acre-foot during debt service (after debt service, these 12 most cost-effective alternatives remain the least expensive). These seven alternatives are comprised of some combination of the following components:

- Marvin Nichols 328′
- Marvin Nichols 313.5′
- Wright Patman 232.5′
- Wright Patman 242.5′
- Talco 350′ – Configuration 1
- Talco 370′ Configuration 1
- Parkhouse I
- Parkhouse II

It is then concluded that *"[i]n general, the larger Marvin Nichols scales, the smaller Wright Patman scales, and the Talco alternatives appear to merit further consideration, at least on the basis of unit costs."*

[2] Taken from *Technical Memorandum on Hydrologic Yields – Sulphur River Basin Feasibility Study, 08/26/2014*.

As noted in the SRBA's Socioeconomic Study of the Sulphur River Basin, "the analysis of socioeconomic resources identifies those aspects of the social and economic environment that are sensitive to change and that may be affected by actions associated with the development of water resources in the Sulphur Basin." Regional economic development effects were estimated using the MIG, Inc. IMPLAN modeling software for the construction and operation of alternative reservoir scenarios, with all costs and impacts expressed in 2014 dollars. Study areas for each of 12 reservoir scenarios were defined via the adjacent counties to each reservoir alternative. The resultant comparisons between modeled estimates of employment and labor income generated during construction and during project operations demonstrate that the considered Wright Patman Reservoir scenario offers the greatest induced, indirect, and direct effects of all the scenarios analyzed.

The *Environmental Evaluation Interim Report, Sulphur River Basin, Comparative Assessment* produced as part of the SRBA Sulphur River Feasibility Study provides consideration of potential environmental concerns associated with the development of additional water supply within the Sulphur River Basin. Preliminary environmental analyses were performed to, "…help with the identification of potential impacts and constraints…" to the considered potential reservoir sites under evaluation. Readily available information regarding land cover/resources, wetlands, bottomland hardwoods, water quality, archeological resources, instream uses, groundwater, and state and federally listed threatened or endangered species was gathered and reviewed. This information was analyzed within the footprint of each alternative reservoir site to develop a structured assessment. Rankings were then developed based on the identified impacts/constraints. With regard to the Marvin Nichols and Wright Patman reservoir scenarios, the report states:

> *"The Marvin Nichols project is representative of a more downstream location for new storage within the Sulphur River Basin. At least five locations for this dam have been considered in previous studies. In general, these alternative sites represent an attempt to locate the impoundment so as to avoid conflicts with Priority 1 bottomland hardwood habitats and oilfield activity while maintaining yield. A potential reservoir at the Marvin Nichols 1A site …was identified as a recommended strategy for [the North Texas Municipal Water District, Upper Trinity River Water District, and the Tarrant Regional Water District] in the 2006 and 2011 [Region C] plan. The Marvin Nichols 1A site is also recommended for protection in the Reservoir Site Protection Study."*

and

"Wright Patman Lake is an existing reservoir located on the Sulphur River in Bowie and Cass Counties, Texas. The top of Wright Patman Dam is at elevation 286 ft. msl. In terms of normal operations, elevation 259.5 ft. msl is considered the top of the flood control pool. At this elevation, Wright Patman Lake would have a cumulative storage capacity of 2,659,000 acre-feet. Theoretically, reallocation of almost any portion of that flood storage is possible. In a practical sense, reallocations are typically limited by either the need to maintain a large amount of flood control storage in order to protect downstream lives and properties, or the constraint on the increase in dependable yield that can be obtained as a result of limited water rights availability, or both. For the purposes of this analysis, the assessment of potential impacts to resources was estimated for two scenarios: 1) the portion of the flood pool from the existing top-of-conservation-pool elevation of 227.5 ft msl up to 237.5 ft. msl. (i.e., an increase of 10 ft. msl. in the conservation pool) and 2) the entire flood pool from the existing top-of-conservation-pool elevation of 227.5 ft. msl. up to 259.5 ft. msl.*

** The existing top-of conservation-pool elevation of 227.5 ft. msl. was determined by calculating an average for seven years of daily water surface elevations recorded by the USGS Gage (Wright Patman Lk nr Texarkana, TX) located at Wright Patman Lake from February 2006 to February 2013."*

Based on the SRBA study's review of cultural resource records and environmental data, it is reported that the Lake Jim Chapman reallocation and Lake Wright Patman minimum reallocation (237.5 ft. msl.) have the "Lowest Impacts", while the Parkhouse I, Parkhouse II, and Wright Patman maximum reallocation (259.5 ft. msl.) have "Moderate Impacts." Significantly, the Talco and Marvin Nichols 1A scenarios were determined to have the "Highest Impacts."

The comparative environmental assessment performed for the Sulphur River Basin Feasibility Study provides a structured comparative assessment of the potential impacts associated with the alternative reservoirs considered. Significant questions remain regarding the specifics of the methods employed in deriving the impacts on archeological resources, bottomland hardwoods, wetlands, the overall rankings, and the individual weight of each ranking in contributing to the overall rankings. However, although such questions remain, the results of the analysis are informative. A comparison is summarized and presented in the SRBA study via a matrix of rankings, presented in Table 6.15.

Table 6.15 Summary/Comparison Matrix of the Potential Impacts of the Alternative Reservoir Sites

Reservoir Site	T&E Impacts	Archeological Resources Impacts	Bottomland Hardwood Impacts	Wetlands	Water Quality	Overall Ranking
WRIGHT PATMAN (259.5)	7	3	7	7	7	7
MARVIN NICHOLS 1A	6	4	6	6	4	6
WRIGHT PATMAN (237.5)	4	2	5	5	6	5
TALCO	5	4	4	4	5	4
PARKHOUSE I	3	3	3	3	3	3
PARKHOUSE II	2	3	2	2	2	2
JIM CHAPMAN (446.2)	1	1	1	1	1	1

Source: Environmental Evaluation Interim Report, Sulphur River Basin, Comparative Assessment, SRBA, June 2013.

The 2021 Region C Plan contains in Table J.6 data that of the 66,103 acres to be inundated by the Proposed Marvin Nichols Reservoir, approximately 62,000 acres are either timberlands or agricultural land. In addition to the lands that would be inundated by the proposed Reservoir, vast amounts of acreage would be taken for mitigation. Based on the significant area in Region D that is used for agricultural and timber use, it is likely that most of the acreage taken for mitigation will also be agricultural and timber lands.

The 2021 Region C Plan also contained Attachment J-4: "Economic, Fiscal and Developmental Impacts of the Proposed Marvin Nichols Reservoir" dated April 13, 2020 prepared by Clower a& Associates. This study has been roundly criticized by agricultural, timber, community and business leaders throughout Northeast Texas for the following reasons:

1. The Study only considered impacts from the Reservoir and no consideration of impacts from mitigated areas;
2. The Study only considered impacts to the counties where the Reservoir would be located. Additional negative impacts would occur to manufacturing areas in Northeast Texas which rely on the raw materials that would no longer exist due to the Reservoir and required mitigation;
3. The authors of the Study have little or no understanding of the agricultural and timber industries in Northeast Texas. The availability of nearby raw materials is the most important factor to these industries being able to compete on a regional, national and international basis. No industry, business or community leaders in our area were consulted as to the potential impacts removing this vast amount of acreage would have to our area and the economic impacts.

6.10 Conclusion

It has been and continues to be the position of the NETRWPG that due to the significant negative impacts upon environmental factors, agricultural resources/rural areas, other natural resources, and third parties, Marvin Nichols I Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan. In referencing Marvin Nichols, the NETRWP incorporates Marvin Nichols I, Marvin Nichols IA, and any major dam sites on the main stem of the Sulphur River.

At the time of publication of this Regional Water Plan, no agreement has been made between Regions C and D for the purposes of the 2026 Region D Plan.

In order to be included in any regional water plan or The State Water Plan, a proposed project must protect the agricultural and natural resources of the State. The proposed Marvin Nichols Reservoir would inundate vast amounts of agricultural and timber lands in Northeast Texas. In addition, this project will require very substantial acreage to be removed from production for mitigation of this project. It is the position of the Region D Water Planning Group that it is not possible to find that this project protects the agricultural and natural resources of the State when so much agricultural/timber land will be inundated and when it is not known how much additional acreage will be required, the location of that acreage, or the type of acreage that will be taken for mitigation.

Considering the aforementioned information, it is the position of the NETRWPG that Marvin Nichols Reservoir be removed from the State Water Plan, that Region C seek other more viable measures to meet any future water needs including, but not limited to, additional conservation, reuse, reduction of water losses, and reallocation of abundant resources currently available (Toledo Bend, Texoma, and other existing Reservoirs). Region D is willing and able to work with and assist Region C in exploring these potential water resources.

CHAPTER 7 DROUGHT RESPONSE INFORMATION, ACTIVITIES, AND RECOMMENDATIONS

Drought is a frequent and inevitable factor in the climate of Texas. Therefore, it is vital to plan for the effect that droughts will have on the use, allocation, and conservation of water in the State. Drought management measures have been incorporated as an increasingly important part of water planning at the local, regional and statewide levels. In 2009, the Texas Water Development Board (TWDB) published "Drought Management in the Texas Regional and State Water Planning Process" (http://www.twdb.texas.gov/publications/reports/contracted_reports/doc/0804830819_DroughtMgmt.pdf) which examines the potential benefits and drawbacks of including drought management as a regional water management strategy.

Prolonged drought conditions can have serious impacts on water supplies. Due to the potentially devastating effects of drought on both individuals and the State's economy, it is important that water suppliers and users consider the potential impacts of drought and develop robust plans to address supply or demand management under drought conditions.

Through the regional water planning process, requirements for drought management planning are found in Title 31 of the Texas Administrative Code (TAC), Part 10, Chapter 357, Subchapter D. TAC §357.42 includes requirements regarding drought response information, activities, and recommendations. This chapter examines these specific requirements and identifies significant drought impacts within the Region.

7.1 Drought(s) of Record in North East Texas

The severity of several recent droughts have significantly impacted the lives of water users, providers and water managers who have been hard-pressed to find solutions to critical supply and demand issues. The severity of the impacts varies, but the overriding sense of urgency to create workable strategies and solutions has been acknowledged and acted upon Statewide. Therefore, it is critical in this and future planning cycles to address the impact that drought may have on the future use, allocation and conservation of water in the State.

There are different types of drought that have been defined in various ways; however, these definitions fall into four primary categories: meteorological drought, agricultural drought, hydrological drought, and socioeconomic drought. In the most general sense, drought is a deficiency of precipitation over an extended period of time, resulting in a water shortage for some activity, group or environmental purpose. The State Drought Preparedness Plan provides more specific and detailed definitions and is located at the following link: https://waterdatafortexas.org/drought/twdb-reports/state_of_texas_drought_annex_2016.pdf .

Meteorological drought is quantified by how dry it is (for example, a rainfall deficit) compared to normal conditions as well as the duration of the dry period. This is typically a region-specific metric, since factors affecting meteorological drought can vary significantly in different regions.

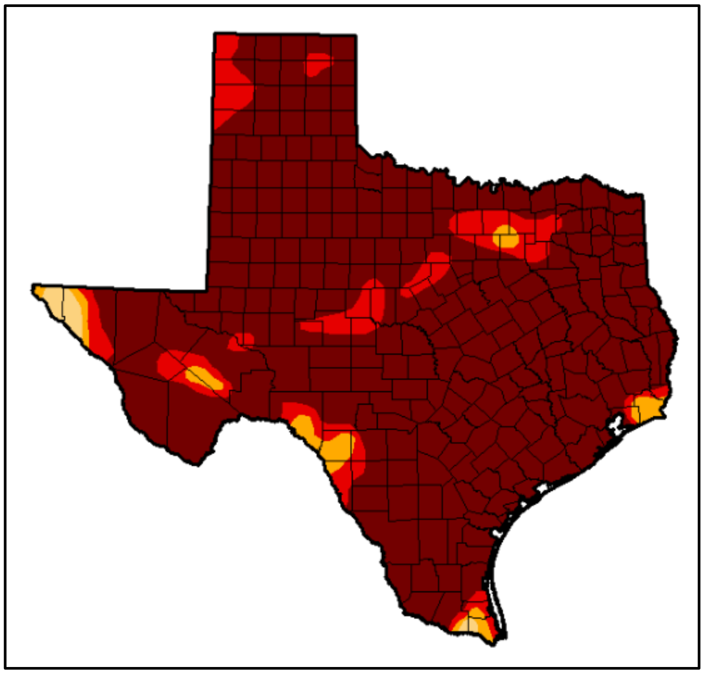
Agricultural drought considers the effects of meteorological drought in terms of agricultural impacts. For example, evapotranspiration, soil moisture and plant stress are measures of agricultural drought, which account for vulnerability of crops through the various growth stages.

Hydrological drought is measured in terms of effects on surface and subsurface waters, such as reservoir stage and capacity, stream flow or groundwater levels in wells. Hydrological drought is usually defined on a river-basin or watershed scale. Hydrological droughts typically lag behind meteorological and agricultural droughts because it takes more time for the evidence of basin-wide impacts to manifest.

Socioeconomic drought occurs when physical water needs affect the health, safety, and quality of life of the general public or when the drought effects the supply and demand of an economic product. An example of socioeconomic drought is when the demand for an economic product (such as hydroelectric power) exceeds supply due to a weather-related deficit. Typically, these demands increase with population growth and per capita consumptions. Supply increases due to efficiency technology and the construction of new water projects. If both are increasing, the rate of change between supply and demand determines the level of socioeconomic drought. However, regardless of the rate of change, when demand exceeds supply, vulnerability is magnified by water shortages during drought.

Several climatological drought indicators have been formulated in order to quantify drought. The Palmer Drought Severity Index (PDSI) was developed in 1965 and is currently used by many federal and state agencies. The PDSI is a soil moisture index that works best in relatively large regions with uniform topography that don't experience extreme climate shifts. PDSI values can lag oncoming drought by several months. The TWDB uses the PDSI to monitor State drought conditions, which has values ranging between 6.0 (driest) to 6.0 (wettest). "Extreme drought" conditions have a PDSI between 6.0 and 4.0, "severe drought" conditions have a PDSI between 3.99 and 3.0, and "moderate drought" conditions have a PDSI between 2.99 and 2.0. "Near normal" conditions are present when the PDSI is between 1.99 and -1.99, and "moist" conditions have a PDSI of less than -2.0.

The week of September 13, 2011, had the highest percentage of the East Texas climate division experiencing exceptional drought (99 percent) for the period of record shown (January 2000 through January 2024). The U.S. Drought Monitor indicates that in September 2011, all of the counties in the North East Texas region experienced at least some periods of severe or extreme drought (Figure 7.1).



Source: U.S. Drought Monitor

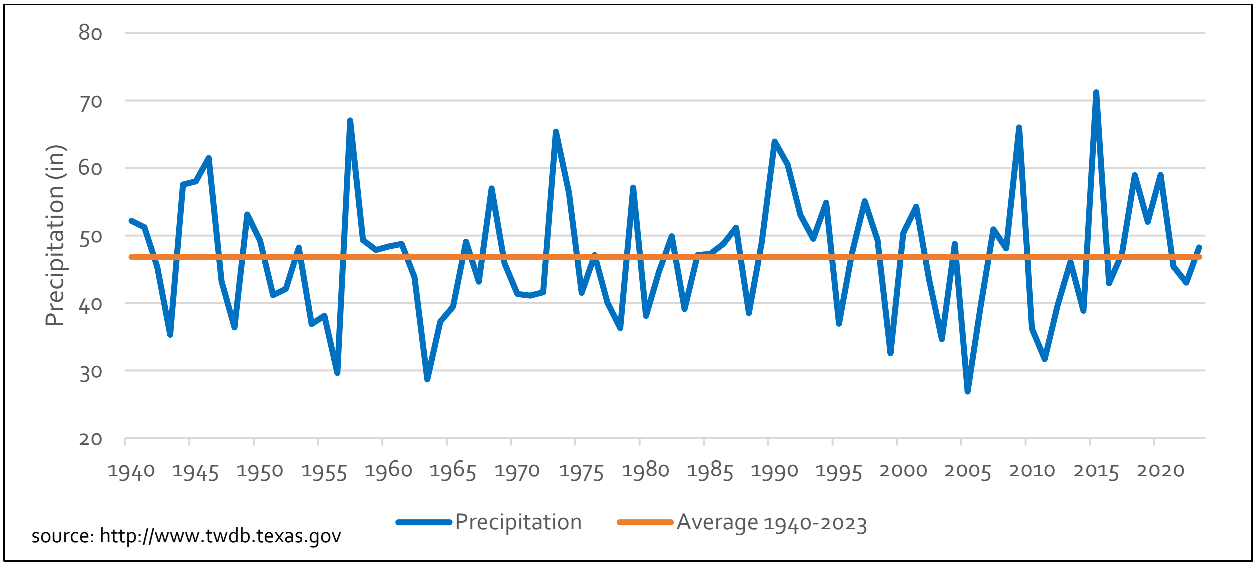
Figure 7.1 Drought in Texas, September 2011

7.1.1 Droughts in the North East Texas Region

North East Texas is within the humid subtropical climate zone and receives the most rainfall of any region of Texas. Comparing the existing 1950's Drought of Record (DOR) and the more recent drought can be done using historic precipitation and the PDSI.

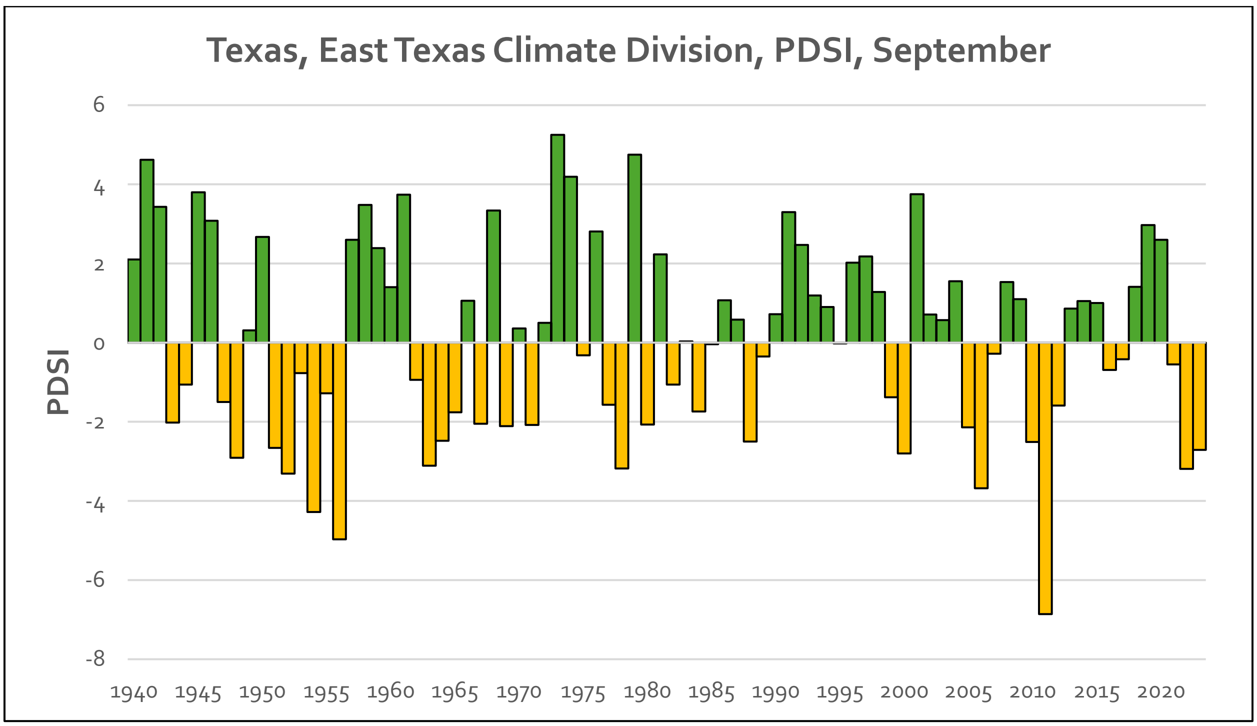
Precipitation data for TWDB defined quadrangles 412, 413, 512 and 513 from 1940 through 2023 are shown in Figure 7.2. These four quadrangles collectively cover the entire RWPA. The average annual rainfall for these quadrangles is approximately 47 inches. These data indicate that the DOR during this period was in the 1950s as indicated by five out of six years of below average rainfall between 1951 and 1956. Note that a recurrence, or continuation, of the drought of the 1950s is also evident between 1962 and 1965.

The recent drought indicates a possible trend toward below average annual rainfall beginning around 1995, but also shows a relatively high-amplitude fluctuation from one year to the next, including the highest rainfall total during this period in the year 2015. The lowest rainfall occurred in 2005 is also lower than any year the 1950s DOR. Years with below average rainfall may have a deficit of about 10 to almost 20 inches for the year. As shown in Figure 7.3, the PDSI values indicate similar patterns as the average annual precipitation data except the years may vary because the PDSI incorporates different factors.



Source: (https://waterdatafortexas.org/lakeevaporationrainfall)

Figure 7.2 Annual Precipitation, 1940 – 2018, TWDB



Source: (https://waterdatafortexas.org/drought/pdsi)

Figure 7.3 PDSI, 1940 – 2023

7.1.2 North East Texas Region Drought of Record

For the purpose of this planning cycle, the droughts of the 1950s and early 2000s are declared the DOR for the majority of the North East Texas Region, as these droughts have affected watersheds within the region to various effects. These droughts are the key drought periods represented and utilized in the official Texas Commission on Environmental Quality (TCEQ) Water Availability Models (WAMs) for the river basins within the RWPA. While other major droughts have occurred in the Region, including some with single years with less rainfall or a lower PDSI, none have yet displayed the combination of intensity and duration of the 1950's and early 2000s drought.

The catalyst for more recent droughts can be attributed primarily to rainfall deficit (meteorological drought). The hydrological drought (impact on surface waters and groundwater) is a result of both meteorological and socioeconomic drought. To reiterate, socioeconomic drought occurs when demand exceeds supply due to a weather-related deficit. Typically, demand for a product increases with population growth and per capita consumptions. Supply increases due to efficiency technology and the construction of new water projects. If both are increasing, the rate of change between supply and demand is the key. However, when demand exceeds supply, vulnerability is magnified by water shortages during drought.

In future planning cycles, it would be useful to attempt to quantify the extent that anthropological factors exacerbate drought severity. Suggested areas of investigation include: base flow studies, sub-watershed scale water balance calculations, and rainfall deficit quantification.

7.2 Uncertainty and Drought(s) Worse than the Drought of Record

As mandated by TAC 357.42, the RWPGs must address water supply needs during a repeat of the drought of record. During plan development, the generated values of planning factors (supplies, demands, population) all have associated ranges of uncertainty. RWPGs may choose to consider scenarios and/or qualitatively address uncertainty and Drought Worse than the Drought of Record (DWDOR) in their region. This section discusses the scenarios and/or qualitative assessments that can be used to more explicitly recognize the relative planning uncertainties and options to help mitigate those risks.

Texas's strategy of planning for a repeat of the 1950s drought may no longer be enough. While historic evidence identifies droughts that were longer and more severe than the Drought of Record, contemporary data points to a likely future of increasing drought severity. A report by Texas 2036 and the Office of the State Climatologist at Texas A&M University projects that rising average temperatures and greater rainfall variability will contribute to a future with more severe droughts. Given this lengthy history and projected future, Texas needs to think differently about how we plan and prepare for drought.

During this current planning cycle, the Drought Preparedness Council (DPC) encouraged 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. A Drought Worse than the Drought of Record will inflict greater economic damage on industries critical to our continued prosperity.

Drought(s) worse than the drought of record (DWDOR) - For the purpose of this planning cycle, the droughts of the 1950s and 2000s are declared the DOR. The NETRWPG considered the use of DWDOR at one of its regular meetings and determined that for the purposes of the 2026 Plan the DOR would remain the standard for planning purposes. A DWDOR may be considered in the future if an entity performs a study such that the necessary information is available for use by the NETRWPG. To date, the RWPG is not aware of such a study in Region D. Therefore, for the current planning cycle, the North East Texas RWP has not included any planning measures to address a DWDOR. At present, the NETRWPG will follow the regulatory and administrative requirements for the development of the 2026 Regional Water Plan.

Uncertainty - Regional Water Planning requirements require use of the default Water Availability Model (WAM) developed and maintained by TCEQ for each river basin located within the region. At present, these WAMs are used for assessing permit and amendment applications for state water rights and assume the use of a sufficiently long historical period of record to characterize impacts from the Drought of Record on the hydrology of each river basin, which includes monthly estimates of net evaporation and naturalized flows at key locations within the basin. Therefore, for the currently planning cycle, the North East Texas RWP does not include any planning measures to address uncertainty relating to DOR.

The Region is not aware of any utilities or Major Water Providers that have planned for a DWDOR or explicitly addressed uncertainty in their drought planning measures.

7.3 Current Drought Preparations and Response

As mandated by 31 TAC 357.42(a)&(b), this section of the plan summarizes and assesses all preparations and Drought Contingency Plans (DCPs) that have been adopted within the North East Texas Region. The summary includes what specific triggers are used to determine the onset of each defined drought stage and the associated response actions developed by local entities to decrease water demand during the drought stage.

7.3.1 Water Suppliers Identification and Response to Drought Conditions

Wholesale water providers and public water suppliers in the North East Texas Region provide detailed information on the identification of drought conditions in their service area and specific responses to drought conditions in their drought contingency plans. DCPs are intended to establish criteria to identify when water supplies may be threatened and the actions that should be taken to ensure these potential threats are minimized. The general structure of DCPs allows increasingly stringent drought response measures to be implemented in successive stages as water supply decreases and water demand increases. This measured, or gradual, approach allows for timely and appropriate action as a water shortage develops.

The onset and termination of each implementation stage should be defined by specific “triggering” criteria. Triggering criteria are intended to ensure that: 1) timely action is taken in response to a developing situation, and 2) the response is appropriate to the level of severity of the situation. Each water-supply entity is responsible for establishing its own DCP that includes appropriate triggering criteria and responses. Drought response triggers and actions are covered in detail in Section 7.4 below.

DCPs typically emphasize measures of demand management designed to decrease water demand through curtailment of uses. Demand management in this context differs from water conservation, although the terms are frequently interchanged. The objective of water conservation is to achieve long-term reductions in water use through improved water use efficiency, reduced waste, and through reuse. Demand management focuses on temporary reductions in use in response to temporary shortages in water supply or other emergencies (e.g. equipment failures caused by peak water demands being excessive).

7.3.1.1 Municipal and Wholesale Water Provider Drought Contingency Plans

Because of the range of conditions that affected the more than 4,000 water utilities throughout the State in 1997, the Texas Legislature directed the TCEQ to adopt rules establishing common drought plan requirements for water suppliers. As a result, the TCEQ requires all retail public water suppliers serving 3,300 connections or more and wholesale public water providers to submit a drought contingency plan to TCEQ. Wholesale water providers and retail public water suppliers serving less than 3,300 connections are also required to prepare and administer DCPs. Plans are required to be made available for inspection upon request, but do not need to be submitted to the TCEQ. The amended Title 30, TAC, Chapter 288 addresses TCEQ's guidelines and plan requirements. The forms for wholesale public water providers, retail public water suppliers and irrigation districts are available at: https://www.tceq.texas.gov/permitting/water_rights/wr_technicalresources/contingency.html.

DCPs for municipal uses by public water suppliers must document coordination with the regional water planning groups to ensure consistency with the regional water plans. A summary of entities, their supply source, specific triggers and actions for each drought stage is provided in Table 7.1.

7.3.1.2 Public Water Supplier Drought Contingency Plans

Drought contingency plans have previously been adopted by most public suppliers and municipalities in the North East Texas Region, although some suppliers did not provide any adopted plans. Current triggers and response actions for participating entities are summarized in Table 7.1.

General recommended drought response actions are detailed in Section 7.4.2.

7.3.1.3 Irrigation

Irrigation wells located within a municipality are subject to the triggers and response actions designated by the city's drought plan. Irrigation wells located outside of a municipality are not regulated as there are no GCDs within the RWPA.

7.3.1.4 Wholesale Water Provider

Wholesale water providers in the North East Texas Region are listed in Table 7.2. Their Drought Contingency Plan, if submitted, is summarized in Table 7.3.

Generally, triggers are based upon reservoir capacities falling below a designated elevation or volume, and/or when user demand exceeds a designated percent capacity of the supply system.

7.3.2 Unnecessary or Counterproductive Drought Response Efforts

The NETRWPG has not identified any unnecessary or counterproductive drought response strategies within the planning area.

Table 7.1 Municipal Mandated Drought Triggers and Actions

Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
ABLES SPRINGS SUD	Multistage drop in volume of surface supplies in water supply lakes.	Water demand has exceeded 90% of maximum capacity for an extended period	Water demand has exceeded 95% of maximum capacity for an extended period	Water demand has exceeded10% of maximum capacity for an extended period	N/A	N/A
		Combined lake storage is less than 70% of the conservation pool during April to October; or	Combined lake storage is less than 55% of the conservation pool during April to October; or	Combined lake storage is less than 30% of the conservation pool during April to October; or		
		Combined lake storage is less than 60% of the conservation pool during November to March	Combined lake storage is less than 45% of the conservation pool during November to March	Combined lake storage is less than 20% of the conservation pool during November to March		
				Demand exceeds storage tank capacity;		
				Demand exceeds high service pump capacity.		
		Schedule restrictions	Stage 1 actions	Stage 2 actions	N/A	N/A
		Reduce non-essential use	Implement alternative water supply strategies	Implement alternative water supply strategies		
		Reduce demand by 2%	Limit landscape watering;	Mandatory water use restrictions;		
			Reduce demand by 5%	Reduce demand by 30%		
BICOUNTY WSC	Capacity usage.	Consumption > 80% daily max supply for 3 consecutive days; or	Consumption > 90% available for 3 consecutive days; or	System failure;	N/A	N/A
		Supply reduced to 20% > consumption of previous month; or	Levels in any storage tanks cannot refill for 3 consecutive days.	Consumption > 95% available 3 days;		
		>8 weeks of low rainfall; and		Consumption > 100% available; and storage levels drop during 24hour period;		
		Daily use > 20% above same period of previous year.		Contamination;		
				Disaster declaration;		
				Wholesale supply reduction due to drought conditions;		
				Imminent health or safety risks to public.		
		Schedule restrictions	Prohibit outside use unless variance	Prohibit outside use	N/A	N/A
		Reduce flushing operations	Public outreach via local media	Usage restrictions		
		Reduce use via education.		Enforcement and educational efforts		

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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
BIG SANDY	Capacity usage.	Shortage reaches 85% of capacity per day; or	Shortage reaches 90% capacity per day; or	Shortage reaches 95% capacity per day; or	N/A	System failure;
		Supply < 50% capacity.	Supply < 40% capacity.	Supply < 25% capacity.		Supply contamination.
		Voluntary reduction 10%.	Prohibit nonessential use except landscape use;	Prohibit nonessential use except landscape use;	N/A	Assess severity of problem;
			Reduce demand 15%.	Reduce demand 20%.		Identify actions needed, time required to solve.
CADDO BASIN SUD	Capacity usage.	Water demand has exceeded 90% of maximum capacity for an extended period	Water demand has exceeded 95% of maximum capacity for an extended period	Water demand has exceeded10% of maximum capacity for an extended period	N/A	N/A
		Combined lake storage is less than 70% of the conservation pool during April to October; or	Combined lake storage is less than 55% of the conservation pool during April to October; or	Combined lake storage is less than 30% of the conservation pool during April to October; or		
		Combined lake storage is less than 60% of the conservation pool during November to March	Combined lake storage is less than 45% of the conservation pool during November to March	Combined lake storage is less than 20% of the conservation pool during November to March		
		Schedule restrictions	Stage 1 actions	Stage 2 actions	N/A	N/A
		Reduce non-essential use	Implement alternative water supply strategies	Implement alternative water supply strategies		
		Reduce demand by 2%	Limit landscape watering;	Mandatory water use restrictions;		
			Reduce demand by 5%	Reduce demand by 30%		
CENTRAL BOWIE COUNTY	Daily supply and demand.	Voluntarily conservation;	Comply with requirements/ restrictions on certain nonessential use.	Comply with requirements/ restrictions on certain nonessential use.	Comply with requirements/ restrictions on certain nonessential use.	System failure;
		Prescribed restrictions on certain use.				Supply contamination.
		Reduce demand by 10%.	Reduce demand by 20%.	Reduce demand by 35%.	Reduce demand by 50%.	Reduce demand by 60%.
CITY OF COMMERCE	Multistage drop in water levels in water supply lakes.	Levels < 432.5 ft. in Lake Tawakoni; or	Production reaches 3.1 MGD for 5 consecutive days; or	Emergency pump activation; or	Production reaches 3.5 MGD for 7 days; or	Contamination; or
		PDSI reaches 2 to 3; or	Storage not refilled for 3 consecutive days.	Shortages deemed severe by City Manager.	Storage not completely refilled for 5 days.	System failure; or
		Requested by SRA.				Unprecedented loss of capability to provide service.
		Reduce demand 5%.	Reduce demand 10% or reduce demand by 2.79 MGD.	Reduce demand to 2.79 MGD.	Reduce demand 10% or reduce demand to 3.15 MGD.	Response determined based on conditions.

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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
CITY OF COOPER	Multistage drop in water levels in water supply lakes.	Reservoir levels < 455 ft.; or	Reservoir levels < 454 ft.; or	Reservoir levels < 453 ft.; or	N/A	N/A
		PDSI at "Moderate;" or	PDSI at "Severe;" or	PDSI at "Extreme;" or		
		Reservoir discharged 2 or fewer times in past year; and	Reservoir discharged no more than 1 time in the past 12 months; and	Reservoir has not discharged in the past 12 months; and		
		Demand is 75% capacity for 3 consecutive days.	Demand is 85% capacity for 3 consecutive days.	Demand is 95% capacity for 3 consecutive days.		
		Voluntary usage reduction;	Prohibit unnecessary water use; landscape water use restrictions;	Prohibit all unnecessary water use, including all landscape water use;	N/A	N/A
		Reduce demand to 70% or less of water plant capacity	Reduce demand to 75% or less of water plant capacity	Reduce demand to 85% or less of water plant capacity.		
CITY OF DETROIT	Daily supply and demand.	85% peak daily use for 7 days; or	90% peak daily use for 14 days; or	95% peak daily use for 21 days; or	97% peak daily use for 21 days; or	System failure; or
		85% peak daily use in east line is 3.12 and west line is 1.44 MGD; 100% peak daily use for 3 days; or	90% peak daily use in east line is 3.3 and west line is 1.53 MGD; 100% peak daily use for 6 days; or	95% peak daily use in east line is 3.49 and west line is 1.61 MGD;	97% peak daily use in east line is 3.56 and west line is 1.65 MGD; or	Supply contamination; or
		100% peak daily use in east line is 3.67 west line is 1.7 MGD; or	100% peak daily use in east line is 3.67 and west line is 1.7 MGD;	100% peak daily use for 9 days; or	100% peak daily use for 9 days; or	"Emergency status" implemented.
		Treated reservoir levels fill < 90% overnight; or	Treated reservoir levels fill < 80% overnight; or	100% peak daily use in east line is 3.67 and west line is 1.7 MGD;	100% peak daily use in east line is 3.67 and west line is 1.7 MGD; or	
		"Mild" status implemented.	"Moderate" status implemented.	Treated reservoir levels fill < 70% overnight; or	Treated reservoir levels fill < 50% overnight; or	
				"Severe" status implemented.	"Critical" status implemented.	
		Reduce demand 10%.	Reduce demand 10%.	Reduce demand 15%.	Reduce demand 20%.	Reduce demand 25%.
CITY OF EMORY	Multistage drop in water levels in water supply lakes.	Lake Tawakoni volume<728.3K ac-ft.;	Lake Tawakoni volume<705.4K ac-ft.;	Lake Tawakoni volume<663.2k ac-ft,	Lake Tawakoni volume < 632.4K acre-ft.; or	System failure; or
		Demand > 1.45 MGD for 30 days; or	Demand >1.7 MGD for 30 days; or	Demand >1.93 MGD 30 days; or	Demand > 2.17 million gallons for 30 days, or	System contamination; or
		Demand > 1.7 MGD;	Demand > 1.93 MGD; or	Demand >2.17 MGD;	Demand >2.42 MGD; or	Supply will not last 90 days.
		Demand >60% safe capacity 30 days or 75% safe capacity one day.	Demand >70% safe capacity 30 days or 80% safe capacity 1 day.	Demand > 80% safe capacity 30 days, or 85% safe capacity one day; or	Demand > 90% safe capacity for 30 days or 100% safe capacity one day; or	
				Supply < 180 days.	Supply < 120 days.	
		Usage reduction 10%.	Prohibit unnecessary water use except for landscape use;	Prohibit unnecessary water use;	Prohibit unnecessary water use;	Prohibit any and all unnecessary water use;
			Reduce demand 20%.	Limited landscape use at prescribed times.	Limit landscape use;	Reduce demand 70%.
				Reduce demand 40%.	Reduce demand 50%.	
					Alternative pumping devices into Lake Tawakoni.	
		The City of Emory employs a water allocation stage when the city determines that the water supply in Lake Tawakoni will not last another 60 days. Water will be rationed on number of residence per household basis at a surcharged rate.				

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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
CITY OF FROGNOT	Capacity usage range; and	Voluntarily conservation;	Restrictions on certain nonessential uses; if	Stage 3 restrictions on certain non-essential water uses; if	Stage 4 restrictions on certain nonessential uses; if Treated reservoir levels fill < 75% overnight; or	System damage or failure; or
	Replenishment percentage.	Prescribed restrictions on certain uses;	Treated reservoir levels fill < 90% overnight; or	Treated reservoir levels fill < 85% overnight; or	Well may be temporarily out of service; or	Supply contamination; or
		Treated reservoir levels fill < 100% overnight; or	Well may be temporarily out of service; or	Well may be temporarily out of service; or	Pumping levels continue to decline.	One or more wells are out of service; or
		Well may be temporarily out of service; or	Pumping levels continue to decline.	Pumping levels continue to decline.		One or more wells are experiencing significant pumping level declines.
		Pumping levels continue to decline.				
		Reduce demand 10%.	Reduce demand 15%.	Reduce demand 20%.	Reduce demand 30%.	Reduce demand 50%.
CITY OF GREENVILLE	Reservoir levels; and	Reservoir levels <532.5 ft.; and	Reservoir levels <531.5 ft.; and	Reservoir levels <531.5 ft.; and	Four of the triggering criteria in "Severe" Stage met; or	All five of the triggering criteria in "Severe" Stage are met; or
	Lake Tawakoni levels; and	Lake Tawakoni <434 ft and	Lake Tawakoni <432 ft.; and	Lake Tawakoni <431 ft.; and	Critical water shortage declaration.	System failure; or
	Palmer Drought Severity Index; and	PDSI at Moderate, and	PDSI at Severe and	PDSI at Extreme and		Supply contamination.
	Reservoir recharge frequency; and	Reservoir recharged 2 times in the past 12 months; and	Reservoir recharged 1 time in the past 12 months; and	Reservoir recharged 0 times in the past 12 months; and		
	Demand.	Demand is 60% capacity.	Demand is 70% capacity.	Demand is 80% capacity.		
		Voluntary usage reduction and conservation.	Reduce demand by 10%;	Reduce demand by 20%	Reduce demand by 30%;	Reduce demand by 40%;
			Restricted use.	Restricted use;	Restricted use;	Prohibit all watering;
				Nonessential use prohibited.	Nonessential use prohibited.	Rationing implemented.
CITY OF GLADEWATER	Multistage drop in water levels in water supply lakes.	Mild shortage exists when Lake Gladewater is 4 ft. above lowest intake pipe.	Moderate shortage exists when Lake Gladewater is 3 ft. above lowest intake pipe.	Stage 3 nonessential use compliance when the level of Lake Gladewater is 2 ft. above lowest intake pipe.	N/A	Stage 4 nonessential use compliance when the level of Lake Gladewater is 1 ft. above lowest intake pipe.
		Reduce demand 5%.	Reduce demand 10%.	Reduce demand 15%.	N/A	Reduce demand 20%.
CITY OF HOOKS	Capacity usage range; and	Consumption > 90% production capacity; or	Consumption >100% prod. capacity 3 days;	Consumption > 110% capacity for 24 hrs or	N/A	System failure; or
	Replenishment percentage.	90% consumption for 3 days; and	Mild drought will exist > 5 days; or	Consumption prevents storage maintained; or		Supply contamination.
		Weather conditions considered in drought classification determination.	Storage tank taken out of service during mild drought; or	Demand > available pump capacity; or		
			Storage capacity not maintained during period of 100% prod.	Two conditions listed during moderate drought occurs in 24 hours; or		
			Existence of preceding conditions listed for 36 hours.	Contamination; or		
				Severe condition or system damage/failure.		
		Reduce demand 10%.	Reduce demand 20%.	Reduce demand 30%.	N/A	Assess severity;
						Identify actions and time required to solve.

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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
CITY OF HUGHES SPRINGS	Capacity usage.	Shortage reaches 85% of capacity per day; or	Shortage reaches 90% capacity per day; or	Shortage reaches 95% capacity per day; or	N/A	System failure;
		Supply < 50% capacity.	Supply < 40% capacity.	Supply < 25% capacity.		Supply contamination.
		Voluntary usage reduction of 10%.	Prohibit nonessential use except for landscape use;	Prohibit nonessential use except for landscape use;	N/A	Assess the severity of the problem;
			Reduce demand by 15%.	Reduce demand by 20%.		Identify the actions needed and time required to solve.
CITY OF KILGORE	Capacity usage.	Available supply < 70% storage capacity; or	Available supply < 60% storage capacity; or	Available supply < 50% storage capacity; or	Available supply < 40% storage capacity; or	System failure;
		Stage 1 drought initiation notification; or	Stage 2 drought initiation notification; or	Stage 3 drought initiation notification; or	Stage 4 drought initiation notification; or	Supply contamination.
		Specific capacity is < 70% of original specific capacity; or	Specific capacity is < 60% of original specific capacity; or	Specific capacity is < 50% of original specific capacity; or	Specific capacity is < 40% of original specific capacity; or	
		Other triggering criteria deemed by city.	Other triggering criteria deemed by city.	Other triggering criteria deemed by city.	Other triggering criteria deemed by city.	
		Voluntary 5% reduction.	Voluntary 10% reduction.	Voluntary 15% reduction.	Voluntary 20% reduction.	Voluntary 30% reduction.
CITY OF LONGVIEW	Capacity usage.	90% of 48.8 MGD pumping capacity for 4 consecutive days.	93% of 49.4 MGD pumping capacity for 3 consecutive days.	95% of 49.4 MGD pumping capacity for 3 consecutive days.	N/A	System failure; Supply contamination.
		10% usage reduction.	15% usage reduction.	25% usage reduction.	N/A	25% usage reduction.
CITY OF MARSHALL	Multistage drop in volume of surface supplies in water supply lakes.	Reservoir volume < 50% for 3 days.; or	Reservoir volume <40% for 3 days.; or	Reservoir levels < 20% for 3 days; or	Analysis of water source indicates the supply is unsafeng	N/A
		Demand is 85% of treatment capacity for 3 consecutive days.	Demand is 90% of treatment capacity for 3 consecutive days.	Demand is 95% or treatment capacity for 3 consecutive days.		
		Voluntary usage reduction;	Reduce non-essential water use; cease water use for construction and road building;	Prohibit all unnecessary water use, limit landscape water use;	Continue Stage 3 restrictions; water rationing	N/A
		Reduce demand by 10%	Reduce demand by 15%.	Reduce demand by 20%.		
CITY OF MOUNT PLEASANT	Based on a percentage of capacity usage rate.	Daily demand > 85% for 3 consecutive days; or	Daily demand > 90% for 3 consecutive days; or	Daily demand > 90% for 3 consecutive days; or	Daily demand > 100% for 1 day; or	System failure; or
		Levels in Lake Bob Sandlin decline at a rate disruptive to supply.	Levels in Lake Bob Sandlin decline at a rate causing imminent disruption to supply.	Pump failure; or	Demand > safe limits;	Supply contamination; or
				Storage levels no longer achieve full recovery in low demand periods.	Storage levels cannot maintain fire protection;	Storage levels and pressures prevent fire protection.
					Lake Bob Sandlin levels decline to potential pumping failure.	
		Voluntary usage reduction of 10%;	Prohibit nonessential use;	Prohibit nonessential use;	Prohibit nonessential use;	All use prohibited except for public health and safety;
		Nonessential use prohibited.	Landscape use limited to prescribed times;	Landscape use limited to prescribed times;	Landscape use limited to prescribed times;	Reduce demand by 75%;
			Reduce demand by 15%	Reduce demand by 25%.	Reduce demand by 30%.	Implement any available alternative supply sources.

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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
CITY OF PARIS	Based on a percentage of capacity usage rate.	Supply < 70% in Pat Mayse Lake and Lake Crook combined; or	Supply < 60% in Pat Mayse Lake and Lake Crook combined; or	Supply < 50% in Pat Mayse Lake and Lake Crook combined; or	N/A	Supply < 40% in Pat Mayse Lake and Lake Crook combined; or
		Period of high demand; or	Daily demand > 32 million gallons for 7 days; or	Daily demand > 34 million gallons for 14 days; or		Daily demand > 35 million gallons for 21 days; or
		Production or distribution limits exist.	Daily demand > 36 million gallons for 3 days; or	Daily demand > 36 million gallons for 6 days; or		Daily demand > 36 million gallons for 9 days; or
			Production or distribution limits exist.	Production or distribution limits exist.		Production or distribution limits exist; or
						System failure; or
						Supply contamination.
		Voluntary usage reduction of 10%;	Prohibit nonessential use;	Prohibit nonessential use;	N/A	Prohibit nonessential use;
		Limited nonessential use.	Landscape use limited to prescribed times;	Landscape use limited to prescribed times;		Landscape use prohibited;
			Reduce demand by 20%.	Reduce demand by 30%.		Reduce demand by 40%;
						Prorata curtailment to wholesale customers.
CITY OF SULFUR SPRINGS		Daily demand > 90%; or	Daily demand > 100%; or	Daily demand > 110%; or	N/A	N/A
		Lake level decline disruptive to supply; or	Lake level decline causes serious disruption; or	Lake levels too low for production equipment; or		
		Supply low enough to cause concern.	Storage capacity not maintained.	Storage capacity prevents fire protection; or		
				Pumping capacity unable to refill; or		
				Failure could cause immediate health and safety hazard; or		
				Supply contamination.		
CITY OF SULFUR SPRINGS	Percent capacity usage; Lake capacity; Potential disruption of supply.	Usage reduction of 10%;	Prohibit nonessential use;	Prohibit nonessential use;	N/A	N/A
		Limited nonessential use.	Landscape use limited to prescribed times;	Landscape use limited to prescribed times;		
			Reduce demand by 15%.	Reduce demand by 20%.		
CITY OF TYLER	Multistage drop in volume of surface supplies in water supply lakes.	Lake Tyler storage volume < 75% of conservation storage; or	Lake Tyler storage volume < 60% of conservation storage; or	Lake Tyler storage volume < 45% of conservation storage; or	N/A	N/A
		Demand is 85% of treatment capacity for 3 consecutive days.	Demand is 90% of treatment capacity for 3 consecutive days.	Demand is 98% of treatment capacity for 3 consecutive days;		
				Demand exceeds storage tank capacity;		
				Demand exceeds high service pump capacity.		
		Voluntary usage reduction, implement landscape watering schedule;	Stage 1 actions, limit landscape watering, reduce non-essential water use;	Prohibit all unnecessary water use, limit landscape water use;	N/A	N/A
		Reduce demand by 5%	Reduce demand by 10%.	Reduce demand by 15%.		

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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
COMBINED CONSUMERS WATER UTILITY	Percentage of capacity usage;	Lake Tawakoni < 432 ft.; or	Lake Tawakoni < 430 ft.;	Lake Tawakoni < 428 ft.; or	Lake Tawakoni < 426 ft.; then	All previous triggering criteria; or
	Lake capacity;	Demand reaches 80% of daily supply for 3 days; or	Demand reaches 90% of daily supply for 2 days; or	Demand 100% of daily supply for 1 day; or	Emergency booster pump installation.	System failure; or
	Replenishment percentage.	System not replenished to 80% capacity in 3 days.	System not replenished to 90% capacity in 2 days.	Contamination; or		Supply contamination; then
				Disaster declaration;		Deeper water source required.
				Health or safety concerns; or		
				System failure.		
		Voluntary usage reduction of 5%;	Prohibit nonessential use;	Prohibit nonessential use;	Prohibit nonessential use;	Prohibit nonessential use;
		Voluntary landscape use reduction;	Landscape use limited to prescribed times;	Landscape use limited to prescribed times;	Landscape use limited to prescribed times;	Landscape use prohibited;
		Conservation request.	Reduce demand 15%.	Reduce demand 20%.	Reduce demand 30%.	Reduce demand 40%.
		Combined Consumers Water Utility employs a water allocation stage when the utility determines falling treated water levels do not refill above 50% overnight for any of the stages listed above. Water use is allocated on a surface per household basis.				
CITY OF WHITE OAK	Capacity usage.	Demand > 85% safe capacity; or	Demand > 90% safe capacity; or	Demand > 90% safe system capacity; or	Demand > 100% safe capacity; or	System failure; or
		Demand > 2.8 MGD for 3 days; or	Demand > 2.97 MGD for 3 days; or	Demand > 2.97 MGD for 7 days; or	Demand > 3.3 MGD for 1 day; or	Supply contamination; or
		Big Sandy Creek levels decline at disruptive supply rate.	Demand causes storage levels to fall daily and recover during low demand periods; or	Pump failure; or	Demand > safe system limits; or	System cannot maintain fire protection.
			Big Sandy Creek levels decline rate makes supply problems imminent.	Storage levels no longer achieve recovery in low demand periods; or	Storage reservoir levels cannot maintain fire protection; or	
				Big Sandy Creek levels lower than highest intake tower.	Big Sandy Creek decline to levels that may cause system failure.	
CITY OF WHITE OAK		Voluntary 5% usage reduction.	Voluntary 10% usage reduction.	Voluntary 15% usage reduction.	Voluntary 20% usage reduction.	Voluntary 25% usage reduction.
HARLETON WSC	Capacity usage.	Consumption is 80% of supply for 3 consecutive days; or	Consumption is 80% of supply for 3 consecutive days; or	Consumption > 95% of supply for 3 consecutive days; or	Consumption > 100% of supply; and	System failure;
		Supply is 20% > previous month's consumption; or	Levels in any storage tanks cannot be refilled for 3 consecutive days.	Disaster declaration; or	Storage levels drop during one 24hour period.	Supply contamination.
		>4 weeks of low rainfall and use > 15% more than same period of previous year.		Wholesale supply reduction due to drought conditions.		
		Voluntary usage reduction of 5%.	10% demand reduction.	15% demand reduction.	20% demand reduction.	30% demand reduction.

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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
LAMAR COUNTY WATER SUPPLY DISTRICT	Capacity usage rate;	Demand reached 85% of peak daily use for 7 days; or	Demand reached 90% of peak daily use for 14 days; or	Demand reached 95% of peak daily use for 21 days; or	Demand reached 97% of peak daily use for 21 days; or	System failure; or
	Replenishment percentage.	System reaches 100% of peak daily use for 3 days; or	System reaches 100% of peak daily use for 6 days; or	System reaches 100% of peak daily use for 9 days; or	System reaches 100% of peak daily use for 9 days; or	Supply contamination.
		Reservoir levels < 90%.	Reservoir levels < 80%.	Reservoir levels < 70%.	Reservoir levels < 50%.	
		Voluntary usage reduction of 10%;	Reduce demand by 10%;	Reduce demand by 15%;	Reduce demand by 20%;	Reduce demand by 25%;
		Voluntary landscape use reduction;	Nonessential water use prohibited;	Nonessential water use prohibited;	Nonessential water use prohibited;	Nonessential water use prohibited;
		Nonessential water use prohibited.	Landscape use limited to prescribed times.	Landscape use limited to prescribed times.	Landscape use prohibited.	Landscape use prohibited.
		Lamar County Water Supply District employs a water allocation stage when emergency conditions are in place.				
LAKE FORK WSC	Capacity usage.	Consumption is 80% of supply for 3 consecutive days; or	Consumption > 90% available for 3 consecutive days; or	System failure; or	N/A	N/A
		Supply is 20% > previous month's consumption; or	Levels in any storage tanks cannot refill for 3 consecutive days.	Consumption > 95% supply for 3 days; or		
		> 8 weeks of low rainfall; and		Consumption of 100% available; and		
		Usage > 20% same period of previous year.		Storage levels drop during 24hour period; Contamination; or		
				Disaster declaration;		
				Wholesale supply reduction from drought; or		
				Events of public health or safety risks.		
		Schedule restrictions;	Prohibit outside use unless variance; Public outreach via local media.	Prohibit outside use.	N/A	N/A
		Reduce flushing operations. Reduce use via education.		Usage restrictions.		
				Enforcement and educational efforts.		
		Prorata water allocation triggered when severe water shortage conditions have been met.				
NORTH EAST TEXAS MUNICIPAL WATER DISTRICT	Capacity usage rate;	48 hours of 85% pumping capacity utilized in a 24hour period; or	48 hours of 90% pumping capacity utilized in a 24hour period; or	48 hours of 95% pumping capacity utilized in a 24hour period; or	N/A	System failure; or
	Replenishment percentage.	Supply volume < 50% capacity.	Supply volume < 40% capacity.	Supply volume < 25% capacity.		Supply contamination.
		Voluntary usage reduction of 10%; or	Reduce demand by 15%;	Reduce demand by 20%;	N/A	Assess the severity of the problem;
		Voluntary landscape use reduction.	Nonessential use prohibited.	Nonessential use prohibited;		Identify the actions needed and time required to solve.
				Prorate curtailment for wholesale customers.		
		Prorata water allocation triggered when severe water shortage conditions have been met.				

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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
NORTH TEXAS MUNICIPAL WATER DISTRICT	Multistage drop in water levels in water supply lakes.	Demand projected as limit; or		Demand projected as limit; or	Demand projected above limit; or	Demand projected as supply limit; or
		Lavon Lake or Jim Chapman Lake < 65% full; or		Lavon Lake or Jim Chapman Lake < 55% full; or	Lavon Lake or Jim Chapman Lake < 45% full; or	Lavon Lake or Jim Chapman Lake < 35% full; or
		Sabine River Authority (SRA) indicates "Mild Drought" in Upper Basin supplies; or		SRA indicates "Mild Drought" in Upper Basin water supplies; or	SRA indicates "Moderate Drought" in Upper Basin water supplies; or	SRA indicates "Severe Drought" in Upper Basin water supply; or
		Demand > 90% delivered amount for 3 consecutive days; or		Demand > 95% of amount delivered for 3 consecutive days; or	Demand > 98% of amount delivered for 3 consecutive days; or	Demand > delivery capacity; or
		Demand approaches delivery capacity; or		Demand approaches delivery capacity; or	Demand > delivery capacity; or	Supply contamination; or
		Supply contamination; or		Contamination; or	Supply contaminated; or	System damage.
		System damage.		System damage.	System damage.	
		Voluntary usage reduction;		Reduce production 5%;	Reduce production by 10%;	Reduce production;
		Increase public education of water reduction.		Further accelerate public education;	Initiate use restrictions;	Impose mandatory restrictions on cities and customers;
				Halt nonessential use;	Limit landscape water to once weekly;	Notify TCEQ.
				Notify TCEQ.	Notify TCEQ	
RED RIVER AUTHORITY	Daily average use; and	System > 2.5 times daily average for 14 days; and	System > 3.5 times daily average for 7 days; and	System > 5.5 times daily average 3 days; and	N/A	N/A
	Demand percentage.	Wholesale demand vol. reduced by 20%; or	Wholesale demand vol. reduced by 20% to 50%; and	Wholesale demand vol. reduced over 50%; and		
		Reduce demand 20%.	Demand reduced between 20% & 50%.	Reduce demand > 50%.		
		Reduce demand by 20%.	Reduce demand by 20%;	Reduce demand to maintain public health and safety;	N/A	N/A
			Prohibit landscape and nonessential use.	Prohibit landscape and nonessential use.		
RIVERBEND	Capacity usage range; and	72 consecutive hours of 85% pumping capacity; or	72 consecutive hours of 90% pumping capacity; or	72 consecutive hours of 95% pumping capacity; or	N/A	System failure; or
	Replenishment percentage.	Supply volume < 50% capacity.	Supply volume < 40% capacity.	Supply volume < 25% capacity.		Supply contamination.
		Reduce demand by 10%.	Reduce demand by 20%.	Reduce demand by 30%.	N/A	Assess the severity of the problem;
						Identify the actions needed and time required to solve.

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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
SABINE RIVER AUTHORITY IRON BRIDGE AND LAKE FORK DIVISIONS	Capacity use percentage.	Lake Tawakoni and Lake Fork capacity < 65% for 2 consecutive months.	Lake Tawakoni and Lake Fork capacity < 55% for 2 consecutive months.	Lake Tawakoni and Lake Fork capacity < 45% for 2 consecutive months.	Lake Tawakoni and Lake Fork capacity < 30% for 2 consecutive months.	Lake Tawakoni and Lake Fork capacity < 30% for 6 consecutive months.
		Reduce contract diversion from temporary and short-term contracts;	Reduce contract diversion from temporary and short-term contracts;	Reduce contract diversion from temporary and short-term contracts;	Reduce contract diversion, temporary and short-term contracts;	Ration contract diversion amounts;
		Notify customers.	Reduce diversion to long-term contracts;	Reduce diversion to long-term contracts;	Reduce diversion to long-term contracts;	All nonessential outdoor use prohibited;
			Notify customers.	Notify public;	Municipal customers to prohibit all outdoor use and limit indoor use;	Indoor use minimized;
				Possible emergency meetings.	Notify public;	Notify public;
					Possible emergency meetings.	Possible emergency meetings.
		In the event of a major contamination of Lake Tawakoni and Lake Fork; or a failure or breakdown of a major component of the pumps or delivery system, SRA will notify its customers and the media, and prohibit all nonessential water use.				
SABINE RIVER AUTHORITY TOLEDO BEND AND GULF COAST DIVISIONS	Capacity use percentage.	Surface elevation in Toledo Bend < 165.1 ft. for 14 consecutive days; or	Surface elevation in Toledo Bend < 162.2 ft. for 14 consecutive days; or	Surface elevation in Toledo Bend < 156 ft. for 14 consecutive days; or	N/A	N/A
		Sabine River flow < "mild" condition trigger.	Sabine River flow < "moderate" condition trigger.	Sabine River flow < "severe" condition trigger.		
SABINE RIVER AUTHORITY TOLEDO BEND AND GULF COAST DIVISIONS		Inform customers of drought condition; and	Inform customers of drought condition;	Inform public of drought condition;	N/A	N/A
		Activate system to answer inquiries.	Possible water curtailing;	Possible emergency meeting;		
			Potentially prohibit nonessential outdoor use.	May curtail water delivery;		
				Potentially prohibit all outdoor use and reduce indoor use.		
		In the event of a major contamination or drawdown of Toledo Bend for emergency repairs; or a failure or breakdown of a major component of the pumps or delivery system, SRA will notify its customers and the media, and prohibit all nonessential water use.				

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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
SAND FLAT WSC	Capacity usage.	Consumption is 80% of supply for 3 consecutive days; or	Consumption > 90% available for 3 consecutive days; or	System failure; or	N/A	N/A
		Supply is 20% > previous month's consumption; or	Levels in any storage tanks cannot refill for 3 consecutive days.	Consumption > 95% available supply for 3 consecutive days; or		
		> 8 weeks of low rainfall; and		Consumption of 100% available; and		
		Usage > 20% same period of previous year.		Storage levels drop during one 24-hour period; or		
				Supply contamination; or		
				Disaster declaration; or		
				Wholesale supply reduction due to drought conditions; or		
				Events which may cause imminent public health or safety risks.		
		Schedule restrictions;	Prohibit outside use unless granted variance;	Prohibit outside use.	N/A	N/A
		Reduce flushing operations.	Public outreach via local media.	Usage restrictions.		
		Reduce use via education.		Enforcement and educational efforts.		
TEXARKANA WATER UTILITIES	Reservoir conditions;	Wright Patman Reservoir is 220.60 ft.; or	Wright Patman Reservoir is 220.60 ft.; and/or;	Wright Patman Reservoir is 220.60 ft.; and	N/A	Unable to produce or provide treated water from both plants simultaneously.
	Demand.	Pump is out of service; or	Supply pump is out of service; and/or;	Supply pumps is out of service; and		
		Demand > 18 MGD.	Demand > 18 MGD.	Demand > 18 MGD.		
		Encourage conservation.	Reduce demand by 30%;	Reduce nonessential demand by 40%;	N/A	Reduce demand to 8.65 MGD;
			Limit nonessential and landscape use.	Reduce total demand by 30%;		Restricted to sanitary use only;
				Prohibit outdoor use;		Curtailing wholesale use.
				Curtail wholesale use.		

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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
WEST CASS	Capacity usage.	Consumption is 80% of supply for 3 consecutive days; or	Consumption > 90% available for 3 consecutive days; or	System failure; or	N/A	N/A
		Supply is 20% > previous month's consumption; or	Levels in any storage tanks cannot refill for 3 consecutive days.	Consumption > 95% available supply for 3 consecutive days; or		
		> 8 weeks of low rainfall; and		Consumption of 100% available; and		
		Usage > 20% same period of previous year.		Storage levels drop during one 24-hour period; or		
				Supply contamination; or		
				Disaster declaration; or		
				Wholesale supply reduction due to drought conditions; or		
				Events which may cause imminent public health or safety risks.		
		Schedule restrictions;	Prohibit outside use unless granted variance;	Prohibit outside use.	N/A	N/A
		Reduce flushing operations.	Public outreach via local media.	Usage restrictions.		
		Reduce use via education.		Enforcement and educational efforts.		
WEST GREGG SUD	Capacity usage.	Demand > 60% total well capacity for 3 consecutive days; or	Demand > 70% total well capacity for 3 consecutive days; or	Demand > 80% total well capacity for 3 consecutive days; or	Demand > 90% total well capacity for 3 consecutive days; or	System failure;
		Demand causes line pressure below safe levels; or	Demand causes line pressure below safe levels; or	Demand causes line pressure below safe levels; or	Demand causes line pressure below safe levels; or	Supply contamination.
		Other triggering criteria deemed by operator.	Other triggering criteria deemed by operator.	Other triggering criteria deemed by operator.	Other triggering criteria deemed by operator.	
		Voluntary usage reduction of 5%.	10% demand reduction.	15% demand reduction.	20% demand reduction.	30% demand reduction.

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Table 7.2 Major/Wholesale Water Providers within the North East Texas Region

Name	Entity Type	Wholesale Customers
CASH SUD	WUG/WWP	BHP WSC, City of Greenville, City of Quinlan, City of Lone Oak, Country Wood Estates, Miller Grove WSC, Oak Ridge Estates, Quinlan North Subdivision, Rock Wall East Mini Ranch, Quinlan South Subdivision
CHEROKEE WATER COMPANY	WWP	City of Longview, Southwestern Electric Power Company (SWEPCO)
CITY OF COMMERCE	WWP	Gafford Chapel WSC, Maloy WSC, Manufacturing Hunt County Sulphur Basin North Hunt WSC, West Delta WSC, Texas A&M University
CITY OF EMORY	WUG/WWP	City of Point, City of East Tawakoni, City of South Rains WSC
FRANKLIN COUNTY WD	WWP	Cypress Springs SUD, City of Winnsboro, City of Mt. Vernon, City of Mt. Pleasant
CITY OF GREENVILLE	WUG/WWP	City of Caddo Mills, Jacobia WSC, Shady Grove WSC, Manufacturing, Mining, Cash SUD, Caddo basin SUD
LAMAR COUNTY WSD	WUG/WWP	410 WSC, City of Blossom, City of Deport, City of Detroit, Manufacturing, Pattonville WSC, Red River County WSC, City of Reno, City of Roxton, City of Toco, M J C WSC, Pretty WSC,
CITY OF LONGVIEW	WUG/WWP	Elderville WSC, Gum Springs WSC 1, City of Hallsville, City of White Oak, City of (raw water), Eastman Chemical Company Texas Operation, Forest Lake Subdivision, Gum Springs WSC 2
CITY OF MARSHALL	WUG/WWP	Cypress Valley WSC, Gill WSC, Leigh WSC, Talley WSC, Blocker Crossroads, City of Scottsville
CITY OF MOUNT PLEASANT	WUG/WWP	Tri Water SUD, Lake Bob Sandlin State Park, Manufacturing, City of Winfield
NORTHEAST TEXAS MWD	WWP	City of Avinger, City of Daingerfield, Diana SUD, City of Hughes Springs, City of Jefferson, City of Lone Star, City of Lone Star Steel Longview, City of Luminant Marshall, Mims WSC, City of Pittsburg , City of SWEPCO Tyron Road SUD
CITY OF PARIS	WUG/WWP	Lamar County WSD, Manufacturing, MJC WSC, Steam Electric
SULPHUR RIVER MWD	WWP	City of Commerce, City of Sulphur Springs, City of Cooper
CITY OF SULPHUR SPRINGS	WUG/WWP	Brashear WSC, Brinker WSC, Gafford Chapel WSC, Marting Springs WSC, Livestock, North Hopkins WSC, Pleasant Hill WSC, Shady Grove WSC #2, Manufacturing
RIVERBEND WATER RESOURCES DISTRICT / TEXARKANA WATER UTILITIES	WUG/WWP	City of Annona, City of Atlanta, City of Avery, City of Central Bowie WSC, City of DeKalb, City of Domino, City of Hooks, Macedonia Eylau MUD, Manufacturing Cass County, Federal Correctional Institution, Manufacturing Bowie County, City of Maud, City of Nash, City of New Boston, City of Oak Grove WSC, City of Queen City, Red River Water Corp., City of Redwater, City of Wake Village, Texarkana Estates, Lone Star Army Ammunition Plant, City of Leary, El Chaparral Mobile Home Park,
TITUS COUNTY FWD #1	WWP	City of Mt. Pleasant, Luminant
SABINE RIVER AUTHORITY	WWP	Ables Springs WSC, Cash SUD, Combined Consumers SUD, City of Commerce, Eastman Chemicals, City of Edgewood, City of Emory, City of Greenville, City of Henderson, City of Bright Star Salem, CIty of Kilgore, City of Longview, Mac Bee SUD, City of Point, City of Quitman, Release from TXU, South Tawakoni WSC, West Tawakoni, City of Wills Point

7.4 Drought Response Triggers and Actions

As mandated by 31 TAC 357.42(c), this section of the plan summarizes drought response triggers and actions regarding the management of existing water sources within the North East Texas Region. The summary includes what specific triggers are used to determine the onset of each defined drought stage and the associated response actions developed by local entities to decrease water demand during the drought stage.

Drought response triggers and actions should be specific to each water supplier and should be based on an assessment of the water user's vulnerability. In some cases, it may be more appropriate to establish triggers based on a supply source volumetric indicator such as a lake surface elevation. Similarly, triggers might be based on supply levels remaining in an elevated or ground storage tank within the water distribution system, although this is not a recommended approach, as the warning of supply depletion would be only three to four days. Triggers based on demand levels can also be effective, if the demands are closely monitored. Whichever method is employed, trigger criteria should be defined on well-established relationships between the benchmark and historical experience. If historical observations have not been made, then common sense must prevail until such time that more specific data can be presented.

Specific drought response triggers and actions at each drought stage for water user groups, including their supply source, specific triggers, and actions in the planning area are summarized in Table 7.1.

7.4.1 Drought Response Triggers

Drought Contingency Plans (DCPs) developed by water user groups within the NETRWPG contain drought response triggers specific to each WUG. Trigger types may include surface water triggers, groundwater triggers, or system capacity triggers. Each of these types of triggers is summarized below.

7.4.1.1 Surface Water Triggers

Surface water triggers are widely used in the RWPA, typically in conjunction with other triggers based on system demands. Surface water triggers based on reservoir capacity and/ or stage (water pool elevation) are relatively easy to monitor remotely as several reservoirs in the RWPA are equipped with gages and satellite telemetry with real-time data posted online.

7.4.1.2 Groundwater Triggers

Groundwater triggers that indicate the onset of drought are not as easily identified as factors related to surface-water systems. This is attributable to: (1) the rapid response of stream discharge and reservoir storage to short-term changes in climatic conditions within a region and watersheds where surface drainage originates, and (2) the typically slower response of groundwater systems to recharge processes resulting from climatologic drought. Although climatic conditions over a period of one or two years might have a significant impact on the availability of surface water, aquifers within the same area might not respond as quickly, depending on the location and size of recharge areas in a basin, the distribution of precipitation over recharge areas, the amount of recharge, and the extent to which aquifers are developed and exploited by major users of groundwater. Decreases in water levels in an aquifer during drought conditions are usually the result of increased pumping from the aquifer rather than a decrease in recharge, and water levels typically recover once the pumping is reduced. No entities utilize groundwater triggers in the RWPA.

7.4.1.3 System Capacity Triggers

Because of the above-described problems with using groundwater levels as drought-condition indicators, several municipal water-supply entities in the North East Texas Region that rely on groundwater generally establish drought-condition triggers based on levels of demand that exceed a percentage of the systems production capacity. All the entities listed in Table 7.1 that use groundwater use both supply triggers as well as demand triggers with one exception. The Red River Authority bases its' drought triggers on average daily use.

7.4.2 Drought Response Actions

Drought Contingency Plans (DCPs) developed by water user groups within the NETRWPG also contain drought response actions that are based on the triggers described above, also specific to each WUG. Actions may include voluntary usage reductions, schedule restrictions, reduction of non-essential water use, limitations on landscape watering including the complete elimination of landscape watering or outside water use, and mandatory water use restrictions including water rationing. The type of action taken will depend on the stage of drought reductions being implemented, and all these actions are intended to reduce the water demand placed on the system and are often rescinded when a different set of conditions are met. In some cases, specific actions are not specified in the DCP, but rather a demand reduction goal is stated.

Additional drought response actions that may be taken by some water user groups do not involve reductions in water demand. These may include implementation of alternative water supply strategies and curtailment to wholesale customers.

7.5 Existing and Potential Emergency Interconnects

As mandate by Texas Statute §357.42(d) & (e), regional water planning groups are to collect information on existing major water infrastructure facilities that may be used in the event of an emergency shortage of water. Pertinent information includes identifying the potential user(s) of the interconnect, the potential supplier(s), the estimated potential volume of supply that could be provided, and a general description of the facility. Texas Water Code §16.053(c) requires information regarding facility locations to remain confidential. This section provides general information regarding existing and potential emergency interconnects among water user groups within the North East Texas Region.

7.5.1 Existing Emergency Interconnects

Water infrastructure facilities within the North East Texas Region were originally identified through a survey process in order to better evaluate existing and potentially feasible emergency interconnects. The survey included major water infrastructure facilities like the City of Longview and the City of Marshall, along with smaller systems such as Karnack WSC. The TCEQ Drinking Water Watch database was then evaluated as a backup source of information for existing interconnects. Based on these sources, a total of 52 water supply systems have the ability to receive an emergency supply of water through an existing emergency interconnect. Table 7.3 presents the survey results for the existing emergency interconnects among water users and neighboring systems.

Table 7.3 Existing Emergency Interconnects in the North East Texas Region

Entity *Providing* Supply	Entity *Receiving* Supply
410 WSC	Red River County WSC
Able Springs WSC	Combined Consumers SUD
Alba-Golden	Grand Saline
BiCounty WSC	Newsome WSC, Thunderbird Point Water System, Woodland Harbor
Bois D Arc MUD	Honey Grove, Windom
Caddo Basin Special Utility District	Caddo Mills, Greenville
Carroll	Van, Twin Oaks Ranch
Cash SUD	Combined Consumer SUD, West Tawakoni, B H P WSC, Miller Grove WSC, Greenville
Central Bowie WSC	De Kalb
Combined Consumers SUD	Quinlan, West Tawakoni
Crooked Creek WSC	Myrtle Springs WSC
Cumby	Miller Grove WSC
East Mountain	Glenwood WSC
Emory	Point
Farmersville	Caddo Basin SUD
Gill WSC	Holiday Springs Mobile Home Park
Gladewater	Clarksville City, Warren City
Glenwood WSC	East Mountain Water System
Greenville	Caddo Basin SUD, Cash SUD
Gum Springs WSC #1	West Harrison WSC
Hughes Springs	Holly Springs WSC
Jefferson	Kellyville-Berea WSC
Karnack WSC	Caddo Lake WSC
Kilgore	Cross Roads SUD, Liberty Danville FWSD 2, Southern Utilities Laird Hill, West Gregg SUD
Lake Fork WSC	Yantis
Lamar County Water	410 WSC, Red River WSC, Pattonville WSC, M J C WSC
Leigh WSC	Shadowood WC
Lindale	Lindale Rural WSC
Longview	White Oak, Gum Springs WSC, Elderville WSC, Forest Lake Subdivision, Hallsville, Tryon Road SUD, White Oak
Mabank	Kemp
MacBee SUD	Ables Springs SUD
Marshall	Blocker Crossroads WSC, Cypress Valley WSC, Gill WSC, Leigh WSC, Talley WSC
Martin Springs WSC	Brinker WSC
Mount Vernon	Cypress Springs SUD

Entity *Providing* Supply	Entity *Receiving* Supply
Mt. Pleasant	Tri SUD
Myrtle Springs WSC	Crooked Creek WSC
NETMWD	Avinger, Daingerfield, Diana SUD, Harleton WSC, Hughes Springs, Jefferson, Lone Star, Mims WSC, Pittsburg, Ore City
Paris	M J C WSC
Pine Ridge WSC	Sky Ranch Retreat
Point	Emory
Pritchett WSC	Int'l Alert Academy
Royse City	BHP WSC
Sharon WSC	Winnsboro
Southern Utilities	Walnut Grove WSC
Sulphur Springs	Martin Springs WSC
Texarkana	Queen City, Red River County WSC
Riverbend	Hooks
Texarkana Water Utilities	Atlanta, Domino, Queen City, Hooks
West Harrison WSC	Gum Springs WSC
West Tawakoni	Combined Consumers SUD
Winnsboro	Sharon WSC
Yantis	Lake Fork WSC

7.5.2 Potential Emergency Interconnects

Responses to survey questions helped identify other potential emergency interconnects for various WUGs within the North East Texas Region. Table 7.4 presents a list of 154 WUGs that may potentially receive water through an emergency interconnect and the WUGs supplying the potential emergency interconnects.

Table 7.4 Potential Emergency Interconnects in the North East Texas Region

Entity *Providing* Supply	Entity *Receiving* Supply
Red River County WSC	410 WSC
Van, R P M WSC, Edom WSC	Ben Wheeler WSC
Caddo Basin SUD	BHP WSC
TRI SUD, Diana SUD, Sharon WSC, Cypress Springs SUD, Holly Springs WSC, Mims WSC, NETMWD	Bi-County WSC
Pritchett WSC, Fouke WSC	Big Sandy
Sharon WSC	Big Wood Springs Water System
Atlanta	Bloomburg WSC
410 WSC, Lamar County WSD, Paris	Blossom
Red River County WSC	Bogata
Shirley WSC, Miller Grove WSC, Sulphur Springs, Gafford Chapel WSC	Brashear WSC
South Rains SUD, Golden WSC, Shirley WSC, Miller Grove WSC	Bright Star-Salem SUD
North Hopkins WSC, Cypress Springs SUD, Franklin County WD	Brinker WSC

Entity *Providing* Supply	Entity *Receiving* Supply
BiCounty WSC	Brookshires Camp Joy Water System
Texarkana, Texas Riverbend WRD	Burns Redbank WSC
BHP WSC, Frognot WSC, Hickory Creek SUD, North Hunt SUD	Caddo Basin SUD
Karnack WSC	Caddo Lake WSC
BHP WSC, Cash SUD	Caddo Mills
Shady Grove WSC	Campbell WSC
Myrtle Springs WSC, MacBee SUD, Fruitvale WSC	Canton
Shady Grove WSC, Miller Grove WSC, South Rains SUD, Combined Consumers SUD, BHP WSC	Cash SUD
Hickory Creek SUD	Celeste
Texarkana, Texas Riverbend WRD, Red River County WSC, New Boston	Central Bowie County WSC
Bi County WSC	Cherokee Point Water Company
Texarkana, Texas Riverbend WRD, Red River County WSC	Clarksville
White Oak	Clarksville City
Quitman	Clear Lakes
MacBee SUD, South Tawakoni WSC	Combined Consumers SUD
North Hunt SUD, Gafford Chapel WSC	Commerce
Delta County MUD	Cooper
Cypress Springs SUD, Winnsboro, Sharon WSC	Cornersville WSC
Pritchett WSC	Country Club Estates
Texarkana, Texas Riverbend WRD, Red River County WSC, Western Cass WSC	County-Other, Bowie
Delta County MUD, Lamar County WSD, North Hunt SUD, NTMWD, Sabine River Authority	County-Other, Delta
North Hopkins WSC, Brinker WSC, Sulphur Springs, Gafford Chapel WSC, Cypress Springs SUD, NTMWD, Sabine River Authority	County-Other, Hopkins
Cash SUD, Greenville, NTMWD, Hickory Creek SUD, North Hunt SUD, Commerce, Sabine River Authority	County-Other, Hunt
Lamar County WSD, Paris, 410 WSC	County-Other, Lamar
Cash SUD, Miller Grove WSC, Shirley WSC, Bright Star Salem SUD, South Rains SUD, Emory, East Tawakoni, NTMWD, Sabine River Authority	County-Other, Rains
Red River County WSC, Lamar County WSD, Texarkana, Texas Riverbend WRD	County-Other, Red River
TRI SUD, Mount Pleasant, Bi County WSC	County-Other, Titus
MacBee SUD, South Tawakoni WSC, Fruitvale WSC, Myrtle Springs WSC, Canton, Little Hope Moore WSC, Bethel Ash WSC, Ben Wheeler WSC, RPM WSC, Van, Carroll WSC, Pruitt Sandflat WSC	County-Other, Van Zandt
Mims WSC	Crestwood Water Company
Lindale Rural WSC	Crystal Systems Texas
Cash SUD, Miller Grove WSC, Gafford Chapel WSC, Brashear WSC	Cumby
Franklin County WD, Brinker WSC, North Hopkins WSC, Tri SUD, Bi County WSC, Sharon WSC, Mt Vernon	Cypress Springs SUD
Texarkana, Texas Riverbend WRD	De Kalb

Entity *Providing* Supply	Entity *Receiving* Supply
Cooper, Lamar County WSD, North Hunt SUD, Ladonia, North Hopkins WSC, NTMWD, Sabine River Authority	Delta County MUD
Western Cass WSC	Douglassville
Cash SUD, South Rains SUD	East Tawakoni
Atlanta	Eastern Cass WSC
South Tawakoni	Edgewood
South Tawakoni WSC, MacBee SUD	Edgewood
Ben Wheeler WSC, RPM WSC, Leagueville WSC, Brownsboro	Edom WSC
Blocker Crossroads	Elysian Fields WSC
Jefferson	EMC WSC
South Rains SUD, Bright Star Salem SUD, Miller Grove WSC	Emory
Lindale Rural WSC	Enchanted Lakes Water System
Quitman	Fouke WSC
Pritchett WSC	Friendship Water System
South Tawakoni WSC, Golden WSC, South Rains SUD, Bright Star Salem SUD	Fruitvale WSC
Cumby, Brashear WSC, Sulphur Springs, North Hunt SUD, Commerce, North Hopkins WSC	Gafford Chapel WSC
Longview	Garden Acres Subdivision
Pritchett WSC	Gilmer
Grand Saline, Fruitvale WSC, Bright Star Salem SUD, Ramey WSC, Sabine River Authority	Golden WSC
Fruitvale WSC, Golden WSC, Pruitt Sandflat WSC	Grand Saline
Shady Grove WSC, North Hunt SUD, Hickory Creek SUD	Greenville
Bi County WSC	HAB WSC
Pritchett WSC	Harmony ISD
Fouke WSC	Hawkins
Celeste, Caddo Basin SUD, Frognot WSC, West Leonard WSC, Leonard, Arledge Ridge WSC, Wolfe City, North Hunt SUD, NTMWD, Sabine River Authority	Hickory Creek SUD
Mims WSC	Holiday Harbor
Jones WSC	Holiday Villages Of Fork
Texarkana, Texas Riverbend WRD	Hooks
Mims WSC	Indian Hills Harbor
West Gregg SUD	Jackson WSC
Hawkins	Jarvis Christian College
Longview	Johnson Mobile Home Park
Martin Springs WSC, Sharon WSC, Fouke WSC, Quitman, Sabine River Authority, NTMWD	Jones WSC
Leigh WSC	Karnack WSC
Jefferson	Kellyville Berea WSC
Paris, 410 WSC, Red River County WSC, Delta County MUD	Lamar County WSD
Kilgore	Liberty City WSC
Lindale Rural WSC	Lindale

Entity *Providing* Supply	Entity *Receiving* Supply
Tyler	Lindale Rural WSC
NETMWD	Linden
Canton, Ben Wheeler WSC	Little Hope Moore WSC
Myrtle Springs WSC, Mabank, Wills Point, Edgewood, South Tawakoni WSC, Combined Consumers SUD, NTMWD, Sabine River Authority	Macbee SUD
Texarkana, Texas Riverbend WRD	Macedonia Eylau MUD 1
Western Cass WSC	Marietta
NETMWD	Marshall
Shady Grove No. 2 WSC, Brinker WSC, Jones WSC, Lake Fork WSC	Martin Springs WSC
Texarkana, Texas Riverbend WRD	Maud
Shirley WSC, Brashear WSC	Miller Grove WSC
Ramey WSC	Mineola
Tri SUD, NETMWD, Cypress Springs SUD, Bi County WSC	Mount Pleasant
Cypress Springs SUD	Mount Vernon
MacBee SUD, Canton, Fruitvale WSC	Myrtle Springs WSC
Tri SUD	Naples
Texarkana, Texas Riverbend WRD	Nash
Texarkana, Texas Riverbend WRD	New Boston
Mineola	New Hope SUD
Marshall	North Harrison WSC
North Hunt SUD, Gafford Chapel WSC, Sulphur Springs, Brinker WSC, Cypress Springs SUD, Delta County MUD	North Hopkins WSC
Wolfe City, Hickory Creek SUD, Ladonia, Commerce, Gafford Chapel WSC	North Hunt SUD
Elysian Fields WSC	Old Town WSC
Tri SUD	Omaha
NETMWD	Ore City
Lamar County WSD, 410 WSC, Red River County WSC	Paris
Mims WSC	Pine Harbor Subdivision
Carroll WSC, Pruitt Sandflat WSC, Golden WSC, Lindale Rural WSC	Pine Ridge WSC
Cash SUD, Ables Springs WSC, Terrell, High Point WSC, RCH WSC, Blackland WSC, NTMWD, Sabine River Authority	Poetry WSC
Emory	Point
East Tawakoni, Cash SUD, South Rains SUD, South Tawakoni WSC, NTMWD, Sabine River Authority	Point
Gilmer	Pritchett WSC
Van, Carroll WSC, Pine Ridge WSC, Golden WSC, Grand Saline, Fruitvale WSC	Pruitt Sandflat WSC
West Tawakoni, Cash SUD, NTMWD, Sabine River Authority	Quinlan
Jones WSC, Fouke WSC	Quitman
Mineola	Ramey WSC
Paris, Texas Riverbend WRD, Central Bowie County WSC	Red River County WSC
Texarkana, Texas Riverbend WRD	Redwater
Paris, 410 WSC, Red River County WSC	Reno (Lamar)

Entity *Providing* Supply	Entity *Receiving* Supply
Texarkana, Arkansas	Riverbend Water Resources District
Pritchett WSC	Rosewood Water System
Chandler, Southern Utilities, Ben Wheeler WSC, Edom WSC	RPM WSC
Lindale Rural WSC	Sand Flat WSC
Marshall	Scottsville
Brashear WSC, Sulphur Springs, Martin Springs WSC	Shady Grove NO. 2 WSC
Greenville, Cash SUD	Shady Grove WSC
Diana SUD	Shady Shores Water System
Winnsboro	Sharon WSC
Bright Star Salem SUD, Miller Grove WSC, Brashear WSC, Martin Springs WSC, Lake Fork WSC, NTMWD, Sabine River Authority	Shirley WSC
Tyler	Smith County MUD 1
Point, Emory, Bright Star Salem SUD, Fruitvale WSC, South Tawakoni WSC, NTMWD, Sabine River Authority	South Rains SUD
Wills Point	South Tawakoni
Combined Consumers SUD, MacBee SUD, South Rains SUD, Fruitvale SUD, Edgewood, Wills Point, NTMWD, Sabine River Authority	South Tawakoni WSC
Winona	Star Mountain WSC
Gladewater	Starrville-Friendship WSC
Shady Grove No. 2 WSC, Brashear WSC, Gafford Chapel WSC, North Hopkins WSC, Brinker WSC, Martin Springs WSC	Sulphur Springs
Texarkana, Arkansas	Texarkana
North Hunt SUD, Gafford Chapel WSC	Texas A&M University Commerce
Caddo Lake WSC	TPWD Caddo Lake State Park
Sand Flat WSC	TPWD Tyler State Park
Cypress Springs SUD, Bi County WSC, Western Cass WSC	TRI SUD
Gladewater	Union Grove WSC
Ben Wheeler WSC, Pruitt Sandflat WSC, Carroll WSC	Van
Texarkana, Texas Riverbend WRD	Wake Village
Waskom Rural WSC	Waskom
Waskom	Waskom Rural WSC
Gum Springs WSC	West Harrison WSC
Quinlan, NTMWD, Sabine River Authority	West Tawakoni
Linden	Western Cass WSC
MacBee SUD, South Tawakoni WSC, NTMWD, Sabine River Authority	Wills Point
Cypress Springs SUD	Winnsboro
Star Mountain WSC	Winona
Arledge Ridge WSC, North Hunt SUD, Hickory Creek SUD	Wolfe City

7.6 Drought Management Water Management Strategies

As mandate by Texas Statute §357.42(f), RWPGs may designate recommended and alternative drought management water management strategies and other recommended drought measures in the RWP. The list of recommended drought strategies and alternative drought strategies must include the associated WUG/ WWP and the triggers that would initiate the strategy. Potentially feasible drought strategies that were considered but not recommended must also be listed, as well as any other recommended measures included the RWP, including any applicable triggers.

The TWDB has required the consideration of a general methodology for estimating economic impacts associated with implementation of drought management as a water management strategy. Water user groups may have some flexibility to focus on discretionary outdoor water use first to reduce water use. Commercial and manufacturing use sectors may find some degrees of drought management to be economically viable and cost-competitive with other water management strategies.

The NETRWPG does not support the provision of drought management measures as an explicit WMS in the 2026 Region D Plan, and therefore no drought management WMSs were considered during the current cycle. Drought management measures vary within the Region, and are temporary strategies intended to conserve supply and reduce impacts during drought and emergency times and are not implemented in the Region to address long-term demands. Little to no firm supply (i.e., yield) is gained from the implementation of these measures, given their application during such specific times, particularly when considered alongside more typical WMS in the planning process. Also, the use of such measures, and their efficacy, varies greatly between entities within the North East Texas Region, creating additional uncertainty. Although not included as a specific WMS herein, drought management is nevertheless an important component of water supply management. The NETRWPG supports implementation of DCPs under appropriate conditions by water providers in order to enhance the availability of limited supplies during emergency and drought conditions and reduce impacts to water users and local economies. Recognizing that implementation of appropriate water management strategies is a matter of local choice, the NETRWPG supports consideration of economically viable drought management approaches as an interim strategy to meet near-term needs through demand reduction until such time as economically viable long-term water supplies can be developed.

The economic impacts on WUG reductions associated with increasing 5, 10, 15, 20, 25, and 30 percent drought management scenarios are shown in Table 7.5 for decades 2030 through 2080 for water user groups in the North East Texas Region.

These impacts were derived using the TWDB’s Drought Management Costing Tool, which relies upon estimated foregone consumer surplus (consumer willingness to pay to restore normal water usage) and annual cost and usage surveys performed by the Texas Municipal League (TML). The costing tool is only applicable to residential outdoor water use.

Table 7.5 Drought Management Action Evaluation Summary

Entity Name	Total Annual Water Reduction (Percentage and volume in ac-ft)						Total annual lost consumer surplus (in 2023 $)					
	5% 2030	10% 2040	15% 2050	20% 2060	25% 2070	30% 2080	2030	2040	2050	2060	2070	2080
410 WSC	5	10	14	18	22	25	836	3,353	7,604	13,753	21,926	32,323
Ables Springs SUD	3	6	9	13	17	21	409	1,869	4,748	9,457	16,574	26,795
Atlanta	24	45	65	82	98	112	3,948	15,922	35,974	64,983	103,360	151,840
Avinger	1	3	4	5	6	7	203	814	1,834	3,310	5,260	7,661
B H P WSC	26	61	103	152	207	270	3,252	15,980	42,748	88,970	162,127	271,629
Ben Wheeler WSC	11	26	44	65	89	117	1,788	8,615	22,952	48,253	88,705	149,702
Bethel Ash WSC	8	17	29	41	55	71	981	4,558	11,807	24,102	43,205	71,454
Bi County WSC	61	124	186	249	312	376	7,575	32,246	77,040	145,920	244,125	378,550
Big Sandy	5	10	15	19	24	28	646	2,752	6,534	12,156	19,951	30,333
Blocker Crossroads WSC	7	15	22	29	37	44	1,107	4,805	11,496	21,836	36,594	56,734
Blossom	5	11	16	21	26	32	865	3,661	8,679	16,322	27,084	41,604
Bogata	6	11	16	20	24	27	667	2,656	5,982	10,730	16,983	24,814
Bois D Arc MUD	0.1	0.1	0.2	0.3	0.3	0.4	10	41	99	187	311	480
Brashear WSC	4	9	14	20	26	32	684	3,114	7,515	14,691	25,378	40,499
Bright Star Salem SUD	18	38	60	88	119	153	2,756	12,632	31,667	65,192	117,718	195,608
Brinker WSC	10	22	33	45	58	72	1,588	7,125	17,257	33,609	57,763	91,815
Burns Redbank WSC	6	12	19	27	36	46	881	3,953	10,001	20,077	35,545	58,258
Caddo Basin SUD	69	125	219	301	373	487	8,544	32,535	90,526	176,358	291,375	490,067
Caddo Mills	4	7	11	15	20	24	604	2,597	6,298	12,108	20,569	32,307
Canton	30	67	111	162	222	288	4,167	19,628	51,653	106,705	194,509	324,990
Carroll WSC	4	8	12	18	24	30	549	2,541	6,512	13,174	23,397	38,347
Cash SUD	93	211	354	510	642	817	11,468	54,950	146,455	299,018	502,448	821,376
Celeste	3	7	10	14	18	23	379	1,688	4,196	8,179	14,068	22,356
Central Bowie County WSC	51	103	156	209	264	319	6,297	26,814	64,443	122,789	206,458	321,267
Chalk Hill SUD	0.1	0.1	0.2	0.3	0.3	0.4	11	45	112	201	335	491
Clarksville	11	19	25	29	31	32	3,332	12,454	25,729	42,760	61,279	79,072
Clarksville City	4	8	12	15	19	22	493	2,100	4,979	9,249	15,172	22,978
Combined Consumers SUD	30	64	99	136	174	215	3,763	16,601	41,097	79,718	136,420	216,048
Commerce	23	45	65	84	100	115	3,001	12,279	28,490	51,608	82,367	121,501
Como	3	5	8	10	13	15	287	1,211	2,886	5,451	9,085	14,017
Cooper	17	33	49	65	80	95	1,974	8,297	19,642	36,629	60,263	91,764
Cornersville WSC	4	9	14	19	25	31	675	2,988	7,361	14,412	24,902	39,918
Cross Roads SUD	1	3	5	6	8	10	230	988	2,408	4,661	7,971	12,611

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Entity Name	Total Annual Water Reduction (Percentage and volume in ac-ft)						Total annual lost consumer surplus (in 2023 $)					
	5% 2030	10% 2040	15% 2050	20% 2060	25% 2070	30% 2080	2030	2040	2050	2060	2070	2080
Crystal Systems Texas	21	44	69	93	118	144	3,340	14,726	36,139	69,301	117,324	183,897
Cumby	3	6	9	11	14	17	445	1,829	4,523	8,520	14,123	21,671
Cypress Springs SUD	43	86	130	178	227	279	5,270	22,533	54,006	104,241	177,695	280,525
Cypress Valley WSC	6	12	18	24	30	37	906	3,943	9,442	17,984	30,203	46,983
Daingerfield	9	19	30	41	52	63	1,365	5,920	14,601	28,056	47,593	74,805
De Kalb	7	15	22	29	36	42	1,469	6,163	14,566	27,114	44,525	67,721
Delta County MUD	8	16	24	33	42	51	1,244	5,325	12,863	24,617	41,584	65,016
Diana SUD	27	59	95	136	184	240	3,377	15,290	39,179	79,887	144,171	241,335
E M C WSC	10	18	24	30	34	36	1,584	6,084	12,816	22,130	33,286	45,634
East Mountain Water System	7	14	20	27	33	39	919	3,917	9,296	17,274	28,381	43,131
East Tawakoni	3	6	9	12	15	18	589	2,516	6,139	11,541	19,097	29,218
East Texas MUD	5	12	20	29	39	50	810	3,981	10,419	21,317	38,275	63,291
Eastern Cass WSC	17	35	55	77	103	133	2,631	11,555	28,861	57,574	102,094	169,298
Edgewood	6	11	18	24	30	37	830	3,618	8,874	16,988	28,724	45,083
Edom WSC	4	7	11	15	19	23	575	2,472	5,981	11,276	18,776	28,968
Elderville WSC	23	46	68	89	110	130	2,797	11,928	28,216	52,430	85,922	130,367
Elysian Fields WSC	3	8	12	19	27	36	548	2,689	6,535	14,171	26,590	45,454
Emory	5	11	17	23	29	35	1,150	4,951	12,133	23,081	38,719	60,027
Fouke WSC	28	59	91	127	166	208	3,510	15,499	37,882	74,757	130,007	209,046
Frognot WSC	0.1	0.3	0.4	0.7	1.0	1.4	16	83	233	517	970	1,729
Fruitvale WSC	14	30	49	70	94	121	2,164	9,999	25,786	52,372	93,494	153,976
Gafford Chapel WSC	4	9	13	18	23	28	656	2,845	6,953	13,363	22,691	35,655
Gill WSC	5	11	16	20	25	29	831	3,496	8,329	15,200	24,490	36,481
Gilmer	19	39	58	76	93	110	2,179	9,282	22,037	41,026	67,390	102,389
Gladewater	25	50	75	98	121	143	3,618	15,420	36,534	67,911	111,429	169,125
Glenwood WSC	12	23	35	46	56	67	1,811	7,715	18,297	34,069	55,961	85,042
Golden WSC	13	28	44	61	80	101	2,079	9,280	23,041	45,662	79,728	128,716
Grand Saline	12	24	37	49	62	74	1,671	7,189	17,427	32,908	54,909	84,909
Greenville	191	430	687	962	1261	1584	18,951	90,067	228,313	452,961	791,568	1,278,490
Gum Springs WSC	50	108	163	233	309	392	6,137	28,047	67,581	136,439	241,614	394,019
Hallsville	16	34	51	73	96	121	3,709	16,858	40,609	81,497	143,606	233,169
Harleton WSC	18	35	51	68	84	100	2,747	11,621	26,943	50,462	83,326	127,137
Hawkins	6	12	18	23	30	36	657	2,823	6,800	12,892	21,596	33,512
Hickory Creek SUD	14	31	53	81	117	161	2,119	10,256	28,014	60,671	115,922	205,035
Holly Springs WSC	6	11	15	19	22	24	910	3,575	7,815	13,832	21,468	30,675

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Entity Name	Total Annual Water Reduction (Percentage and volume in ac-ft)						Total annual lost consumer surplus (in 2023 $)					
	5%	10%	15%	20%	25%	30%	2030	2040	2050	2060	2070	2080
	2030	2040	2050	2060	2070	2080						
Hooks	10	19	29	38	46	55	1,444	6,058	14,294	26,594	43,612	66,217
Hughes Springs	8	16	22	28	34	39	1,059	4,272	9,651	17,427	27,709	40,737
Jackson WSC	6	14	22	30	39	49	1,010	4,602	11,534	22,619	39,126	62,509
Jefferson	8	14	20	25	29	33	1,356	5,341	11,741	20,901	32,710	47,265
Jones WSC	17	36	56	80	107	136	2,689	12,046	29,689	59,813	105,969	173,156
Josephine	1	2	3	4	5	7	131	644	1,740	3,624	6,578	11,060
Kellyville-Berea WSC	4	9	13	17	21	24	689	2,846	6,660	12,379	20,385	31,211
Kilgore	38	77	115	151	186	219	5,599	23,879	56,525	105,050	172,215	261,355
Lake Fork WSC	9	20	30	43	57	73	1,443	6,468	15,938	32,052	56,730	92,600
Lamar County WSD	82	164	244	324	403	482	10,076	42,657	101,123	190,151	315,467	484,454
Leigh WSC	6	11	16	18	17	15	953	3,617	8,493	13,170	17,327	19,789
Liberty City WSC	18	37	56	73	90	107	2,868	12,291	29,187	54,470	89,643	136,548
Liberty Utilities Silverleaf Water	12	25	38	52	66	82	1,863	8,139	19,762	38,378	65,779	104,323
Lindale	21	44	67	90	113	137	2,610	11,381	27,728	52,762	88,626	137,869
Lindale Rural WSC	42	92	147	206	271	341	5,144	23,983	60,915	121,131	212,033	342,818
Linden	19	36	51	65	78	89	2,022	8,169	18,515	33,496	53,400	78,647
Little Hope Moore WSC	7	14	22	31	39	48	1,071	4,728	11,715	22,734	38,969	61,788
Lone Star	6	10	14	17	20	22	877	3,421	7,387	13,013	20,099	28,492
Longview	309	629	955	1281	1610	1943	21,966	94,420	227,694	432,554	724,899	1,124,251
Mabank	1	2	3	5	6	8	120	571	1,504	3,124	5,692	9,548
MacBee SUD	41	101	186	305	470	695	5,047	26,216	76,877	178,881	367,514	699,379
Macedonia Eylau MUD 1	42	84	124	163	200	237	5,192	21,780	51,382	95,583	156,794	238,006
Marshall	88	172	257	323	380	429	10,391	42,957	102,160	182,003	285,583	413,981
Martin Springs WSC	12	24	37	51	65	79	1,844	8,041	19,602	37,780	64,223	101,052
Maud	3	7	10	13	17	20	754	3,165	7,462	13,859	22,764	34,560
Miller Grove WSC	5	11	17	24	31	38	829	3,689	9,012	17,625	30,381	48,425
Mims WSC	8	17	26	36	46	57	1,285	5,579	13,870	26,770	45,782	73,032
Mineola	24	50	77	108	141	177	4,978	22,068	54,040	107,240	187,416	302,670
Mount Pleasant	53	108	165	223	282	344	5,335	23,133	55,951	107,003	180,758	282,998
Mount Vernon	9	18	27	36	46	55	1,195	5,015	11,789	22,436	37,657	58,505
Myrtle Springs WSC	13	31	55	87	124	168	1,987	10,337	29,061	64,456	123,383	215,097
Naples	6	12	18	23	29	34	927	3,885	9,215	17,269	28,613	43,887
Nash	16	32	48	63	78	92	2,249	9,436	22,263	41,415	67,945	103,166
New Boston	20	40	59	77	95	112	2,691	11,285	26,634	49,530	81,251	123,332
New Hope SUD	12	24	35	45	55	63	1,866	7,832	18,582	33,828	54,320	80,784

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Entity Name	Total Annual Water Reduction (Percentage and volume in ac-ft)						Total annual lost consumer surplus (in 2023 $)					
	5%	10%	15%	20%	25%	30%	2030	2040	2050	2060	2070	2080
	2030	2040	2050	2060	2070	2080						
North Harrison WSC	6	13	19	26	34	41	946	4,184	10,039	19,483	33,316	52,643
North Hopkins WSC	41	86	132	180	230	282	5,111	22,448	54,638	105,595	179,995	283,989
North Hunt SUD	10	20	30	39	47	55	1,620	6,718	15,782	29,015	46,993	70,489
Omaha	4	7	11	14	17	20	726	2,993	6,962	12,889	21,023	31,797
Ore City	5	10	15	21	26	31	703	3,054	7,447	14,140	23,687	36,755
Overton	0.5	1.1	1.7	2.4	3.1	3.8	60	269	676	1,312	2,257	3,570
Panola-Bethany WSC	1.8	2.9	3.5	3.8	3.9	3.8	277	949	1,843	2,842	3,840	4,830
Paris	101	202	301	400	498	594	14,450	61,182	145,108	272,794	452,458	694,711
Pine Ridge WSC	6	14	24	35	47	61	988	4,791	12,580	25,930	46,845	77,897
Pittsburg	18	36	55	73	92	112	2,810	11,997	28,667	54,606	91,749	142,731
Poetry WSC	8	19	31	44	46	55	1,274	6,168	16,229	32,725	45,475	70,594
Point	4	7	11	15	19	23	1,001	4,305	10,533	19,983	33,392	51,609
Pritchett WSC	35	71	106	140	172	204	4,358	18,569	44,080	82,079	134,882	205,004
Pruitt Sandflat WSC	5	10	15	20	24	28	786	3,323	7,923	14,640	23,903	36,145
Queen City	5	10	15	20	24	29	878	3,566	8,243	15,210	24,963	38,316
Quinlan	8	18	28	40	52	66	1,268	5,808	14,802	29,485	51,729	83,873
Quitman	9	18	27	36	44	51	1,432	6,051	14,423	26,567	43,254	65,250
R P M WSC	7	13	19	25	30	35	1,030	4,307	10,178	18,570	29,898	44,630
Ramey WSC	14	32	56	85	122	168	2,204	10,685	29,229	63,398	121,322	214,925
Red River County WSC	20	38	55	71	88	108	3,137	12,542	28,716	52,874	87,505	137,735
Redwater	11	22	33	44	54	64	1,776	7,446	17,571	32,665	53,608	81,363
Reno (Lamar)	11	23	34	45	56	67	1,786	7,563	17,932	33,712	55,920	85,896
Riverbend Water Resources District	2	4	6	7	9	11	296	1,242	2,928	5,447	8,915	13,538
Royse City	18	52	97	156	229	315	2,228	13,443	40,372	91,787	179,045	316,750
Sand Flat WSC	16	32	50	67	85	103	2,447	10,712	26,174	49,954	84,190	131,333
Scottsville	5	10	16	23	31	40	732	3,425	8,283	17,165	31,052	51,571
Shady Grove No 2 WSC	3	7	11	15	19	24	520	2,360	5,700	11,140	19,212	30,639
Shady Grove SUD	7	18	35	59	95	145	1,126	6,057	18,393	44,277	94,049	184,898
Sharon WSC	33	68	105	146	190	238	4,019	17,765	43,320	85,533	148,654	238,945
Shirley WSC	10	22	33	47	61	76	1,601	7,173	17,599	34,743	60,423	97,197
South Rains SUD	12	25	40	57	75	96	1,833	8,321	20,833	42,102	74,840	122,833
South Tawakoni WSC	10	16	19	20	20	19	1,548	5,277	10,162	15,141	19,974	24,435
Southern Utilities	50	106	165	226	288	354	6,229	27,738	68,498	132,314	225,475	355,623
Star Mountain WSC	5	11	17	23	29	35	799	3,551	8,769	16,904	28,761	45,308
Starrville-Friendship WSC	6	11	17	22	27	32	881	3,716	8,825	16,371	26,768	40,557

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Entity Name	Total Annual Water Reduction (Percentage and volume in ac-ft)						Total annual lost consumer surplus (in 2023 $)					
	5%	10%	15%	20%	25%	30%	2030	2040	2050	2060	2070	2080
	2030	2040	2050	2060	2070	2080						
Sulphur Springs	63	129	198	268	340	414	7,493	32,273	78,930	151,410	256,174	401,186
Talco	2	4	6	8	10	12	402	1,696	3,924	7,228	11,699	17,512
Talley WSC	7	15	22	30	37	44	1,142	4,909	11,737	22,031	36,469	55,911
Texarkana	142	282	419	551	679	802	9,897	41,552	98,206	182,868	300,341	456,469
Texas A&M University Commerce	1.2	2.3	3.5	4.6	5.8	6.9	180	761	1,814	3,427	5,711	8,811
Tri SUD	86	191	303	429	564	706	10,678	49,774	125,625	251,763	441,154	709,706
Tryon Road SUD	35	75	114	159	208	259	4,380	19,684	47,025	93,190	162,344	260,955
Tyler	5	9	13	15	17	18	499	1,901	4,201	7,077	10,405	13,969
Union Grove WSC	7	14	20	27	33	39	1,064	4,532	10,756	20,030	32,904	49,999
Van	12	24	37	49	61	73	1,936	8,321	20,149	37,981	63,264	97,694
Wake Village	29	58	86	112	138	163	3,583	15,029	35,459	65,950	108,204	164,212
Waskom	11	20	30	35	37	38	1,393	5,482	12,941	21,411	30,780	40,123
West Gregg SUD	16	34	53	74	96	120	2,524	11,155	27,786	54,794	95,388	153,831
West Harrison WSC	14	31	47	71	98	128	2,145	10,263	24,865	52,615	96,888	163,170
West Leonard WSC	0	0	1	1	1	1	22	108	288	616	1,105	1,827
West Tawakoni	10	23	37	53	70	89	2,579	11,993	30,875	62,122	109,987	179,692
Western Cass WSC	26	49	70	89	106	121	4,037	16,258	36,726	66,278	105,391	154,713
White Oak	21	43	64	84	104	122	2,469	10,530	24,913	46,284	75,861	115,070
Wills Point	18	39	64	92	124	160	2,542	11,872	30,882	63,304	113,914	188,865
Winnsboro	17	35	53	72	92	112	2,652	11,471	27,647	53,401	90,964	143,566
Winona	2	5	7	10	14	17	245	1,143	2,904	5,789	10,141	16,388
Wolfe City	6	11	17	23	29	36	1,270	5,462	13,243	25,164	42,165	65,478

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7.7 Emergency Responses to Local Drought Conditions or Loss of Municipal Supply

Texas Statute §357.42(g) requires regional water planning groups to evaluate potential temporary emergency water supplies for all County-Other WUGs and municipalities with 2030 populations less than 7,500 that rely on a sole source of water. The purpose of this evaluation is to identify potential alternative water sources that may be considered for temporary emergency use in the event that the existing water supply sources become temporarily unavailable due to extreme hydrologic conditions such as emergency water right curtailment, unanticipated loss of reservoir conservation storage, or other localized drought impacts. This section provides potential solutions that should act as a guide for municipal water users that are most vulnerable in the event of a loss of supply. This review was limited and did not require technical analyses or evaluations following in accordance with 31 TAC §357.34.

The TCEQ tracks public water suppliers who have self-reported drought stages and implemented TCEQ drought stages. Data on these implementations includes PWS name and ID, TCEQ Stage, estimated days of water remaining, and date of implementation. Table 7.6 provides a summary of all drought stages declared in the North East Texas Region and self-reported to the TCEQ since 2012.

7.7.1 Emergency Responses to Local Drought Conditions

A survey was conducted to identify and evaluate the municipal water users that are most vulnerable in the event of an emergency water shortage for the previous round of planning. The analysis included all ‘County-other’ WUGs and rural cities with a population less than 7,500 and on a sole source of water regardless of whether that water is provided by a WWP. Table 7.7 presents temporary responses that may or may not require permanent infrastructure. It was assumed in the analysis that the entities listed would have approximately 180 days or less of remaining water supply. Additionally, entities with existing infrastructure but no contract language that specifically addresses emergency supply have been included in this table.

7.7.2 Releases from Upstream Reservoirs and Curtailment of Rights

In times of drought and limited supply, the most ‘junior’ right holder must be the first to discontinue use under Texas’ “prior appropriations system”. This temporary source of supply was evaluated as a feasible option during an emergency shortage of water. Of the 90 entities listed in Table 7.7, 49 municipalities might have the option of implementing curtailment of water rights. In addition, release from upstream reservoirs was also evaluated. Table 7.7 identifies 25 entities where this approach might be feasible.

7.7.3 Brackish Groundwater

Brackish groundwater was evaluated as a temporary source during an emergency water shortage. Some brackish groundwater is found in certain places in the Carrizo-Wilcox Aquifer, and other brackish groundwater supplies can be obtained from the Nacatoch and Queen City aquifers in the North East Texas Region.

Required infrastructure would include additional groundwater wells, potential treatment facilities and conveyance facilities. Brackish groundwater at lower TDS concentrations may require only limited treatment. Of the entities listed in Table 7.7, ten will be able to potentially use brackish groundwater as a feasible solution to an emergency local drought condition.

7.7.4 Drill Additional Local Groundwater Wells and Trucking in Water

If the existing water supply sources become temporarily unavailable, drilling additional groundwater wells and trucking in water are optimal solutions. Table 7.7 presents this option as viable for most of the entities listed.

Table 7.6 Summary of self-reported implementation of drought stages to the TCEQ in the North East Texas Region since 2012.

PWS ID	PWS Name	County	TCEQ Stage	Estimated Days of Water Remaining	Date of Implementation
TX0320019	NORTHEAST TEXAS MWD PITTSBURG PLANT	Camp	Voluntary	Greater Than 180-Days	1/11/12
TX2120008	COMMUNITY WATER CO MONTGOMERY GARDEN	Smith	M1	Greater Than 180-Days	1/25/12
TX2340007	CALLENDER LAKE	Van Zandt	M1	Greater Than 180-Days	1/25/12
TX0320019	NORTHEAST TEXAS MWD PITTSBURG PLANT	Camp	Voluntary	Greater Than 180-Days	2/8/12
TX1160004	CITY OF GREENVILLE	Hunt	M1	Greater Than 180-Days	2/8/12
TX1900001	CITY OF EMORY	Rains	M3	Greater Than 180-Days	2/8/12
TX2340007	CALLENDER LAKE	Van Zandt	M1	Greater Than 180-Days	2/8/12
TX2120008	COMMUNITY WATER CO MONTGOMERY GARDEN	Smith	M1	Greater Than 180-Days	2/15/12
TX0320019	NORTHEAST TEXAS MWD PITTSBURG PLANT	Camp	Voluntary	Greater Than 180-Days	3/7/12
TX1160004	CITY OF GREENVILLE	Hunt	Voluntary	Greater Than 180-Days	3/7/12
TX1020004	CITY OF HALLSVILLE	Harrison	Voluntary	Greater Than 180-Days	3/7/12
TX1160017	CAMPBELL WSC	Hunt	M1	Greater Than 180-Days	3/7/12
TX2340007	CALLENDER LAKE	Van Zandt	M1	Greater Than 180-Days	3/7/12
TX2120008	COMMUNITY WATER CO MONTGOMERY GARDEN	Smith	M1	Greater Than 180-Days	3/14/12
TX1160017	CAMPBELL WSC	Hunt	Voluntary	Greater Than 180-Days	3/21/12
TX2340007	CALLENDER LAKE	Van Zandt	M1	Greater Than 180-Days	3/26/12
TX2120004	CITY OF TYLER	Smith	Voluntary	Greater Than 180-Days	3/26/12
TX2120008	COMMUNITY WATER CO MONTGOMERY GARDEN	Smith	Voluntary	Greater Than 180-Days	4/18/12
TX1020004	CITY OF HALLSVILLE	Harrison	Voluntary	Greater Than 180-Days	4/25/12
TX1160028	HOLIDAY ESTATES WATER	Hunt	Voluntary	Greater Than 180-Days	4/25/12
TX0320001	CITY OF PITTSBURG	Camp	Voluntary	Greater Than 180-Days	7/3/12
TX1160005	CITY OF WOLFE CITY	Hunt	M1	Greater Than 180-Days	8/1/12
TX1020004	CITY OF HALLSVILLE	Harrison	Voluntary	Greater Than 180-Days	8/8/12
TX1020078	WEST HARRISON WSC	Harrison	M1	Greater Than 180-Days	4/24/13
TX1116004	CITY OF GREENVILLE	Hunt	Voluntary	Greater Than 180-Days	5/1/13

PWS ID	PWS Name	County	TCEQ Stage	Estimated Days of Water Remaining	Date of Implementation
TX1160018	CASH SUD	Hunt	M1	Greater Than 180-Days	5/1/13
TX2340009	EDOM WSC	Van Zandt	Voluntary	Greater Than 180-Days	5/8/13
TX2010018	SOUTHERN UTILITIES LAIRD HILL	Gregg	Voluntary	Greater Than 180-Days	5/15/13
TX2120063	SOUTHERN UTILITIES	Smith	Voluntary	Greater Than 180-Days	5/15/13
TX0600001	CITY OF COOPER	Delta	M1	Greater Than 180-Days	5/22/13
TX1900001	CITY OF EMORY	Rains	M1	Greater Than 180-Days	5/29/13
TX1900011	CITY OF EAST TAWAKONI	Rains	M1	Greater Than 180-Days	6/5/13
TX2120008	COMMUNITY WATER CO MONTGOMERY GARDEN	Smith	Voluntary	Greater Than 180-Days	6/19/13
TX1160007	CITY OF QUINLAN	Hunt	M1	Greater Than 180-Days	7/17/13
TX1160042	SHADY GROVE WSC	Hunt	M1	Greater Than 180-Days	7/17/13
TX1120001	CITY OF CUMBY	Hopkins	M1	Greater Than 180-Days	7/24/13
TX1120015	MARTIN SPRINGS WSC	Hopkins	Voluntary	Greater Than 180-Days	7/24/13
TX1900001	CITY OF EMORY	Rains	M1	Greater Than 180-Days	8/7/13
TX0600001	CITY OF COOPER	Delta	M2	Greater Than 180-Days	8/21/13
TX0600018	DELTA COUNTY MUD	Delta	M1	Greater Than 180-Days	8/21/13
TX1160004	CITY OF GREENVILLE	Hunt	M1	Greater Than 180-Days	8/21/13
TX1160029	CADDO BASIN SUD	Hunt	M1	Greater Than 180-Days	8/21/13
TX2120006	CITY OF BULLARD	Smith	Voluntary	Greater Than 180-Days	8/21/13
TX1160031	JACOBIA WSC	Hunt	M2	Greater Than 180-Days	8/28/13
TX1160052	COMBINED CONSUMERS SUD	Hunt	M1	Greater Than 180-Days	8/28/13
TX0920006	CITY OF WHITE OAK	Gregg	M2	Greater Than 180-Days	8/28/13
TX1160006	CITY OF LONE OAK	Hunt	Voluntary	Greater Than 180-Days	8/28/13
TX0920028	SUN ACRES MOBILE HOME PARK	Gregg	M2	Greater Than 180-Days	9/11/13
TX1940002	CITY OF CLARKSVILLE	Red River	Voluntary	Greater Than 180-Days	9/11/13
TX1120011	BRINKER WATER SUPPLY	Hopkins	Voluntary	Greater Than 180-Days	9/18/13
TX1120013	CORNERSVILLE WSC	Hopkins	Voluntary	Greater Than 180-Days	9/18/13

PWS ID	PWS Name	County	TCEQ Stage	Estimated Days of Water Remaining	Date of Implementation
TX1120018	PICKTON WSC	Hopkins	Voluntary	Greater Than 180-Days	9/18/13
TX1900009	SOUTH RAINS WSC	Rains	M1	Greater Than 180-Days	10/9/13
TX1160004	CITY OF GREENVILLE	Hunt	Voluntary	Greater Than 180-Days	10/30/13
TX1160052	COMBINED CONSUMERS SUD	Hunt	M1	Greater Than 180-Days	2/26/14
TX1900009	SOUTH RAINS WSC	Rains	M2	Greater Than 180-Days	4/2/14
TX1900011	CITY OF EAST TAWAKONI	Rains	M1	Greater Than 180-Days	5/7/14
TX1160052	COMBINED CONSUMERS SUD	Hunt	M1	Greater Than 180-Days	5/21/14
TX1160052	COMBINED CONSUMERS SUD	Hunt	M1	Greater Than 180-Days	7/30/14
TX1160052	COMBINED CONSUMERS SUD	Hunt	M1	Greater Than 180-Days	12/3/14
TX1160012	CITY OF WEST TAWAKONI	Hunt	Voluntary	Greater Than 180-Days	1/21/15
TX1160052	COMBINED CONSUMERS SUD	Hunt	M1	Greater Than 180-Days	2/18/15
TX1160012	CITY OF WEST TAWAKONI	Hunt	M3	Greater Than 180-Days	3/4/15
TX1160052	COMBINED CONSUMERS SUD	Hunt	M1	Greater Than 180-Days	3/11/15
TX1160052	COMBINED CONSUMERS SUD	Hunt	Voluntary	Greater Than 180-Days	3/18/15
TX1020002	CITY OF MARSHALL	Harrison	M3	Greater Than 180-Days	4/15/15
TX1160012	CITY OF WEST TAWAKONI	Hunt	Voluntary	Greater Than 180-Days	5/6/15
TX1020078	WEST HARRISON WSC	Harrison	Voluntary	Greater Than 180-Days	7/8/15
TX1020078	WEST HARRISON WSC	Harrison	Voluntary	Greater Than 180-Days	7/15/15
TX1160018	CASH SUD	Hunt	Voluntary	Greater Than 180-Days	9/16/15
TX2120035	PINE TRAIL SHORES	Smith	M1	Greater Than 180-Days	8/3/16
TX0190021	RIVERBEND WATER RESOURCES DISTRICT	Bowie	Voluntary	Greater Than 180-Days	10/12/17
TX1020004	CITY OF HALLSVILLE	Harrison	Voluntary	Greater Than 180-Days	10/24/18
TX2120035	PINE TRAIL SHORES	Smith	Voluntary	Greater Than 180-Days	11/20/19
TX0320016	H A B WSC	Camp	Voluntary	Greater Than 180-Days	5/24/21
TX2120063	SOUTHERN UTILITIES	Smith	Voluntary	Greater Than 180-Days	5/24/21
TX2120006	CITY OF BULLARD	Smith	M1	Greater Than 180-Days	6/21/22

PWS ID	PWS Name	County	TCEQ Stage	Estimated Days of Water Remaining	Date of Implementation
TX2340009	EDOM WSC	Van Zandt	Voluntary	Greater Than 180-Days	6/30/22
TX1020026	GUM SPRINGS WSC 1	Harrison	Voluntary	Greater Than 180-Days	7/7/22
TX2340004	CITY OF VAN	Van Zandt	M2	Greater Than 180-Days	7/13/22
TX2340011	LITTLE HOPE-MOORE WATER SUPPLY	Van Zandt	Voluntary	Greater Than 180-Days	7/13/22
TX2120015	CRYSTAL SYSTEMS	Smith	Voluntary	Greater Than 180-Days	7/13/22
TX2500016	FOUKE WSC	Wood	M1	Greater Than 180-Days	7/20/22
TX2500039	LAKE FORK WSC	Wood	M1	Greater Than 180-Days	7/20/22
TX2340016	R P M WSC	Van Zandt	Voluntary	Greater Than 180-Days	7/27/22
TX2340019	SOUTH TAWAKONI WSC	Van Zandt	Voluntary	Greater Than 180-Days	7/20/22
TX1160018	CASH SUD	Hunt	M1	Greater Than 180-Days	7/27/22
TX0600017	WEST DELTA WSC	Delta	M1	Greater Than 180-Days	7/27/22
TX1160039	NORTH HUNT SUD	Hunt	M2	Greater Than 180-Days	7/27/22
TX2120063	SOUTHERN UTILITIES	Smith	M2	Greater Than 180-Days	7/27/22
TX2500015	BRIGHT STAR-SALEM SUD	Wood	M3	Greater Than 180-Days	8/3/22
TX2340005	CITY OF WILLS POINT	Van Zandt	M1	Greater Than 180-Days	8/3/22
TX2500007	JONES WSC	Wood	M1	Greater Than 180-Days	8/17/22
TX1900001	CITY OF EMORY	Rains	Voluntary	Greater Than 180-Days	8/17/22
TX2340001	CITY OF CANTON	Van Zandt	Voluntary	Greater Than 180-Days	8/17/22
TX1020026	GUM SPRINGS WSC 1	Harrison	Voluntary	Greater Than 180-Days	8/10/23
TX2500008	NEW HOPE SUD	Wood	M3	Greater Than 180-Days	8/10/23
TX2120015	CRYSTAL SYSTEMS	Smith	M1	Greater Than 180-Days	8/18/23
TX2340004	CITY OF VAN	Van Zandt	M3	Outage	1/4/24
TX2340004	CITY OF VAN	Van Zandt	M3	Less than 180-day supply	1/11/24

Table 7.7 Emergency Responses to Local Drought Conditions in the North East Texas Region

Entity				Implementation Requirements									
Water User Group Name	County	2030 Population	2030 Demand (AF/year)	Release from upstream reservoir	Curtailment of upstream or downstream water rights	Local groundwater wells	Brackish groundwater limited treatment	Brackish groundwater desalination	Potential Emergency interconnect	Trucked in water	Type of infrastructure required	Entity providing supply	Emergency agreements already in place
410 WSC	RED RIVER	1,356	353		▪				▪	▪			
Atlanta	CASS	5,031	981	▪	▪	▪			▪	▪		Texarkana	
Ben Wheeler WSC	VAN ZANDT	2,864	294			▪			▪	▪			
Big Sandy	UPSHUR	1,124	266			▪	▪		▪	▪	piping & meters	Pritchett WSC	
Blocker Crossroads WSC	HARRISON	1,572	152			▪			▪	▪		Marshall	
Blossom	LAMAR	1,385	137		▪	▪			▪	▪			
Bogata	RED RIVER	892	170			▪			▪	▪			
Brashear WSC	HOPKINS	995	210	▪	▪				▪	▪			
Bright StarSalem Sud	WOOD	4,227	708			▪			▪	▪			
Burns Redbank WSC	BOWIE	2,344	260	▪	▪	▪			▪	▪			
Caddo Mills	HARRISON	1,083	153	▪		▪				▪		Karnack WSC	▪
Celeste	HUNT	826	109			▪			▪	▪			
Central Bowie County WSC	BOWIE	9,911	769	▪	▪	▪			▪	▪			
Clarksville	RED RIVER	2,483	623			▪			▪	▪		White Oak	
Clarksville City	GREGG	838	126			▪			▪	▪		White Oak	
Combined Consumers SUD	HUNT	6,634	873		▪				▪			Cash SUD	▪
Cooper	DELTA	2,067	464		▪				▪	▪			
Cornersville WSC	HOPKINS	1,211	126			▪			▪	▪		Cypress Springs SUD	
Crystal Systems	SMITH	5,065	1,624			▪			▪	▪		Lindale Rural WSC	
Cumby	HOPKINS	736	98			▪			▪	▪			
Cypress Springs SUD	FRANKLIN	8,977	1,440		▪	▪			▪	▪	piping & meters	Mt. Vernon	
Daingerfield	MORRIS	2,179	452	▪	▪	▪			▪	▪		NETMWD	
De Kalb	BOWIE	1,398	266	▪	▪	▪			▪	▪			
Delta County MUD	HUNT	1,987	198		▪	▪			▪	▪			
Diana SUD	UPSHUR	6,294	604	▪	▪	▪			▪	▪	piping	Northeast Texas MUD	
East Texas MUD	SMITH	2,934	1,328		▪	▪	▪		▪	▪	well & equip.		
Edom WSC	VAN ZANDT	1,271	169			▪			▪	▪			
Fouke WSC	UPSHUR	5,977	793			▪			▪	▪		Quitman	
Fruitvale WSC	VAN ZANDT	3,467	332			▪			▪	▪			

Entity				Implementation Requirements									
Water User Group Name	County	2030 Population	2030 Demand (AF/year)	Release from upstream reservoir	Curtailment of upstream or downstream water rights	Local groundwater wells	Brackish groundwater limited treatment	Brackish groundwater desalination	Potential Emergency interconnect	Trucked in water	Type of infrastructure required	Entity providing supply	Emergency agreements already in place
Gladewater	GREGG	6,328	1,376		▪	▪	▪		▪		well & equip.	Warren City	▪
Glenwood WSC	UPSHUR	2,863	348			▪			▪	▪		East Mountain	
Golden WSC	RAINS	3,524	393			▪			▪	▪		Ramey WSC	
Grand Saline	VAN ZANDT	3,404	466			▪			▪	▪			
Gum Springs WSC	HARRISON	10,430	1,677		▪	▪			▪	▪			
Hallsville	HARRISON	4,575	653		▪	▪			▪	▪		Longview	
Hawkins	WOOD	1,334	354			▪			▪	▪		Fouke WSC	
Holly Springs WSC	MORRIS	1,526	127	▪	▪	▪			▪	▪		Hughes Springs	
Hooks	BOWIE	2,637	317	▪	▪	▪			▪	▪			
Hughes Springs	CASS	2,108	378	▪	▪	▪			▪	▪		NETMWD	
Jones WSC	HOPKINS	4,284	602			▪			▪	▪		Quitman	
KellyvilleBerea WSC	MARRION	977	125			▪			▪			Jefferson	▪
Lake Fork WSC	WOOD	2,140	317			▪			▪	▪		Yantis	
Leigh WSC	HARRISON	1,476	399			▪			▪	▪		Marshall	
Liberty City WSC	GREGG	4,941	567			▪			▪	▪		Kilgore	
Lindale	SMITH	5,358	1,247			▪			▪	▪		Lindale Rural WSC	
Lindale Rural WSC	SMITH	13,116	1,699			▪			▪	▪		Lindale	▪
Linden	CASS	1,742	347			▪			▪	▪			
Little Hope Moore WSC	VAN ZANDT	1,478	133			▪			▪	▪			
Lone Star	MORRIS	1,294	206	▪	▪	▪			▪	▪		NETMWD	
Macedonia Eylau MUD 1	BOWIE	8,447	710	▪	▪	▪			▪	▪			
Maud	BOWIE	787	164	▪	▪	▪			▪	▪			
Miller Grove WSC	RAINS	1,384	232			▪			▪				▪
MIMS WSC	CASS	2,095	138	▪	▪	▪			▪	▪		NETMWD	
Mineola	WOOD	6,281	937			▪			▪	▪		Ramey WSC	
Mount Vernon	FRANKLIN	2,444	481			▪			▪	▪		Cypress Springs SUD	
Myrtle Springs WSC	VAN ZANDT	3,375	275			▪			▪	▪			
Nash	BOWIE	4,160	314	▪	▪	▪			▪	▪			
New Hope SUD	WOOD	2,984	533			▪			▪	▪		Mineola	
North Harrison WSC	HARRISON	1,453	163	▪	▪	▪			▪	▪	piping, meters & valves	Leign WSC	

Entity				Implementation Requirements									
Water User Group Name	County	2030 Population	2030 Demand (AF/year)	Release from upstream reservoir	Curtailment of upstream or downstream water rights	Local groundwater wells	Brackish groundwater limited treatment	Brackish groundwater desalination	Potential Emergency interconnect	Trucked in water	Type of infrastructure required	Entity providing supply	Emergency agreements already in place
North Hopkins WSC	HOPKINS	9,220	1,152		▪	▪	▪		▪	▪	well & equip.		
Pine Ridge WSC	VAN ZANDT	1,967	233			▪			▪	▪			
Pittsburg	CAMP	3,974	841	▪	▪	▪	▪		▪	▪		BiCounty WSC	
Point	RAINS	1,092	229		▪				▪	▪	well & equip.	Emory	
Pruitt Sandflat WSC	VAN ZANDT	1,151	125			▪			▪	▪			
Quitman	WOOD	2,214	345		▪	▪			▪	▪	well & equip.	Jones WSC; Fouke WSC	
Ramey WSC	WOOD	3,637	581			▪			▪	▪		Mineola	
Reno (Lamar)	LAMAR	2,754	402		▪	▪			▪	▪			
Sand Flat WSC	SMITH	4,067	319			▪			▪	▪		Lindale Rural WSC	
Scottsville	HARRISON	1,308	338	▪	▪	▪			▪	▪		Marshall	
Shady Grove SUD	HUNT	1,732	174	▪	▪				▪	▪			
Sharon WSC	WOOD	6,448	739			▪	▪		▪	▪	piping & valves	Winnsboro	▪
South Rains WSC	WOOD	2,797	271	▪	▪	▪			▪	▪		Bright StarSalem WSC	
South Tawakoni WSC	VAN ZANDT	2,619	295		▪				▪	▪		Wills Point	
Star Mountain WSC	SMITH	1,380	244		▪	▪	▪		▪	▪	well & equip.		
Talley WSC	HARRISON	1,883	129	▪	▪	▪			▪	▪	piping & valves	Marshall	▪
Texas A&M University Commerce	HUNT	2,125	433		▪	▪			▪	▪			
Tryon Road SUD	GREGG	7,757	1,249	▪	▪	▪	▪		▪	▪		Longview	
Wake Village	BOWIE	5,831	649	▪	▪	▪				▪			
Waskom	HARRISON	2,023	288			▪			▪	▪		Waskom Rural WSC	
West Harrison WSC	HARRISON	1,876	195	▪	▪	▪			▪	▪		Gum Springs WSC #1	▪
West Tawakoni	HUNT	2,874	323		▪				▪			Cash SUD	▪
White Oak	GREGG	6,421	2,656		▪	▪	▪		▪			Longview	▪
Winnsboro	WOOD	3,337	661		▪	▪	▪		▪	▪	well & equip.	Cypress Springs SUD	
Winona	SMITH	597	180			▪			▪	▪		Star Mountain WSC	

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7.7.5 TCEQ Emergency Funds for Groundwater Supply Wells

In order to qualify for emergency funds that are earmarked for emergency groundwater supply wells, entities must have a drought plan in place and be currently listed as an entity that is limiting water use to avoid shortages. This list is updated weekly by the TCEQ's Drinking Water Technical Review and Oversight Team and can be found at: https://www.tceq.texas.gov/drinkingwater/trot/exception

100 instances of Public Water Systems (PWS) within the RWPA self-identifying to the TCEQ as having implemented drought restrictions occurred between 2012 and 2024. The list is presented in Appendix C7 1.

There is some assistance available through the Texas Department of Agriculture (TDA) and the TWDB. There are requirements, deadlines, and a specific application process. Contact the TWDB by email, <Financial_Assistance@twdb.texas.gov>, or call (512) 463-7853. Contact the TDA, Community Development Block Grants by email at CDBGApps@TexasAgriculture.gov or call (512) 936-7891. Funding is limited.

7.7.6 Other TCEQ Guidance Resources

- Questions from the TCEQ's Workshops on Drought Emergency Planning: Answers to Help Drinking Water Systems Prepare for Emergencies https://www.tceq.texas.gov/assets/public/response/drought/workshopquestions071312.pdf
- Video: Workshop on Drought Emergency Planning for PWSs in Texas http://www.youtube.com/watch?v=BdlF9CEcGPI&feature=plcp&context=C34378a7UDOEgsToPDskJNYWXf5I3pKq8tW9pkVqQU

7.8 Region-Specific Model Drought Contingency Plans

As mandated by TAC 357.42(c)&(i), the RWPGs shall develop drought response recommendations regarding the management of existing groundwater and surface water sources in the RWPA designated in accordance with §357.32. The RWPGs shall make drought preparation and response recommendations regarding the development of, content contained within, and implementation of local drought contingency plans. The RWPGs shall develop region-specific model drought contingency plans that shall be presented in the RWP which shall be consistent with 30 TAC Chapter 288 requirements.

Region-specific model DCPs have been developed for the North East Texas Region for both Wholesale Water Providers and for groundwater users. A region-specific model DCP for Wholesale Water Providers is included in Appendix 7A-1, and a region-specific model DCP for groundwater users, including both municipal and industrial (steam-electric power and manufacturing) users, is included as Appendix 7A-2. The region-specific model DCPs will likely change over time in order to address the needs and issues of the Region's users.

A focus of the model plan considers the consistency of existing plans within the Region. Entities that have adopted drought plans will only be assessed to this end; therefore, fine tuning existing triggers of existing municipal drought plans is not a goal of the model plan, beyond an effort toward achieving consistent responses/actions to drought across the Region.

7.9 Other Drought-related Considerations and Recommendations

As mandated by TAC 357.42(h), &(i), RWPGs shall consider any relevant recommendations from the Drought Preparedness Council and may make drought preparation and response recommendations regarding:

- Development of content and implementation of local DCPs required by the Commission;
- Current drought management preparations in the RWPA including (drought response triggers, responses to drought conditions);
- The Drought Preparedness Council and the State Drought Preparedness Plan;
- And any other general recommendations regarding drought management in the Region or State.

7.9.1 Texas Drought Preparedness Council

The Drought Preparedness Council was authorized and established by the 76th legislature (HB 2660) in 1999. The Council is described in Chapter 16, Section 2, Subchapter C of the Texas Water Code, and was created to carry out the provisions of Sections 16.055 and 16.0551 of the Code. The drought preparedness council is responsible for:

- The assessment and public reporting of drought monitoring and water supply conditions;
- Advising the governor on significant drought conditions;
- Recommending specific provisions for a defined state response to drought related disasters for inclusion in the state emergency management plan and the state water plan;
- Advising the regional water planning groups on drought-related issues in the regional water plans;
- Ensuring effective coordination among state, local, and federal agencies in drought-response planning; and
- Reporting to the legislature, not later than January 15 of each odd-numbered year, regarding significant drought conditions in the state.

The Drought Preparedness Council has a significant role in Texas regarding drought monitoring, advising the governor and other groups, and coordinating amongst state and federal agencies. The Council has produced the State Drought Preparedness Plan, establishing a framework for approaching drought in Texas that attempts to minimize the impacts of drought on people and resources.

The NETRWG has considered the recommendations made by the Texas Drought Preparedness Council and provided to the NETRWPG in a February 8, 2024, letter. Specifically, the Drought Preparedness Council's recommendations included:

1. 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.
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.
3. 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.

Additionally, water supplies developed for the 2026 Region D Plan have been based upon firm yield/100% reliability of existing supply, thus accounting for significant drought conditions experienced historically by North East Texas. Availability determinations have been based upon full utilization of existing, permitted water rights, while demand projections have been based upon per capita usage amounts from the year 2011, a period of significant drought in the region. Each of these factors allow a margin of safety when considering risks associated with droughts more significant than the DOR, to address and plan for responses to extreme drought conditions.

The NETRWPG supports the Texas Drought Preparedness Council and recommends that water providers and others regularly review the Council's Situation Reports as part of their drought monitoring efforts.

7.9.2 Drought Response Recommendations

As mandated by TAC 357.42(c)&(j), the RWPGs shall develop drought response recommendations regarding the management of existing groundwater and surface water sources in the RWPA designated in accordance with §357.32. The RWPGs shall make drought preparation and response recommendations regarding the development of content contained within, and implementation of local DCPs. The RWPGs shall develop region-specific model DCPs that shall be presented in the RWP which shall be consistent with 30 TAC Chapter 288 requirements.

Regional Drought Planning expands the conceptualization and application of drought planning by specific entities to encompass the entire RWPA. The approach utilized in developing a region-specific drought plan considers the following:

1. All regional groundwater and surface water sources;
2. Current drought plans that are being utilized by user entities within the region; and
3. Current groundwater monitoring wells within the region that have evolved since the previous planning cycle.

The goals of this approach are:

1. To gain a comprehensive view of what resources are being monitored by entities within the region;
2. Determine which resources are not being monitored;
3. Determine which users do not fall under the umbrella of existing DCPs,
4. Identify potential groundwater monitoring stations with publicly accessible real-time data that currently exist;
5. Determine how these data can be utilized for the water user groups that are not subject to existing DCPs; and
6. Development of a regional model drought contingency plan.

As discussed in Section 7.3, several WUGs and various public supply systems have written drought management plans or DCPs and have provided them for inclusion in the Regional Plan. Drought triggers based on groundwater elevations are not utilized in Region D. Additionally, there is only one real-time monitoring well on TWDB's Water Data for Texas website. State well number 3430907 monitors the confined portion of the Carrizo-Wilcox Aquifer. It is located about four miles north of Tyler State Park in northern Smith County. As a result, it is recommended that the NETRWPG use the U.S. Drought Monitor (USDM) to help assess drought stages for all groundwater users, since there are no Groundwater Conservation Districts within the RWPA. A summary of drought severity classification used by the USDM is shown in Table 7.8.

Drought triggers for surface water are usually related to reservoir levels. A summary of municipal mandated drought triggers and actions are included in Table 7.1, and a summary of recommended regional drought triggers and actions are included in Table 7.9.

Table 7.8 USDM Drought Severity Classification

Category	Description	Possible Impacts	Palmer Drought Index	USGS Weekly streamflow (Percentiles)
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	20.01 to 30.00
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	10.01 to 20.00
D2	Severe Drought	Crop or pasture losses likely; Water shortages common; Water restrictions imposed	3.0 to 3.9	5.01 to 10.00
D3	Extreme Drought	Major crop/pasture losses; Widespread water shortages or restrictions	4.0 to 4.9	2.01 to 5.00
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; Shortages of water in reservoirs, streams, and wells creating water emergencies	5.0 or less	0.01 to 2.00

Source: https://droughtmonitor.unl.edu/About/AbouttheData/DroughtClassification.aspx and https://climatedataguide.ucar.edu/climate-data/palmer-drought-severity-index-pdsi

7.9.3 Development and Implementation of DCPs

The NETRWPG recognizes that DCPs developed by water providers within the RWPA are the best available approach for drought management, and makes the following recommendations:

- In addition to monitoring procedures within the DCP, consider regular monitoring of information from TCEQ, TWDB, the Texas Drought Preparedness Council, and the U.S. Drought Monitor.
- Coordination with water providers regarding the identification of drought conditions and implementation of the DCP, particularly during times of drought.
- Communication with water customers during times of drought to ensure adequate implementation of drought management measures.
- Regular consideration of updating the DCP to reflect recent changes in the status of demand, water sources, infrastructure, or service area.

7.9.4 Regional Source Recommendations

Table 7.9 provides a summary overview of all existing regional water sources and the recommended drought triggers and actions. The intent of this table is to provide a comprehensive region-wide assessment of what current tools are available to monitor water resources within the region. These may be used as guidelines for the development of WUG-specific DCPs.

The Regional Model DCP will undoubtedly change over time to address particular needs and issues of the Region's users. The version of the model in this Plan will primarily focus on identifying sources, users, and monitoring tools to find the specific components within the Region that are not currently incorporated into any existing drought plan but could potentially utilize existing data resources. Another focus of this model plan will consider consistency of existing plans within the Region. Entities that have adopted drought plans will only be assessed to this end, therefore fine-tuning existing triggers of existing municipal drought plans is not a goal of the model plan beyond an effort toward achieving consistent responses/actions to drought across the Region.

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Table 7.9 Recommended Regional Drought Plan Triggers and Actions for Regional Water Sources

Source Name	Type (SW/GW)	Factor considered	TRIGGERS						ACTIONS					
			Source Manager			Users			Source Manager			Users		
			Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency
FORK	SW	Supply capacity	65% combined storage	45% combined storage	duration <30% combined storage	varies by user; see Table 7.1	varies by user; see Table 7.1	varies by user; see Table 7.1	Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
TAWAKONI	SW								Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
CYPRESS SPRINGS	SW	Supply capacity, demand	demand % of capacity; lake water level declines at disruptive rate			unknown			Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
BOB SANDLIN	SW													
JIM CHAPMAN	SW	Supply capacity, demand	lake less than 50% capacity; >48 hours x% pumping capacity	loss of capacity, line breaks		voluntary	halt nonessential use	mandatory restrictions	Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
MONTICELLO	SW	unknown	unknown			unknown			Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
LAKE O' THE PINES	SW	unknown	unknown			unknown			Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
CADDO	SW	unknown	unknown			unknown			Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
CROOK	SW	Supply capacity	70% combined storage	50% combined storage	40% combined storage	70% combined storage	50% combined storage	40% combined storage	Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
PAT MAYSE	SW													

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Source Name	Type (SW/GW)	Factor considered	TRIGGERS						ACTIONS					
			Source Manager			Users			Source Manager			Users		
			Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency
SULPHUR SPRINGS	SW	unknown	unknown			unknown			Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
WRIGHT PATMAN	SW	unknown	unknown			unknown			Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
CYPRESS RIVER	SW	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
SABINE RIVER	SW	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
SULPHUR RIVER	SW	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
BLOSSON AQUIFER	GW	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
CARRIZO-WILCOX AQUIFER	GW	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
NACATOCH AQUIFER	GW	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
QUEEN CITY AQUIFER	GW	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	

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Source Name	Type (SW/GW)	Factor considered	TRIGGERS						ACTIONS					
			Source Manager			Users			Source Manager			Users		
			Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency
TRINITY AQUIFER	GW	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
WOODBINE AQUIFER	GW	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	
OTHER AQUIFER	GW	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies		Invoke needed actions from DCP	Invoke needed actions from DCP, evaluate other/emergency supplies	

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CHAPTER 8 UNIQUE STREAM SEGMENTS, RESERVOIR SITES, AND LEGISLATIVE RECOMMENDATIONS

The Texas Administrative Code (TAC) allows for the Regional Water Planning Groups (RWPG) to include legislative recommendations in the regional water plan regarding legislative designation of ecologically unique river and stream segments, unique sites for reservoir construction, and legislative recommendations (31 TAC, §357.43). RWPGs may include in the adopted regional water plans recommendations for all or parts of river and stream segments of unique ecological value located within the regional water planning area. The 77th Texas Legislature clarified that the designation of unique stream segments solely means that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in a designated stream segment of unique ecological value. It does not affect the analysis to be made by the planning groups. The RWPGs are also authorized to make recommendations of unique sites for reservoir construction and prepare specific legislative recommendations in these two areas. The North East Texas Regional Water Planning Group (NETRWPG) has elected to make comments in these two areas and, in specific cases, has elected to forward several recommendations to the legislature, which are presented in this chapter.

8.1 Legislative Designation of Ecologically Unique Stream Segments

In the regional water planning process, the planning group is given the opportunity to make recommendations for designation of ecologically "unique stream segments." This process involves multiple steps with the NETRWPG, the Texas Parks and Wildlife Department (TPWD), the Texas Water Development Board (TWDB) and, ultimately, the Texas Legislature each having a role. 30 TAC 357.43(b) states:

> *"Regional water planning groups may include in adopted regional water plans recommendations for all or parts of river and stream segments of unique ecological value located within the RWPA by preparing a recommendation package consisting of a physical description giving the location of the stream segment, maps, and photographs of the stream segment and a site characterization of the stream segment documented by supporting literature and data."*

As stated above, the 77th Texas Legislature clarified that the designation of unique stream segments solely means that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in a stream segment designated of unique ecological value.

TWDB rules provide that the planning group forward any recommendations regarding legislative designation of ecologically unique streams to the TPWD and include TPWD's written evaluation of such recommendations in the adopted regional water plan. The planning group's recommendation is then to be considered by the TWDB for inclusion in the state water plan. Finally, the Texas Legislature will consider any recommendations presented in the state water plan regarding designation of stream segments as ecologically unique.

8.2 Criteria for Designation of Ecologically Unique Stream Segments

TAC §358.2 also specifies the criteria that are to be applied in the evaluation of potentially ecologically unique river or stream segments. These are:

- **Biological Function:** Stream segments which 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 which 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 which 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 stream 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.

8.3 Candidate Stream Segments

The TPWD prepared and published in May of 2000 a report entitled *Ecologically Significant River and Stream Segments of Region D, Regional Water Planning Area* which identified 14 stream segments within the region that meet one or more of the criteria for designation as ecologically unique. Those 14 segments are listed in Table 8.1 (the report actually listed 15 segments, but the Quail Creek segment is located within Region I). Figure 8.1 shows the location, in red line, of all 14 segments located within Region D. Particulars of these river and stream segments may be found in either the TPWD report or the 2006 Region D Plan.

During the development of the 2011 Region D Plan, the NETRWPG received presentation of two additional stream segments for consideration as Unique Stream Segments. These are White Oak Creek in the Sulphur River Basin in Titus and Morris Counties and Pecan Bayou in the Red River Basin in Red River County. These two stream segments are shown in blue line in Figure 8.1 and in Figures 8.3, 8.4 and 8.5. They are also described in Table 8.2.

Table 8.1 TPWD Identified Ecologically Unique Stream Segments – Region D (North East Texas)

Name	Description
BIG CYPRESS BAYOU/CREEK	From a point 7.6 miles downstream of State Highway (SH) 43 in Marion/Harrison County upstream to Ferrell's Bridge Dam in Marion County (Texas Commission on Environmental [TCEQ] classified stream Segment 0402).
	Biological function - priority bottomland hardwood habitat displays significant overall habitat value (United States Fish and Wildlife Service [USFWS], 1985).
	Riparian conservation area - Caddo Lake State Park and Wildlife Management Area.
	Threatened or endangered species/unique communities - Paddlefish (Species of Concern [SOC]/St. T) (Pitman, 1991; TPWD, 1998).
BIG CYPRESS CREEK	From a point 0.6 mile downstream of US 259 in Morris/Upshur County upstream to Fort Sherman Dam in Camp/Titus County (TCEQ classified stream segment 0404).
	Threatened or endangered species/unique communities - paddlefish (SOC/St.T) (Pitman, 1991; TPWD, 1998).
BLACK CYPRESS CREEK	From the confluence with Black Cypress Bayou east of Avinger in south Cass County upstream to its headwaters located four miles northeast of Daingerfield in the eastern part of Morris County.
	Biological function - priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985).
	High water quality/exceptional aquatic life/high aesthetic value - ecoregion stream; diverse benthic macroinvertebrate and fish communities (Bayer et al., 1992; Linam et al., 1999).
	Threatened or endangered species/unique communities - paddlefish (SOC/St.T) (Pitman, 1991).
BLACK CYPRESS BAYOU	From the confluence with Big Cypress Bayou in south-central Marion County upstream to the confluence of Black Cypress Creek east of Avinger in south Cass County.
	Biological function - priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985).
	Threatened or endangered species/unique communities - paddlefish (SOC/St.T) (Pitman, 1991).
FRAZIER CREEK	From the confluence with Jim Bayou in Marion County upstream to its headwaters located three miles north of Almira in west Cass County.
	High water quality/exceptional aquatic life/high aesthetic value - ecoregion stream; diverse fish community (Bayer et al., 1992; Linam et al., 1999).
GLADE CREEK	From the confluence with the Sabine River in the northwestern corner of Gregg County near Gladewater upstream to its headwaters located about five miles southwest of Gilmer in Upshur County.
	Biological function - Swamp/bog habitat displays significant biodiversity and overall habitat value (Bauer et al., 1991).
	Threatened or endangered species/unique communities - unique swamp/bog community (Bauer et al., 1991).

Name	Description
LITTLE CYPRESS BAYOU	From the confluence with Big Cypress Bayou in Harrison County to a point 0.6 mile upstream of Farm to Market Road (FM) 2088 in Wood County (TCEQ classified stream segment 0409).
	Biological function - priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985).
	High water quality/exceptional aquatic life/high aesthetic value - ecoregion stream; diverse benthic macroinvertebrate community (Bayer et al., 1992).
	Threatened or endangered species/unique communities - bluehead shiner (SOC/St.T), creek chubsucker (SOC/St.T) (SOC/St.T), and blackside darter (SOC/St.T) (Bauer et al., 1991).
LITTLE SANDY CREEK	From Lake Hawkins upstream to its headwaters in Wood County.
	Biological function - priority bottomland hardwood habitat displays significant overall habitat value (Bauer et al., 1991).
	Riparian conservation area - Little Sandy National Wildlife Refuge High water.
	Threatened or endangered species/unique communities - unique swamp/bog community (Bauer et al., 1991); rough-stemmed aster (SOC) (J. Poole, 1999, pers. comm.).
PINE CREEK	From the confluence with the Red River in Red River County upstream to Crook Lake Dam in Lamar County.
	Threatened or endangered species/unique communities - one of two sites in Texas where Ouachita rock-pocketbook freshwater mussel (Fed.E) has been collected (Howells, 1995; Howells et al., 1997).
PURTIS CREEK	From the Van Zandt/Henderson County line upstream to its headwaters in Van Zandt County.
	Riparian conservation area - Purtis Creek State Park.
SABINE RIVER	From US 59 in south Harrison County upstream to Easton on the Rusk/Harrison County line (within TCEQ classified stream segment 0505).
	Biological function - Texas Natural Rivers System nominee, diverse riparian assemblage including hardwood forest and wetlands, and significant natural areas (NPS, 1995); priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985).
	High water quality/exceptional aquatic life/high aesthetic value - exceptional aesthetic value (NPS, 1995).
	Threatened or endangered species/unique communities - Paddlefish (SOC/St.T) (Pitman, 1991; TPWD, 1998).
SABINE RIVER	From FM 14 in Wood/Smith County upstream to FM 1804 in Wood/Smith County (within TCEQ classified stream segment 0506).
	Biological function - priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985).
	Riparian conservation area - Old Sabine Bottom Wildlife Management Area; Little Sandy National Wildlife Refuge.
	Threatened or endangered species/unique communities - Paddlefish (SOC/St.T) (Pitman, 1991; TPWD, 1998).

Name	Description
SANDERS CREEK	From the confluence with the Red River in Lamar County upstream to the confluence of Spring Branch in Lamar County, excluding Pat Mayse Reservoir.
	Riparian conservation area - Pat Mayse State Wildlife Management Area.
	Threatened or endangered species/unique communities - one of two sites in Texas where Ouachita rock-pocketbook freshwater mussel (Fed.E) has been collected (Howells, 1995; Howells et al., 1997).
SULPHUR RIVER	From a point 0.9 miles downstream of Bassett Creek in Bowie/Cass County upstream to the IH 30 bridge in Bowie/Morris County.
	Biological function - priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985)
	Threatened or endangered species/unique communities - Paddlefish (SOC/St.T) (Pitman, 1991; TPWD, 1998)

Table 8.2 NETRWPG Identified Ecologically Unique Stream Segments – Region D (North East Texas)

Name	Description
WHITE OAK CREEK	From just east of US 271 in western Titus County downstream to IH 30 in Western Morris County approximately 18 miles. The site, including bottomland forest, encompasses approximately 27,000 acres (Figure 8.2). The entirety of the segment is within the White Oak Creek Wildlife Management Area.
	Biological Function - Extensive mature bottomland hardwood forest, Water oak-Willow oak association (Quercus nigra-Q. phellos G4S3) (USFWS, 1985) Emergent wetland (PEM1), Shrub-Scrub wetland (PSS1), and Forested wetland (PFO1) (USFWS, 2009) Intact natural hydrologic regime. No modification to stream. (USFWS, 1985);
	Riparian conservation area - White Oak Creek Wildlife Management Area; and
	Threatened or endangered species/unique communities - Wintering area for bald eagle (USFWS, 1985). High-value habitat for migratory birds. (USFWS, 1985).
PECAN BAYOU	This Red River Basin Stream extends from two miles south of Woodland in northwestern Red River County east to the Red River approximately one mile west of the eastern Bowie County line (Texas Historical Association, 2009). The site, including bottomland forest, encompasses approximately 958 square miles (Figure 8.3 and Figure 8.4). It represents one of the largest undammed watersheds in northeast Texas; and supports multiple large examples of mature bottomland hardwood forest, and rare and endangered species (Zwartjes, et al, 2000).
	Biological function - Extensive bottomland hardwood forest supporting multiple occurrences of rare plant life, including:
	Arkansas meadowrue (*Thalictrum arkansanum* G2QS1) (Sanders, 1994);
	Southern lady's slipper orchid (*Cypripedium kentuckiense* G3S1) (Sanders, 1994);
	Old growth Shortleaf Pine-Oak forest (*Pinus echinata-Quercus sp*. G4S4) (Sanders, 1994); and
	Water oak-Willow oak association (*Quercus nigra-Q. phellos* G4S3) (Sanders, 1994).
	Hydrologic function - Represents one of the largest undammed watersheds in northeast Texas, natural hydrologic regime is assumed intact. Flood attenuation, flow stabilization and impacts on groundwater recharge have not been quantified.
	Riparian conservation areas - No public conservation areas however significant private conservation area (Figure 8.4) The Nature conservancy, Texas Chapter owns 1334 acres within a 6,960 acre site protecting examples of the preceding conservation elements although they are extensive within the watershed. The preserve, Lennox Woods, is located approximately 1.5 miles south of the community of Negley. The land protects approximately 2.6 miles of Pecan Bayou.
	High water quality/exceptional aquatic life - Insufficient data.
	Threatened and endangered species/unique communities:
	American Burying Beetle (*Nicrophorus americanus* G2 Federally listed Endangered) (Godwin, 2005);
	Black Bear (Ursus americanus G5 State Threatened, ssp. luteolus Federally listed Threatened) (Garner, personal communication, 2007); and
	Timber Rattlesnake (*Crotalus horridus* G4 State Threatened).

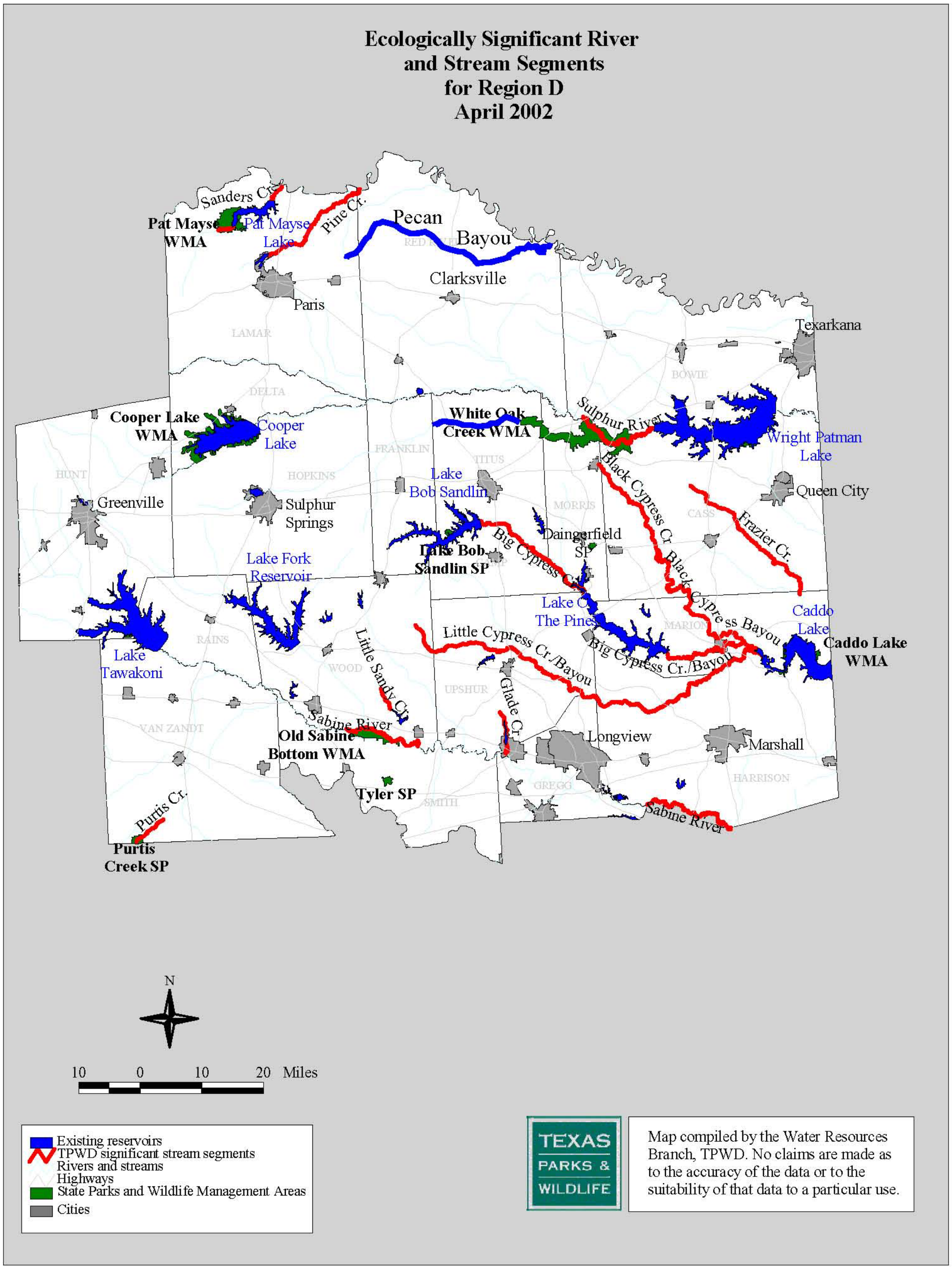

Figure 8.1 Ecologically Significant River and Stream Segments (from TPWD, 2000)

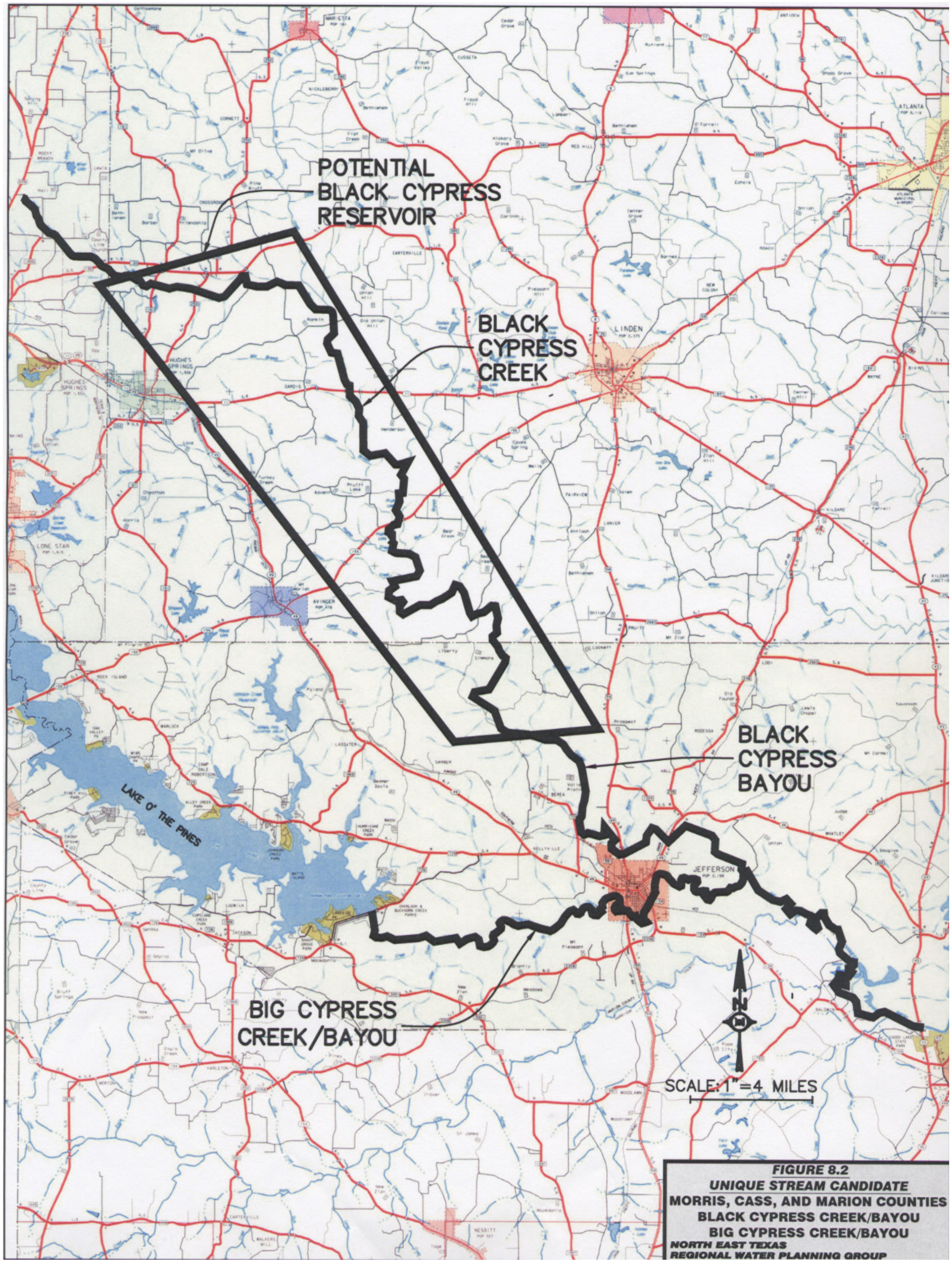

Figure 8.2 Black Cypress Creek/Black Cypress Bayou

8.4 Conflicts With Water Management Strategies

As a part of the planning effort, the TPWD candidate streams from the TPWD report and the more recent suggestions were compared to reservoir sites which have been suggested previously in the region. Further, the candidate streams which border on other regions were compared against the recommendations of that region.

The following TPWD suggested segments conflict with the proposed location of Black Cypress Reservoir or the Caddo Lake enlargement. Neither of these projects were supported by the NETRWPG in previous rounds of planning:

- **Black Cypress Creek** (Cass County).
- **Black Cypress Bayou** (Marion County).
- **Big Cypress Bayou/Creek** (Marion County).

The following TPWD suggested segments are contiguous with Region C or I:

- **Purtis Creek** (Region C) (Van Zandt County).

The following TPWD suggested segments do not appear to conflict with Region D's recommended water management strategies provided the stated conditions are met:

- **Sanders Creek** (Lamar County) provided there is no interference with the operation or maintenance of Pat Mayse Reservoir.
- **Pine Creek** (Lamar County) provided that there is no interference with the operation and maintenance of Lake Crook, or the City of Paris wastewater treatment plant.
- **Big Cypress Bayou/Creek** (Marion County) provided that there is no interference with the operation and maintenance of Lake O' the Pines.
- **Glade Creek** (Upshur County) provided there is no interference with the operation or maintenance of Lake Gladewater.
- **Big Cypress Creek** (Titus, Morris, and Camp Counties) provided there is no interference with the operation and maintenance of Lake Bob Sandlin or Lake O' the Pines.
- **Pecan Bayou** (Red River County) provided there are no interference with operations and maintenance of any local entities.

The following suggested segments have one or more conflicts with potential Region D reservoirs or other regional plans:

- **Sabine River from US 59 upstream to Easton** (Harrison County). This segment includes the potential Carthage Reservoir site. Additionally, it abuts Region I, which has not designated it as a unique segment. A possible impact may exist on the operation or maintenance of Lake Cherokee.
- **Sabine River from FM 14 to FM 1804** (Wood/Smith Counties). This segment includes the potential Waters Bluff Reservoir site.
- **Little Cypress Creek/Bayou** (Harrison, Upshur, Wood Counties). This segment includes the potential site of the Little Cypress Reservoir.

- **Sulphur River from a point 0.9 miles downstream of Bassett Creek upstream to the IH 30 bridge** (Bowie, Morris, Cass Counties). This segment lies downstream of the proposed Marvin Nichols Reservoir and upstream of existing Wright-Patman Reservoir. Designation of this segment could impact strategies which involve raising the level or changing the operations strategy in Wright Patman and could impact the potential Marvin Nichols Reservoir.
- **White Oak Creek from US 271 east to IH 30 (Titus and Morris Counties).** This segment lies upstream of the existing Wright-Patman Reservoir. Designation of this segment could impact strategies which involve raising the level or changing the operations strategy in Wright Patman or other potential water management strategies located on White Oak Creek under consideration.
- **Pecan Bayou (Red River County).** This segment extends from two miles south of Woodland in northwestern Red River County, east to the Red River approximately one mile west of the eastern Bowie County line. Designation of this segment could impact strategies, including the potential Dimple Reservoir site, or other potential water management strategies located upstream of Pecan Bayou.

8.5 Recommendations for Designation of Ecologically Unique Stream Segments

The NETRWPG does not recommend that any stream segment be unconditionally designated as Ecologically Unique in this region.

8.6 Considerations for Ecologically Unique Stream Segment Recommendations

After considering available information, the NETRWPG elected not to recommend unconditionally that any stream segments from the TPWD (2000) report entitled *Ecologically Significant River and Stream Segments of Region D, Regional Water Planning Area,* nor did they recommend the White Oak Creek segment presented in the previous regional planning round for ecologically unique status. Reasons for this decision include the following:

1. The RWPG believes that there exists a lack of clarity as to the effects of designation with respect to private property takings issues.
2. The RWPG does not wish to infringe upon the options of individual property owners to utilize stream segments adjacent to their property as they deem appropriate. For example, if reservoirs cannot be built in unique segments, will these become prime candidates for mitigation sites acquired by eminent domain?
3. Despite previous legislative clarification, there remains uncertainty as to the myriad ways in which the designation may ultimately be construed.
4. Where overlap occurs between unique stream candidates and water management strategies, sufficient information to express preference for one use to the exclusion of another is not available at this time.
5. The White Oak Creek segment could possibly be in the proposed inundated area should the level of Wright-Patman Reservoir be raised. At this time sufficient information is not available for a proper evaluation of the White Oak Creek segment.

The NETRWPG further elected to conditionally recommend to the Legislature that the Pecan Bayou stream segment in the Red River Basin and the Black Cypress Bayou and Black Cypress Creek in the Cypress Creek Basin be identified as Ecologically Unique Stream Segments. It is believed that these three segments exhibit sufficient ecological features and meet the TAC criteria for such designation. Because the consequences of such designation by the Legislature are not well understood, this recommendation is conditioned upon legislation providing for such designation to contain the following clarifying provisions:

1. A provision affirming that the only constraint that may result from the ecologically unique stream segment designation is that constraint described in the Texas Water Code (TWC), Subsection 16.051(f), which prohibits a state agency or political subdivision of the state from financing the construction of a reservoir in a designated stream segment.
2. A provision stating that the constraint described in Subsection 16.051(f) Water Code does not apply to a weir, diversion, flood control, drainage, water supply, or recreation facility currently owned by a political subdivision.
3. A provision stating that this designation will not constrain the permitting, financing, construction, operation, maintenance, or replacement of any water management strategy recommended, or designated as an alternative, to meet projected needs for additional water supply in the 2026 Regional Water Plan for the North East Texas Water Planning Region.
4. A provision affirming that this designation is not related to the "wild and scenic" federal program or to any similar initiative that could result in "buffer zones," inadvertent takings, or overreaching regulation.
5. A provision stating that all affected landowners shall retain all existing private property rights.
6. A provision recognizing that the unique ecological value of the designated segment is due, in part, to the conscientious, voluntary stewardship of many landowners on the adjoining properties.

Supporting material on these stream segments from the 2011 Region D Water Plan is presented in Appendix C8 for the purposes of the 2026 Region D Water Plan. The conditional recommendations herein are those as presented in the previously adopted 2011, 2016, and 2021 Region D RWPs. The information required in 31 TAC §357.43(b) is presented herein as part of the conditional recommendations proffered in this Plan. The TPWD will have the opportunity to review this information as part of their review of the Region D IPP. A separate, standalone package reflecting these recommendations will be submitted to the TPWD by the NETRWPG prior to the development of the final Region D RWP.

There are no recommended strategies in the 2021 Region D Water Plan that impact the conditionally recommended ecologically unique stream segments.

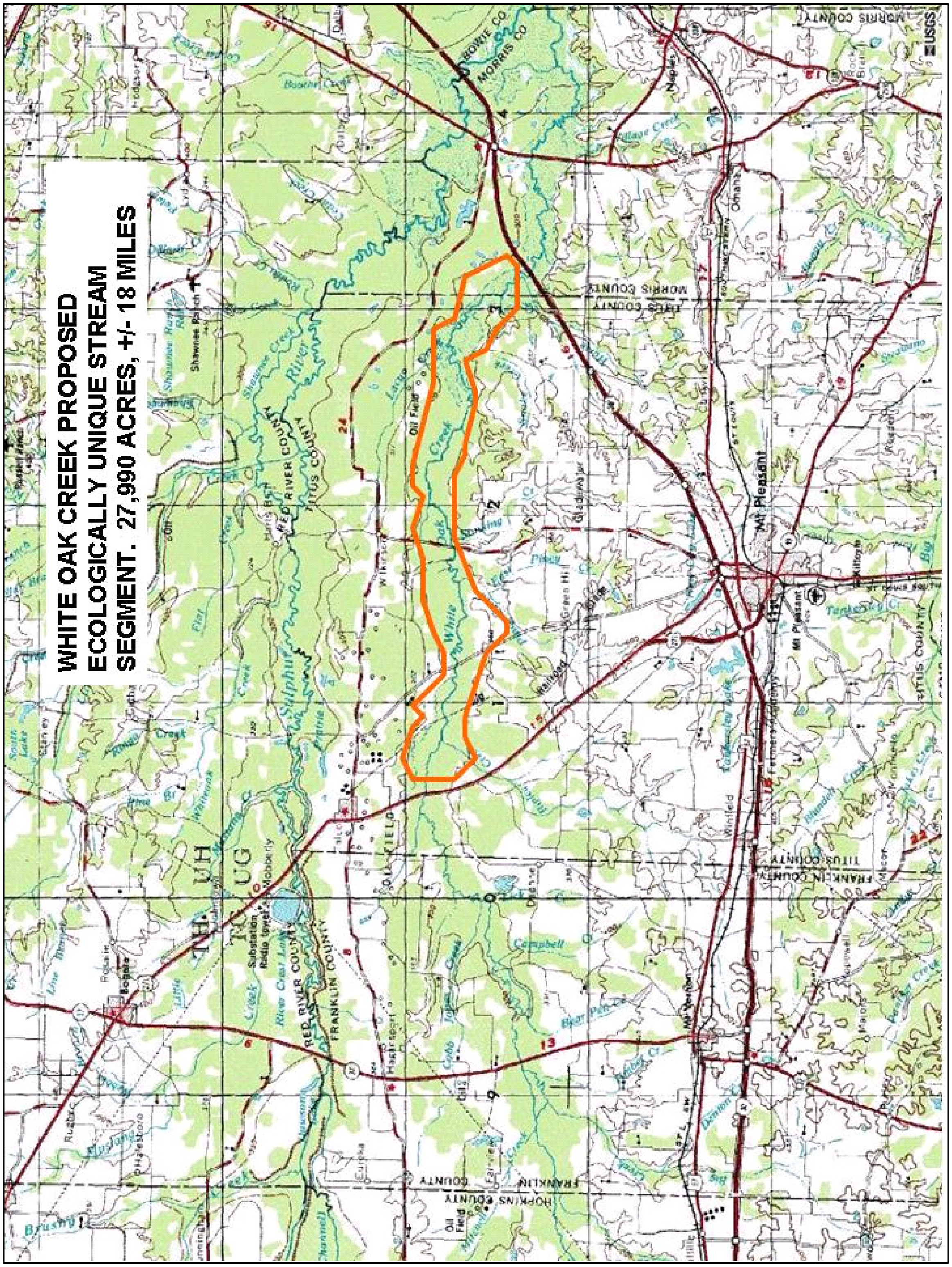

Figure 8.3 White Oak Creek Proposed

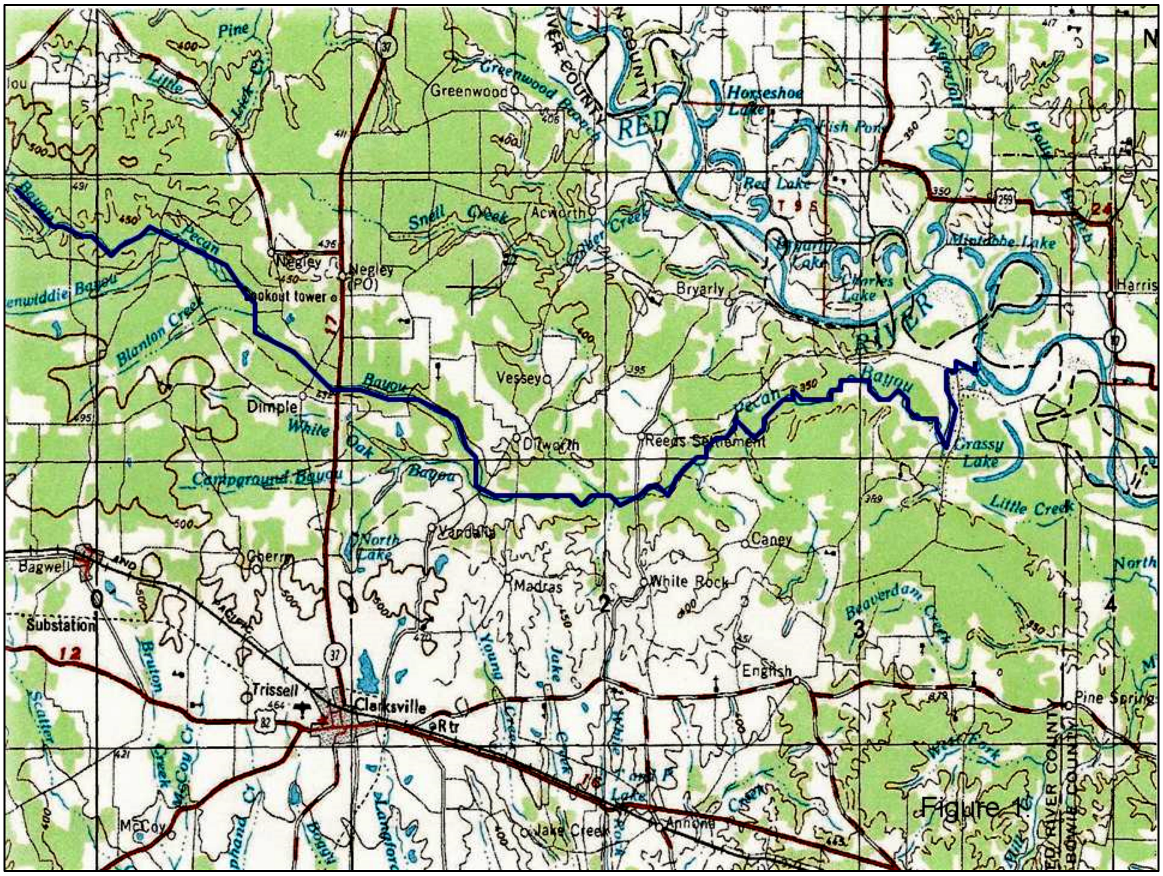

Figure 8.4 Reach of the Pecan Bayou in Red River County

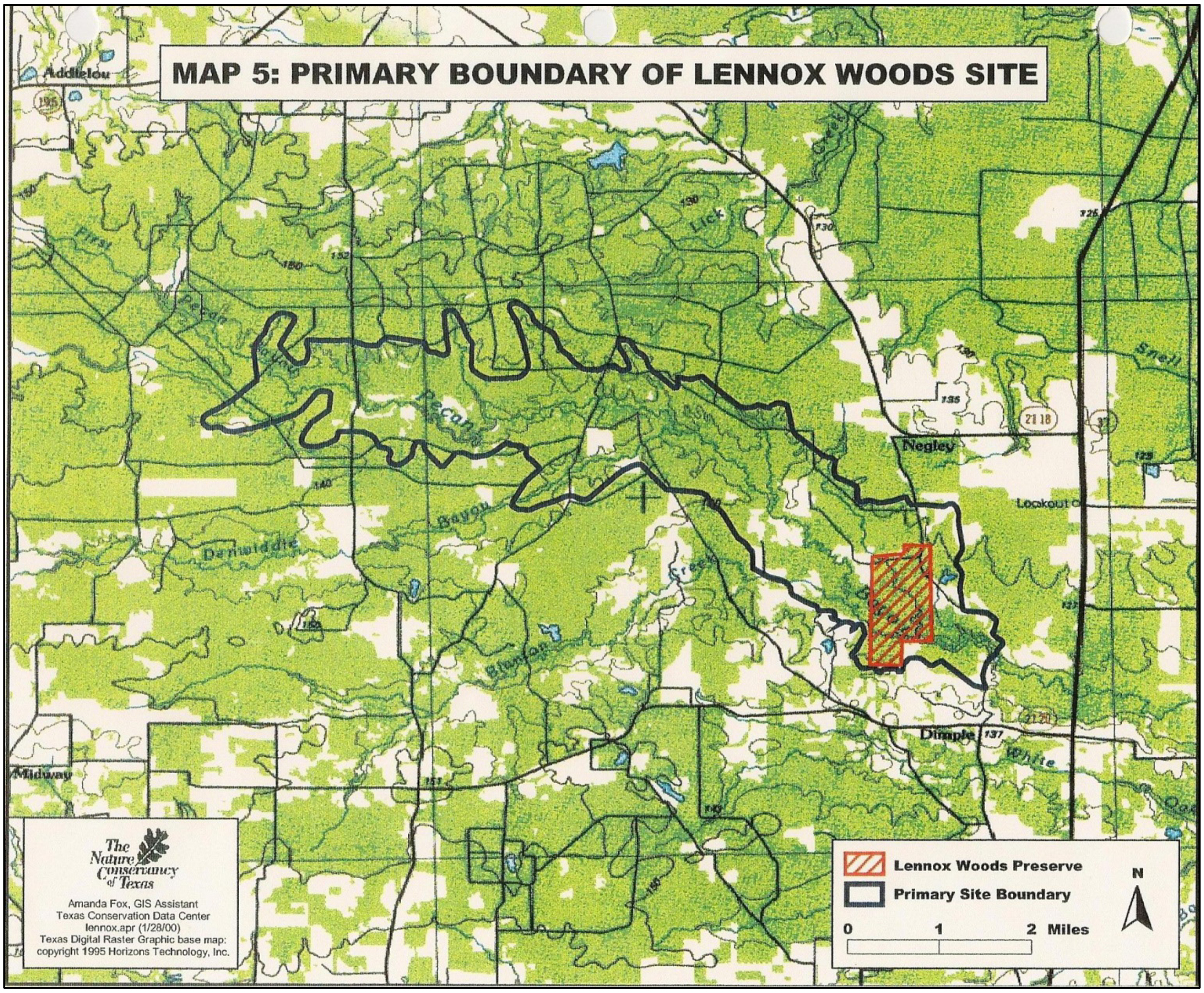

Figure 8.5 Primary Boundary of Lennox Woods Site

8.7 Voluntary Instream Flow Goals and Proposals

Since 1997, the Senate Bill 1 water planning process has required protection of agricultural and natural resources as the state determines how to meet future water needs. For example, the basic directive of the legislature in Senate Bill 1 is:

> "The state water plan shall provide for the orderly development, management and conservation of water resources and preparation for and response to drought conditions, in order that sufficient water will be available at a reasonable cost to ensure public health, safety and welfare, further economic development and protection of agricultural and natural resources of the entire state." (TWC, Section. 16.051.)

One of the "Guiding Principles" as adopted by the TWBD for the 2027 State Water Plan is:

> (23) Consideration of **environmental water needs, including instream flows** and bay and estuary inflows, including adjustments by the [Regional Water Planning Groups] to water management strategies to provide for environmental water needs, including instream flows and bay and estuary needs. Consideration shall be consistent with the Commission's adopted environmental flow standards under 30 TAC Chapter 298 in basins where standards have been adopted. (31 TAC §358.3(23)), emphasis added.

Moreover, the legislature has enacted two other laws that focus on protecting environmental water needs: Senate Bill 2 in 2001 and Senate Bill 3 in 2007. These laws recognized the important role that water left in rivers plays in conserving fish and wildlife habitat, protecting healthy timber and agricultural lands, providing recreational opportunities, and sustaining economic and cultural values. Even the value of private property along a river and associated riparian rights can vary significantly with the flow conditions in the river.

Texas law and TWDB's Guiding Principle 23 (TAC §358.3) provide authority for RWPGs to focus some of their work on "environmental water needs." TWDB defines "environmental flows" as the flow of water (both quantity and timing of flow) needed to maintain ecologically healthy streams and rivers," as described at the following location:

(http://www.twdb.texas.gov/surfacewater/flows/index.asp).

Within Senate Bill 3, the term "environmental flow regime" is defined as:

> (16) "Environmental flow regime" means a schedule of flow quantities that reflects seasonal and yearly fluctuations that typically would vary geographically, by specific location in a watershed, and that are shown to be adequate to support a sound ecological environment and to maintain the productivity, extent, and persistence of key aquatic habitats in and along the affected water bodies. Section 11.002, Tex. Water Code.

TWDB has further provided guidance on the value and role of environmental flows on its aforementioned website.

Meeting environmental flow goals can be compatible while meeting other water needs. Most of the needs presently addressed in the regional plans and state water plan are for "consumptive uses," that is, water diverted from a river, stream, or lake and used for drinking water, agricultural and industrial uses. A percentage of that water is returned to the river.

In contrast, most environmental water needs are non-consumptive, such as flows in the river to provide for fish and wildlife. Moving water downstream in a way that mimics natural flows can meet environmental flow goals while providing water for consumptive use downstream.

In the 2011 Region D Regional Water Plan, as well as in subsequent Plans, the NETRWPG stated that it was taking steps to protect environmental flow goals, such as instream flows. In section 1.5 (a) Historical and Current Water Use, the 2011 Region D plan states:

> "Historical and current uses in the North East Texas Region include municipal, manufacturing, recreation, irrigation, mining, power generation and livestock. . . .

> In addition to these uses, which are mostly consumptive uses, there are non-consumptive uses such as flows in rivers, streams, and lakes that have been relied upon to maintain healthy ecological conditions, navigation, recreation and other conditions or activities that bring benefit to the Region. These historic non-consumptive uses and future needs have not yet been the subject of detailed consideration in the State's Senate Bill 3 planning process, but are discussed in *Section 2.3.7 Regional Environmental Flow Demand Projections* and will be addressed in more detail in Round 4 of the planning process. . . .

The 2011, 2016, and 2021 Plans each presented past considerations of the NETRWPG for both the Cypress and Sulphur River Basins, stating:

> "**CYPRESS CREEK BASIN**
>
> It is the position of the North East Texas Water Planning Group that there will be unavoidable negative impacts to the integrity of the ecological environment of the water bodies of the Cypress River Basin and especially Caddo Lake, should there be development of new reservoirs in the Cypress River Basin or transfer of water out of the basin, unless such new reservoirs or transfers do not conflict with the environmental flow needs for the water in the North East Texas Region. Those flow needs are defined as the low, pulse and flood flows needed for a sound ecological environment in Senate Bill 3, 2007 Regular Session of the Texas Legislature (SB-3).
>
> Those flow needs have been identified initially by the process of obtaining recommendations from scientists and stakeholders for the flow regimes for the Cypress Basin through a process initiated in 2004 and summarized in the draft Report on Environmental Flows for the Cypress Basin, updated May 2010 and provided as Appendix to the May 31, 2010 Comments of the Caddo Groups to the Region D IPP and referred to as the *Cypress Basin Flow Project Report*. . . .
>
> Proposals for new reservoirs or interbasin transfers can be made consistent with the environmental flow needs in the Cypress Basin only after final decisions have been made to determine those needs and sources to fill them. Until then, however, no water should be proposed for a new reservoir or for uses in other regions unless the proposals in other regional plans explicitly recognize the environmental flow needs for Region D and that the amount, timing, diversion rate and other characteristics must be consistent with the needs…"

And

> **"SULPHUR RIVER BASIN**
>
> **. . .** It is the position of the NETRWPG that there be no development of new reservoirs in the Sulphur River Basin within Region D nor transfer of water out of the basin for that part that is within Region D until the flow needs for a sound ecological environment are defined for the Sulphur River Basin through the process established in Senate Bill 3, 2007 Regular Session of the Texas Legislature. Those flow needs are defined as the low, pulse, and flood flows.

> The flow needs assessment for the Sulphur River has not yet begun. No development should take place until the State has identified the flow needs for the Sulphur River and established a demand for the environmental flows for the basin…"

The NETRWPG recommended that no new reservoirs be constructed on Black Cypress based in part on data from the *Cypress Basin Flow Project Report* but did not make any other specific recommendations.

Senate Bill 3 provided for development of environmental flow "standards" for a number of river basins but did not include an established schedule for the Cypress, Red, or Sulphur River basins. Senate Bill 3 does, however, provide that in those basins not listed, voluntary development of environmental flow goals and proposals can proceed.[1] That voluntary approach is taking place in the Cypress Creek Basin.

8.7.1 Cypress Creek Basin

Over the past 20 years, a number of stakeholders have worked with the United States Army Corps of Engineers (USACE) and the Northeast Texas Municipal Water District (NETMWD) to develop a set of environmental flow regimes in the Cypress Creek Basin. Those voluntary efforts, which have involved participation by a wide variety of interests (including permit holders, 3 federal and 7 state conservation agencies, 9 universities, 6 local and regional governmental entities, along with conservation organizations, landowners, and industry representatives), have been, and continue to be, undertaken in accordance with Section 11.02362(e) of the Texas Water Code. Over the past 14 years, USACE and NETMWD have worked to meet those flow regimes through voluntary changes in the water release patterns from Lake O' the Pines. Because of the success of this project to date, the NETRWPG considers those regimes as voluntary goals for instream flows for the purposes of this 2026 Region D Plan. The NETRWPG recognizes that, as with other aspects of the planning process, new information in the future may change the position of the NETRWPG on these instream flow goals.

Consistency with the goals, as they continue to be refined, is identified as a factor to be weighed and addressed for interbasin transfers subject to Water Code Section 11.085(k)(2)(F), but the strategies to meet future water needs of regional water plans and the State Water Plan are otherwise not to be limited by these voluntary goals for instream flows. Such goals also are presented herein as a point of reference for the consideration of whether water strategies are consistent with the protection of the agricultural and natural resources of the Cypress Creek Basin and the state that rely upon such flows.

Details on the voluntary environmental flow goals (i.e., the recommended "flow regimes" in that study) and proposals to meet those goals , as then developed, are set out in detail in "Summary of Development of Environmental Flow Regimes for the Cypress Creek Basin and Caddo Lake Watershed as of 2012, with 2015 Update," available at https://caddolakeinstitute.org/documents/#major.

In addition to identifying environmental flow regimes for the rivers and streams, the Cypress Summary Report (2012, with 2015 update) discusses proposals to reach such goals over time where they are not being met. One example involves enhancement of the instream flows below Lake O' the Pines to Caddo Lake by increasing the period of the recreational pool to provide additional water for release downstream.

[1] See Section 11.02362(e), Tex. Water Code , the Senate Bill 3 provision for the "voluntary consensus-building process" for basins not scheduled for the formal environmental flow process.

The State's Science Advisory Commission, first created by statute in 2003, published a report giving a number of other options for protecting and restoring environmental flows goals.[2]

The flow regimes for the Cypress Basin report, as they may be further refined through those ongoing efforts, are incorporated in this regional water plan as the voluntary goals for instream flows in that basin and the best flow-related information available for the evaluation and protection of instream uses, water quality, and aquatic and riparian habitats potentially affected by interbasin transfers from the basin that are subject to Water Code Section 11.085(k).

8.7.2 Sulphur River Basin

While a process similar to that used in the Cypress Basin has not yet been developed for the Sulphur Basin, a potential first step has been taken that is important to the NETRWPG. This step is described in more detail in Trungale (2015), located at:
https://caddolakeinstitute.org/docs/flows/RegionD_Sulphur_eflows_20150409%20%281%29.pdf

As noted in Trungale (2015), the identified flow regime therein "reflects the historic instream flow conditions that continue to exist today." The regime has not, however, been subject to review and revision by scientists or stakeholders to determine the extent of this flow regime that is needed to maintain the ecological health of the fish and wildlife habitat and the economic and other values currently provided. Thus, this flow regime serves as only a first attempt at identifying voluntary instream flow goals for the Sulphur River Basin. The NETRWPG proposes and supports the development of a stakeholder process, similar to that of the Cypress Creek Basin, to develop such goals in the future.

Although the flows identified in Trungale (2015) are not presented herein as requirements to be implemented on regional water management strategies, the flow regime identified therein does provide additional information for consideration of potential impacts on the agricultural and natural resources of the region and the state. This initial work provides a point of reference for considering the pulse flows previously discussed in Chapter 6 as necessary for the floodplain forests below the Marvin Nichols reservoir site.

It is the position of the NETRWPG that there be no development of new reservoirs in the Sulphur River Basin within Region D nor transfer of water out of the basin for that part that is within Region D until the flow needs for a sound ecological environment are defined for the Sulphur River Basin through the process established in Senate Bill 3, 2007 Regular Session of the Texas Legislature. Those flow needs are defined as the low, pulse, and flood flows.

The flow needs assessment for the Sulphur River has not yet begun. No development should take place until the State has identified the flow needs for the Sulphur River and established a demand for the environmental flows for the basin. The NETRWPG recognizes that other RWPGs may include recommendations for new reservoirs in the Sulphur River Basin or for the transfer of water out of the Sulphur River Basin to basins in other regions as part of their recommended water management strategies or as alternate strategies. It is the position of the NETRWPG that such proposed reservoirs or transfers

[2] Final Report, Science Advisory Committee Report on Water for Environmental Flows, Chapter 7, October 26, 2004, Prepared for the Study Commission on Water for Environmental Flows.

include explicit recognition that the needs for environmental flows in the North East Texas Region must be satisfied first, consistent with Senate Bill 3.

8.8 Reservoir Sites

Rules for regional water planning (31 TAC§ 357.43) state that a RWPG "…*may recommend sites of unique value for construction of reservoirs by including descriptions of the sites, reasons for the unique designation and expected beneficiaries of the water supply to be developed at the site."* The criteria used to determine if a site is unique for reservoir construction are specified in Section §358.2(7) and are as follows:

(1) Site-specific reservoir development is recommended as a specific water management strategy or as a unique reservoir site in an adopted regional water plan; 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 for:

a) The current planning period; or

b) Where it might reasonably be needed to meet needs beyond the 50-year planning period."

In the preparation of the 2011 Region D Plan, the NETRWPG conducted a "reconnaissance-level" assessment of previously identified reservoir sites in the region. This assessment was based on a review and limited update of information contained in previous studies for 17 reservoir sites. It should be noted that the "proposed" and "potential" designations used here and in the *Reservoir Site Assessment Study* (Appendix B), *2001 North East Texas Regional Water Plan,* were made only to assist in the planning process and are not intended to convey a relative priority among the various reservoir sites.

The 1997 State Water Plan recommended development of two new reservoirs within the North East Texas Region – the George Parkhouse II reservoir project (Lamar County) and the Marvin Nichols I reservoir project (Red River, Franklin, Morris, and Titus counties), both of which are located within the Sulphur River Basin. It is noted in the 1997 State Water Plan that development of the Nichols I reservoir could eliminate or significantly delay the need for the Parkhouse II reservoir. Also, the *Comprehensive Sabine Watershed Management Plan* includes a recommendation that the Sabine River Authority develop the Prairie Creek Reservoir and Pipeline Project (Gregg and Smith counties) to supply projected needs within portions of the North East Texas Region. It should be noted that the Prairie Creek Reservoir and Pipeline Project is not being pursued at this time because of the federal fish and wildlife conservation easement limitation on the Waters Bluff reservoir site. If the conservation easement were removed, the Waters Bluff reservoir could be a priority project of the Sabine River Authority to meet projected water needs in the upper Sabine River Basin.

In addition to the Marvin Nichols I, George Parkhouse II, and Prairie Creek reservoir sites, available information on 14 other reservoir sites within the North East Texas Region were also reviewed. These are:

Cypress Creek	**Basin Red River Basin**
▪ Little Cypress (Harrison)	▪ Barkman (Bowie) ▪ Big Pine (Lamar and Red River) ▪ Liberty Hills (Bowie) ▪ Pecan Bayou (Red River) ▪ Dimple (Red River)
Sabine River Basin	**Sulphur River Basin**
▪ Big Sandy (Wood and Upshur) ▪ Carl Estes (Van Zandt) ▪ Carthage (Harrison) ▪ Kilgore II (Gregg and Smith) ▪ Waters Bluff (Wood) ▪ Grand Saline Creek (Van Zandt)	▪ George Parkhouse I (Delta and Lamar) ▪ George Parkhouse II (Lamar) ▪ Marvin Nichols I/IA ▪ Marvin Nichols II (Titus)

Figure 8.6 shows the approximate location of the previously proposed and potential reservoir sites in the region, as delineated in the *Reservoir Site Assessment Study* (Appendix B), *2001 North East Texas Regional Water Plan*. The *Reservoir Site Assessment Study* (Appendix B), *2001 North East Texas Regional Water Plan*, provided information on various characteristics of each reservoir site, including:

- Location.
- Impoundment size and volume.
- Site geology and topography.
- Dam type and size.
- Hydrology and hydraulics.
- Water quality.
- Project firm yield for water supply.
- Other potential benefits (e.g., flood control, hydropower generation, recreation).
- Land acquisition and easement requirements and potential land use conflicts.
- Environmental conditions and impacts from reservoir development.
- Local, state, and federal permitting requirements.
- Project costs updated to third quarter (September) 2023 price levels using the Engineering News Record Construction Cost Index (ENR) from the original ENR values of the second quarter (June) of 1999.
- Annualized costs include reservoir debt service with an interest rate of 3.5 percent over a period of 40 years as these are the current default values in the TWDB's Unified Costing Model.

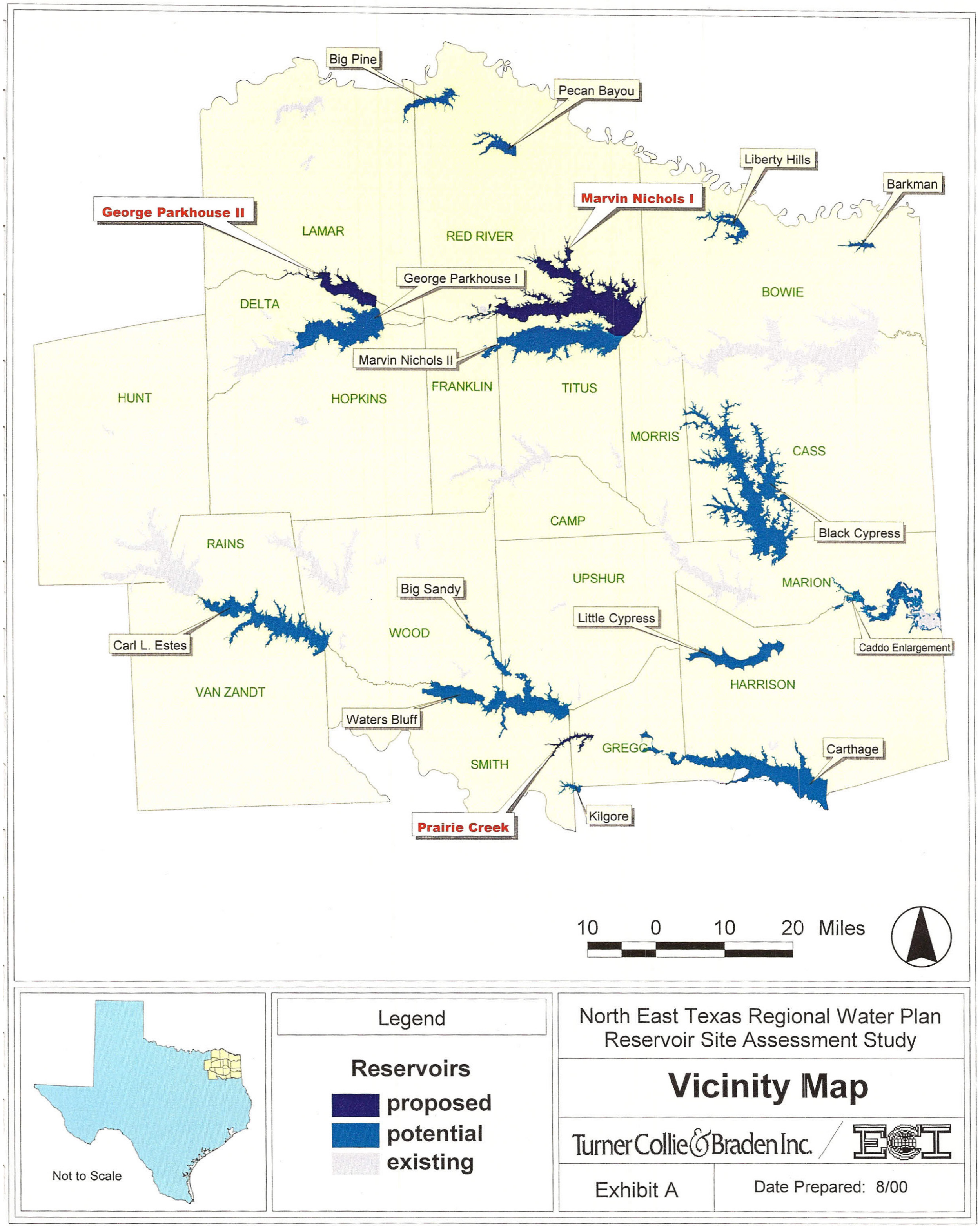

Figure 8.6 Potential Reservoir Vicinity Map, Site Assessment Study (2000)

8.9 Cypress Creek Basin

It is the position of the NETRWPG that there will be unavoidable negative impacts to the integrity of the ecological environment of the water bodies of the Black Cypress portion of the Cypress Creek Basin and especially Caddo Lake, should there be development of new reservoirs or transfer of water out of the basin, unless such new reservoirs or transfers do not conflict with the environmental flow needs for the water in the North East Texas Region. Those flow needs are defined as the environmental flows necessary to maintain a sound ecological environment in Senate Bill 3, 2007 Regular Session of the Texas Legislature (SB-3).

It is the position of the NETRWPG that such proposed reservoirs or transfers include explicit recognition that the needs for environmental flows in the North East Texas Region must be satisfied first consistent with the legislative intent of Senate Bill 3 with regard to maintaining an environmental flow regime necessary for a sound ecological environment.

The Cypress Basin lies entirely in the North East Texas Region (Region D). The amount of needs in the Cypress Basin for environmental flows is not fully or finally determined. Once the State has set aside water for such needs, the State will have made its determination on such needs. Proposals for new reservoirs or interbasin transfers can be made consistent with the environmental flow needs in the Cypress Basin only after final decisions have been made to determine those needs and sources to fill them.

As indicated above, three potential reservoir sites in the Cypress Creek Basin were included in the *Reservoir Site Assessment Study* (Appendix B), *2001 North East Texas Regional Water Plan* for the North East Texas Region – Black Cypress, the enlargement of Caddo Lake, and Little Cypress. However, the 2001 plan did not recommend the Black Cypress and the Caddo Lake enlargement; therefore, the Little Cypress is the only one included here and is briefly described below.

8.9.1 Little Cypress

The Little Cypress reservoir site is located approximately nine miles northwest of the City of Marshall, within Harrison County. The dam site is at River Mile 21.3 on the Little Cypress Bayou. Previous studies have evaluated a reservoir with a conservation pool elevation of 233.1 feet at mean sea level (ft-MSL), with a storage capacity of 217,234-acre foot (ac-ft). The maximum design water surface elevation would be 252.0 ft-MSL. An earthfill dam 58 feet high and with a crest length of 7,000 feet would be constructed to form the reservoir. The dam would have an ogee weir type spillway with a crest elevation of 233.1 and a 400-foot crest length. The outlet works would consist of a single conduit with a 10-foot diameter and two 4.5-foot by 10-foot gates.

Previous studies of the Little Cypress reservoir site have evaluated a project with a firm yield of 144,900 ac-ft per year (ac-ft/yr). In current dollars (2023), the total cost to develop the reservoir is estimated to be approximately $649.4 million with an annualized cost of nearly $40.2 million. The unit cost of water from the project on an annualized basis would be $278 per ac-ft ($0.86 per 1,000 gallons) of firm yield. Potential beneficiaries of the project include municipal and industrial users within the Cypress Creek Basin and/or water users outside of the basin. In addition to water supply, other potential benefits of the project could include recreation and some amount of flood control.

Based on readily available information, there are no potential ecologically unique stream segments of high importance, wetland mitigation banks, or conservation easements within or adjacent to the reservoir site. The potential Little Cypress reservoir is within and adjacent to the Little Cypress Bayou site and listed as priority two: good quality bottomlands with moderate waterfowl benefits. Analyses indicate that there are no municipal solid waste landfill sites, Superfund sites, permitted industrial or hazardous waste locations, or air quality monitoring stations in or near the reservoir site. State and federal agency listings for threatened, endangered, or rare plant or animal species indicate that several species potentially occur or have habitat in or near the project location. Available data indicates that there are five hydric soil associations within the reservoir site. The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist.

A summary of key characteristics of the reservoir site that were examined in the Cypress Creek Basin is provided in Table 8.3.

Table 8.3 Potential Reservoir Sites in the Cypress Creek Basin

Reservoir Site	Conservation Storage (ac-ft)	Surface Area (acres)	Firm Yield (ac-ft/yr)	Total Project Development Cost ($1,000)	Annualized Cost Per (ac-ft)
LITTLE CYPRESS	217,324	15,763	144,900	$649,407	$278

The NETRWPG does not recommend the designation of the potential Little Cypress reservoir site as a unique reservoir site.

8.10 Red River Basin

The scope of work for the *Reservoir Site Assessment Study* (Appendix B), *2001 North East Texas Regional Water Plan* identified Barkman, Liberty Hills, Big Pine, and Pecan Bayou as potential reservoir sites within the portion of the Red River Basin that lies within the North East Texas Region. These sites are also listed in the 1997, 2001, and the 2006 State Water Plan as potential sites. However, a thorough search for previous studies and reports on these sites found little documentation on the Barkman and Liberty Hills sites. The Liberty Hill site is also located in Bowie County. Also, within the portion of the Red River Basin within the North East Texas Region is a potential site for Dimple Reservoir, studied by HDR (1986) for the Red River Authority and participating entities at that time.

Potential beneficiaries of new reservoirs in the Red River Basin portion of the North East Texas Region include municipal, industrial, and irrigation users within the basin and/or users outside of the basin. Other potential benefits include recreation, hydroelectric power generation, and flood control.

8.10.1 Barkman

The Barkman site is located near the City of Texarkana in Bowie County. This site has apparently not been studied in detail, as no information was found with regard to type and size of the dam, project firm yield, or costs.

The USFWS and TPWD combined lists for threatened, endangered, or rare species identify seven birds, six fish, one mammal, and three reptiles to potentially occur or have habitat within the potential Barkman reservoir project location. Natural Resource Conservation Service (NRCS) data shows six hydric soil associations are within the potential Barkman reservoir footprint. The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist. There are no known existing or proposed wetland mitigation bank projects, no designated bottomland hardwood areas, no high-importance ecologically unique stream segments, and no conservation easements that are located near or adversely affected by the potential Barkman reservoir. The analyses indicate that there are no recorded Superfund sites, municipal solid waste landfill sites, permitted industrial and hazardous waste locations, or air quality monitoring stations located within reservoir study area.

The NETRWPG does not recommend the designation of the potential Barkman reservoir site as a unique reservoir site.

8.10.2 Liberty Hill

The Liberty Hill site is also located in Bowie County on Mud Creek. The preferred alternative site is located about three miles upstream of the authorized site, near the Davenport Road crossing at river mile 7.8. This site has apparently not been studied in detail, as no information was found with regard to type and size of the dam, project firm yield, or costs.

The USFWS and TPWD combined lists for threatened, endangered, or rare species identify seven birds, six fish, one mammal, and three reptiles to potentially occur or have habitat within the potential Liberty Hills project location. There are no known existing or proposed wetland mitigation bank projects, no designated bottomland hardwood areas, no high-importance ecologically unique stream segments, and no conservation easements that are located near or adversely affected by the potential Liberty Hill site. The analyses indicate that there are no recorded Superfund sites, municipal solid waste landfill sites, permitted industrial and hazardous waste locations, or air quality monitoring stations located within reservoir study area. Current NRCS data shows that there is a hydric soil association within the potential Liberty Hills reservoir footprint. The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist.

The NETRWPG does not recommend the designation of the Liberty Hill possible reservoir site as a unique reservoir site.

8.10.3 Big Pine

The Big Pine site is located on Pine Creek, primarily in Red River County, with a small portion of the reservoir area in Lamar County. The land area required for the reservoir is 9,200 acres. No information was found regarding the type and size of the dam. The project has an estimated firm yield of 35,840 ac-ft/yr and a project development cost of approximately $117 million. The cost per ac-ft of firm yield on an annualized basis is $202 ($0.63 per 1,000 gallons). This site has apparently not been studied in detail, as no information was found with regard to the type and size of the dam.

The USFWS and TPWD combined lists for threatened, endangered, or rare species list eight birds, five fish, one mammal, three reptiles, one insect, and one mollusk to potentially occur or have habitat within the potential project location. There are no known existing or proposed wetland mitigation bank projects, ecologically unique stream segments of high importance, and no conservation easements that are located near or adversely affected by the potential Barkman reservoir. The analyses indicate that there are no recorded Superfund sites, municipal solid waste landfill sites, permitted industrial and hazardous waste locations, or air quality monitoring stations located within reservoir study area. NRCS data shows that there are hydric soil associations within the potential Big Pine reservoir footprint. The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist. The potential Big Pine reservoir is located within the Red River basin, which represents a negligible quantity of the remaining bottomland hardwood in Texas. The potential Big Pine reservoir is within and adjacent to the Sulphur River Bottom West site and listed as priority one: excellent quality bottomlands of high value to waterfowl.

The NETRWPG does not recommend the designation of the potential Big Pine reservoir site as a unique reservoir site.

8.10.4 Pecan Bayou

The Pecan Bayou reservoir site is located in Red River County on Pecan Bayou, which is a tributary of the Red River. Previous studies have examined 20 alternative sites, of which three were chosen for evaluation. The alternative that would produce the greatest firm yield would have a storage capacity of 688 ac-ft and a surface area of 122 acres. This alternative would have an earthen dam approximately 2,950 feet long with a top elevation of 384 ft-MSL. The estimated firm yield of the project is 1,866 ac-ft/yr. The total cost to develop the project would be $31 million. The unit cost of water from the reservoir would be $1029 per ac-ft of firm yield ($3.16 per 1,000). Potential beneficiaries of this project include municipal and industrial water users in the vicinity of the site in Red River County.

Based on a review of readily available information, there are potential ecologically unique streams of high importance, bottomland hardwoods, wetland mitigation banks, or conservation easements within or adjacent to the reservoir site. Analyses also indicate that there are no Superfund sites, municipal solid waste landfill sites, permitted industrial and hazardous waste locations, or air quality monitoring stations located within or adjacent to the reservoir study area. However, state and federal agency listings for threatened, endangered, or rare plant or animal species list eight birds, five fish, one mammal, three reptiles, one insect, and one mollusk that potentially occur or have habitat in or near the project location. Also, available data indicates that there are hydric soil associations within the reservoir site. The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist.

The NETRWPG does not recommend the designation of the potential Pecan Bayou reservoir site as a unique reservoir site.

A summary of key characteristics of the potential Pecan Bayou and Big Pine reservoir sites that were examined in the Red River Basin is provided in Table 8.4. Similar data for the others in the Red River Basin was not available.

8.10.5 Dimple Reservoir

The Dimple reservoir site is located in Red River County on White Oak Bayou, which is a tributary of Pecan Bayou, which is a tributary to the Red River. Previous studies have examined this site (HDR 1986). The studied storage capacity of the reservoir is 28,541 ac-ft and a surface area of 2,130 acres. This alternative would have an earthen dam approximately 1,000 feet long with a top elevation of 425 ft-MSL. The calculated firm yield of the project is 10,200 ac-ft/yr, utilizing the latest TCEQ Water Availability Model (WAM) (Run 3) for the Red River Basin and employing consensus planning criteria to account for environmental needs. The total cost to develop the project would be approximately $55.5 million, including pipeline. If the entirety of the firm yield is utilized, the unit cost of water from the reservoir would be $394 per ac-ft of firm yield ($1.22 per 1,000 gal). Potential beneficiaries of this project include municipal and irrigation water users in the vicinity of the site in Red River County.

Based on a review of readily available information, there are potential ecologically unique streams of high importance, bottomland hardwoods, wetland mitigation banks, or conservation easements within or adjacent to the reservoir site. The site lies upstream of Pecan Bayou, which is conditionally recommended herein as an ecologically unique stream segment, as it has been identified by the TPWD. State and federal agency listings for threatened, endangered, or rare plant or animal species list eight birds, five fish, one mammal, three reptiles, one insect, and one mollusk species that potentially occur or have habitat in or near the project location. Also, available data indicates that there are hydric soil associations within the reservoir site. The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist.

The NETRWPG does not recommend the designation of the potential Dimple reservoir site as a unique reservoir site.

A summary of key characteristics of the potential Pecan Bayou, Big Pine, and Dimple reservoir sites that were examined in the Red River Basin is provided in Table 8.4. Similar data for the others in the Red River Basin was not available.

Table 8.4 Potential Reservoir Sites in the Red River Basin

Reservoir Site	Conservation Storage (ac-ft)	Surface Area (acres)	Firm Yield (ac-ft/yr)	Total Project Development Cost ($1,000)	Annualized Cost Per (ac-ft)
PECAN BAYOU	688	112	1,866	$31,028	$1029
BIG PINE	N/A	9200	35,840	$117,108	$202
DIMPLE	28,541	2,130	10,200	$64,953	$394

8.11 Sabine River Basin

A number of potential reservoir sites in the upper portion of the Sabine River Basin have been previously studied and were reviewed in the *Reservoir Site Assessment Study* (Appendix B), *2001 North East Texas Regional Water Plan*. These are the Big Sandy, Carl Estes, Carthage, Kilgore II, Prairie Creek, and Waters Bluff sites, each of which is described below.

8.11.1 Big Sandy

The Big Sandy reservoir site is located in Upshur and Wood counties at River Mile 10.6 of the Big Sandy Creek north of the City of Big Sandy. At an elevation of 336 ft-MSL, the conservation storage capacity of the reservoir would be 69,300 ac-ft, and it would cover 4,400 surface acres. An earthfill dam 54 feet high and with a crest length of 2,175 feet would be constructed to create the impoundment. The outlet works would consist of a 10-foot diameter conduit controlled by two 4.5-foot by 10-foot gates.

The estimated firm yield of the Big Sandy Reservoir would be 46,600 ac-ft/yr. Total cost to develop the project is estimated to be $178 million. The annualized cost per ac-ft of firm yield would be $237 ($0.74 per 1,000 gallons). Potential beneficiaries of the project include municipal and industrial water users within the upper portion of the Sabine River Basin and/or water users outside of the basin. Recreation is another potential benefit of the project.

Based on available information, there are no potential ecologically unique streams of high importance, wetland mitigation banks, or conservation easements within or adjacent to the site. Analysis also indicates that there is one municipal solid waste landfill site and no Superfund sites, permitted industrial and hazardous waste locations, or air quality monitoring stations located within or adjacent to the reservoir study area. State and federal agency listings for threatened, endangered, or rare species list eight birds, three fish, one mammal, five mollusks, and five reptiles to potentially occur or have habitat within the proposed project location. The reservoir site is also within and adjacent to two areas that the USFWS has classified as having good-quality bottomlands with moderate waterfowl benefits. The marsh area has previously been identified as a significant stream segment by TPWD. Also, NRCS data indicates that there are hydric soil associations within the reservoir site. The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist.

The NETRWPG does not recommend the designation of the potential Big Sandy reservoir site as a unique reservoir site.

8.11.2 Carl Estes

The Carl L. Estes Reservoir site is located on the main-stem of the Sabine River at River Mile 479.7, approximately eight miles west of the City of Mineola. The reservoir would inundate land in portions of Rains, Wood, and Van Zandt Counties. The conservation storage capacity of the reservoir at an elevation of 379.0 ft-MSL would be 393,000 ac-ft and the reservoir would inundate 24,900 surface acres. The reservoir would have a flood pool elevation of 403.0 ft-MSL, which would store 1,205,200 ac-ft with a surface area of 44,000 acres. The dam would be approximately 15,800 feet in length and constructed of compacted earthfill. The flood spillway would be an uncontrolled ogee-shaped spillway with a crest elevation of 403.0 ft-MSL. The outlet works for the dam would consist of a multilevel opening to a 180-inch diameter conduit through the dam and a stilling basin.

The optimal project size in terms of unit costs of water would provide a firm yield of 95,630 ac-ft/yr. The estimated cost to develop the reservoir is $837.1 million. The project would provide water at a unit cost of approximately $541 per ac-ft ($1.67 per 1,000 gallons) of firm yield. Estimated costs may not accurately reflect bottomland hardwood mitigation costs.

Potential beneficiaries of the project include municipal and industrial water users within the upper portion of the Sabine River Basin and/or water users in the Trinity River Basin. In addition to water supply, other potential benefits of the project include recreation, hydroelectric power generation, and flood control.

Based on readily available information, there are no potential ecologically unique streams of high importance or conservation easements within or adjacent to the reservoir site. The potential Carl Estes reservoir is within and adjacent to the Sulphur River Bottom West site and is listed as Priority 2 bottomland hardwoods: good quality bottomlands with moderate waterfowl benefits. There is a proposed wetland mitigation bank project that is located near the reservoir site. Analysis also indicates that there are two municipal solid waste landfill sites but no Superfund sites, permitted industrial and hazardous waste locations, or air quality monitoring stations located within or adjacent to the reservoir study area. State and federal agency listings for threatened, endangered, or rare plant or animal species indicate that nine birds, two fish, one mammal, five mollusks, and three reptile species potentially occur or have habitat in the project location. Also, available data indicates that there are hydric soil associations within the reservoir site. The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist. The project may negatively impact two downstream reaches of the Sabine River identified by TPWD as "significant stream segments" due to unique federal holdings and the bottomland hardwood.

The NETRWPG does not recommend the designation of the potential Carl Estes reservoir site as a unique reservoir site.

8.11.3 Carthage

The Carthage reservoir site is located on the main stem of the Sabine River immediately upstream of the US 59 crossing and downstream of the City of Longview. The reservoir site is located in portions of four counties: Gregg, Harrison, Panola, and Rusk counties. At an elevation of 244 ft-MSL, the reservoir would have a conservation storage capacity of 651,914 ac-ft and surface area of 41,200 acres. The estimated firm yield of the project is 537,000 ac-ft/yr, and the total cost to develop the project is approximately $1032.6 million. On an annualized basis, the unit cost of water from the project would be approximately $118 per ac-ft of firm yield ($0.37 per 1,000 gallons). The potential beneficiaries of the project are municipal and industrial water users in the upper portions of the Sabine Basin and/or users outside of the basin. Other potential benefits include recreation, hydroelectric power generation, and flood control.

Based on available information, there are no conservation easements within or adjacent to the reservoir site. There is one existing mitigation bank consisting of 175 acres that is located near the reservoir site. The potential Carthage reservoir is within and adjacent to the Lower Sabine River Bottom West site listed as priority one bottomland hardwood area described as excellent quality bottomlands of high value to waterfowl. There is one potential ecologically unique stream segment that was included on the TPWD list of candidate segments that would be impounded by the reservoir. Analyses also indicate that there are four municipal solid waste landfill sites, one Superfund site, and two permitted industrial and hazardous waste locations within or adjacent to the reservoir study area. There are no air quality monitoring stations in the area. State and federal agency listings for threatened, endangered, or rare plant or animal species list seven birds, five fish, three mammals, five mollusks, three reptiles, one amphibian, and two vascular plant species that potentially occur or have habitat in or near the project location. Also, available data indicates that there are hydric soil associations within the reservoir site.

The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist.

The NETRWPG does not recommend the designation of the potential Carthage reservoir site as a unique reservoir site.

8.11.4 Grand Saline Creek

The City of Canton has identified a feasible strategy to meet future water supply needs as being the construction of a new 1,845 acre (24,980 ac-ft) reservoir on Grand Saline Creek, a tributary of Sabine River. This reservoir project was originally described in a 2008 report from Gary Burton Engineering, Inc. to the City of Canton, entitled Long-Term Water Study Surface Water Supply. The 2008 report identifies the project site, reservoir surface area, drainage area, and estimated construction costs for the reservoir, intake structure, transmission pipeline, and water treatment plant expansion. From Burton (2008).

The proposed reservoir is located within the Gulf Coastal Plain region. The land surface is generally flat along the flood plains of the major streams but is gently rolling otherwise. A heavy cover of soft (pine) and hardwoods are predominant in this area.

The normal annual average runoff is approximately 10 inches per year or 550 ac-ft per square mile of basin drained. The annual average gross lake surface evaporation rate from 1950 to 1979 was approximately 54 inches, and the monthly average equaled or exceeded rainfall five months out of the year. The major aquifers are the (Carrizo-Wilcox). The Queen City is a minor aquifer underlying the region. Groundwater recharge is from the infiltration of rainfall and runoff on the outcrop areas and direct charging from the streams and lakes. The groundwater is discharged naturally and artificially. Natural processes include springs, seeps, evaporation or movement of perched (shallow) groundwater, and transpiration by trees and plants whose roots reach the water table. Artificial processes include pumping from water wells. The artificial processes are usually several times the natural processes. The surrounding lakes are Lake Fork, Lake Tawakoni, Lake Palestine, and Cedar Creek Lake.

The land use for the study area consists of developed and undeveloped areas. The developed areas are primarily low-density residential, with some light commercial and light industrial. Land use in the undeveloped areas includes agriculture (improved pasture), forestry, tree farming, and oil and gas production. The developed and undeveloped areas are both within and outside of the City limits. Historical development and land use trends have been influenced by three primary factors: (1) the oil and gas industry, (2) First Monday Trades Day, and (3) Dallas suburban expansion.

Based on readily available information, there are no potential ecologically unique streams of high importance, wetland mitigation banks, or conservation easements within or adjacent to the reservoir site. Analysis also indicates that there are no Superfund sites, municipal solid waste landfill sites, permitted industrial and hazardous waste locations, or air quality monitoring stations located within or adjacent to the reservoir site. Native prairie remnants and bottomland hardwood communities within the vicinity have been noted (Burton 2008). State and federal agency listings for threatened, endangered, or rare plant or animal species indicate there is the potential for the area to contain threatened and endangered species and their respective critical habitat(s). Aerial photographic interpretation of the region indicates there are forested and emergent wetlands approximate to these water bodies that are associated primarily with the floodplains of these streams.

Streams associated with this site are considered waters of the United States, as defined in Chapter 33 of the Code of Federal Regulations Part 328.3(a), and are subject to jurisdiction of the USACE; therefore, coordination with the USACE would be necessary to obtain a Clean Water Act, Section 404 permit were this site to be developed.

The NETRWPG does not recommend the designation of the potential Grand Saline Creek reservoir site as a unique reservoir site.

8.11.5 Kilgore II

The Kilgore II reservoir site is located on a tributary of the Sabine River, the upper portion of Wilds Creek near the City of Kilgore. The reservoir site is located within portions of Gregg, Rusk, and Smith counties. With a conservation pool elevation of 398 ft-MSL, the reservoir would have a conservation storage capacity of 16,270 ac-ft and a surface area of 817 acres. The estimated firm annual yield of the project is 5,500 ac-ft. Previous studies examined as part of the *Reservoir Site Assessment Study* (Appendix B), *2001 North East Texas Regional Water Plan* did not include cost estimates from which to prepare updated costs of reservoir development. The reservoir site has been previously studied as a potential local water supply source for the City of Kilgore.

Based on readily available information, there are no potential ecologically unique streams of high importance, bottomland hardwoods, wetland mitigation banks, or conservation easements within or adjacent to the reservoir site. Analysis also indicates that there are no Superfund sites, municipal solid waste landfill sites, permitted industrial and hazardous waste locations, or air quality monitoring stations located within or adjacent to the reservoir site. However, state and federal agency listings for threatened, endangered, or rare plant or animal species indicate that seven birds, two fish, one mammal, five mollusks, and five reptile species potentially occur or have habitat in or near the project location. Available data indicates that there are no hydric soil associations (i.e., potential wetlands) within the reservoir site.

The NETRWPG does not recommend the designation of the potential Kilgore II reservoir site as a unique reservoir site.

8.11.6 Prairie Creek

As indicated previously, the Prairie Creek Reservoir is included as a recommended project in the Sabine River Authority's Comprehensive Sabine Watershed Management Plan. Development of the project would provide additional water supplies to municipal and industrial water users within the upper portion of the Sabine River Basin, particularly the Longview area. The reservoir site is located approximately 11 miles west of the City of Longview in Gregg and Smith counties. The location of the dam site is immediately upstream of the FM 2207 crossing of Prairie Creek, which is a tributary of the Sabine River. With a conservation pool elevation of 318.0 ft-MSL, the storage capacity and surface area of the reservoir would be 45,164 ac-ft and 2,280 acres, respectively. At the probable maximum flood (PMF) elevation of 339.5 ft-MSL, the reservoir surface area would be 4,282 acres.

Previous studies of the Prairie Creek site envision a compacted earth fill dam, approximately 3,000 feet in length with a maximum height of 87 feet, which corresponds to an elevation of 245.0 ft-MSL. The spillway for the dam would be ogee-shaped with a crest elevation of 300 ft-MSL with two 20-foot by 20-foot tainter gates for controlled floodwater releases. The outlet works would consist of a multilevel opening with a 66-inch diameter conduit through the dam and a stilling basin.

As part of the *Reservoir Site Assessment Study* (Appendix B), *2001 North East Texas Regional Water Plan*, the firm yield of the proposed Prairie Creek Reservoir was re-evaluated using the TWDB Daily Reservoir Analysis Model. This was performed to determine the firm yield of the project with consideration of the environmental pass-through requirements contained in the State Consensus Environmental Guidelines Planning Criteria. Previous studies estimated a firm yield of the project of 19,700 ac-ft/yr. Consideration of the environmental pass-through requirements reduced the estimated yield to 17,215 ac-ft/yr.

The Sabine River Authority has considered the Prairie Creek Reservoir as the first component of a larger project that would be developed in phases. The second phase would include diversion of flows from the Sabine River to the reservoir to develop a firm yield of approximately 29,685 ac-ft/yr and, ultimately, construction of a 90-inch pipeline from the Toledo Bend Reservoir to develop a total firm yield of 115,000 ac-ft/yr. The cost to develop the reservoir as a stand-alone project is estimated to be $126 million, which would provide water at an annualized cost of $453 per ac-ft of firm yield ($1.40 per 1,000 gallons). The diversion of flows from the Sabine River would increase the project development costs to $152.6 million and would reduce the unit cost of water to $318 per ac-ft ($0.99 per 1,000 gallons) of firm yield. The addition of supplies delivered to the Prairie Creek Reservoir from the Toledo Bend Reservoir would provide water supply at a unit cost of $211 per ac-ft of firm yield ($0.65 per 1,000 gallons).

Based on available information, there are no potential ecologically unique streams of high importance, wetland mitigation banks, or conservation easements within or adjacent to the site. There are no USFWS priority designated bottomland hardwood areas located within or adjacent to the proposed Prairie Creek reservoir; however, TPWD has estimated 12 percent of the area is of this habitat type. Analysis also indicates that there are no Superfund sites, municipal solid waste landfill sites, permitted industrial and hazardous waste locations, or air quality monitoring stations located within or adjacent to the reservoir study area. However, state and federal agency listings for threatened, endangered, or rare plant or animal species indicate that seven birds, three fish, two mammals, five mollusks, five reptiles, one amphibian, and one vascular plant species potentially occur or have habitat in or near the project location.

Also, available data indicates that there are hydric soil associations within the reservoir site. The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist.

The NETRWPG supports the proposal of the Sabine River Authority to build Prairie Creek Reservoir, if used in conjunction with a pipeline from Toledo Bend, to supply water to both Region D and Region C.

8.11.7 Waters Bluff

The Waters Bluff reservoir site is located on the main stem of the Sabine River, approximately 3.5 miles upstream of the US 271 crossing and approximately four miles west of the City of Gladewater. The reservoir site lies within portions of Smith, Upshur, and Wood counties. The reservoir would have a conservation storage capacity of 525,163 ac-ft at a conservation pool elevation of 303 ft-MSL and would cover 36,396 surface acres. The maximum flood pool elevation would be 314.7 ft-MSL. The dam for the Waters Bluff Reservoir would be a homogeneous earthen embankment 70 feet high with a crest elevation of 320 ft-MSL and a crest length of 11,000 feet. The spillway would be a concrete gravity ogee with a crest elevation of 276.0 ft-MSL, with eleven 40-foot wide by 28-foot high tainter gates for control.

As reported from previous studies, the estimated firm yield of Waters Bluff Reservoir would be 324,000 ac-ft/yr. Updated estimates of the costs to develop the reservoir are $1042 million, with an annualized unit cost of water of $199 per ac-ft of firm yield ($0.62 per 1,000 gallons). The potential beneficiaries of the project are municipal and industrial water users in the upper portions of the Sabine Basin and/or users outside of the basin. Other potential benefits include recreation, hydroelectric power generation, and flood control.

There are two stream segments in or near the Waters Bluff reservoir site that the TPWD has identified as potential ecologically unique streams. There are also four existing or proposed wetland mitigation banks and two existing conservation easements within or near the reservoir site. The USFWS has also identified areas within or near the site that are classified as having excellent quality bottomlands of high value to waterfowl habitat and good quality bottomlands with moderate waterfowl benefits. In addition, analyses indicate that there are six municipal solid waste landfill sites but no Superfund sites, permitted industrial and hazardous waste locations, or air quality monitoring stations located within or adjacent to the reservoir study area. State and federal agency listings for threatened, endangered, or rare plant or animal species list eight birds, two fish, one mammal, five mollusks, and five reptile species that potentially occur or have habitat in or near the project location. Also, available data indicates that there are hydric soil associations within the reservoir site. The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist.

The NETRWPG does not recommend the designation of the potential Waters Bluff reservoir site as a unique reservoir site. A summary of key characteristics of the seven reservoir sites that were examined in the Sabine River Basin is provided in Table 8.5.

Table 8.5 Potential Reservoir Sites in the Sabine River Basin

Reservoir Site	Conservation Storage (ac-ft)	Surface Area (acres)	Firm Yield (ac-ft/yr)	Total Project Development Cost ($1,000)	Annual Cost Per (ac-ft)
BIG SANDY	69,300	4,400	46,600	$177,956	$237
CARL ESTES	393,000	44,900	95,630	$837,142	$541
CARTHAGE	651,914	41,200	537,000	$1032604	$118
GRAND SALINE	24,980	1,845	1,810	NA	NA
KILGORE II	16,270	817	5,500	NA	NA
PRAIRIE CREEK	45,164	2,280	17,215	$126,042	$453
PRAIRIE CREEK WITH DIVERSION	45,164	2,280	29,685	$152,603	$318
PRAIRIE CREEK WITH PIPELINE	45,164	2,280	115,000	$392,976	$211
WATERS BLUFF	525,163	36,396	324,000	$1,041,900	$199

8.12 Sulphur River Basin

Five reservoir sites in the Sulphur River Basin were examined as part of the *Reservoir Site Assessment Study* (Appendix B), *2001 North East Texas Regional Water Plan*: Marvin Nichols I, Marvin Nichols II, George Parkhouse I, and George Parkhouse II. Each is described below.

As discussed in Chapter 6, Section 6.9, and will be expanded below, the NETRWPG opposes the reservoirs listed below and others similarly situated. The opposition includes the potential impacts of such reservoirs on the environmental flow needs, as well as the impact on agricultural and other natural resources that would result from the creation of the reservoir, the mitigation that would be required for creation of the reservoir, and the impacts on downstream flows to significant bottomland hardwoods and other flood plain forests.

8.12.1 Marvin Nichols I/IA

In the interim since the 2001 plan there have been four identified studies concerning the Marvin Nichols site. The Texas Forest Service produced "The Economic Impact of the Proposed Marvin Nichols I Reservoir to the Northeast Texas Forest Service" in August 2002. In March of 2003, the Sulphur River Basin Authority (SRBA) had prepared "The Economic, Fiscal, and Developmental Impacts of the Proposed Marvin Nichols Reservoir Project." More recently, the Sulphur River Basin Feasibility Study was performed for the SRBA and USACE by Freese and Nichols, Inc. and MTG Engineers and Surveyors (referred to hereafter as the 2014 SRBA Study). As part of this effort, the USACE produced the report Sulphur River Basin – Socio-Economic Assessment. More recently, an updated socio-economic study entitled, *The Economic, Fiscal and Developmental Impacts of the Proposed Marvin Nichols Reservoir* was conducted in April 2020 by Clower & Associates.

Over time, these studies, along with previous efforts, have been presented to the NETRWPG and reviewed (results of the more recent SRBA study were reviewed as information became available). The results of the studies present varying views of effects on the area concerning reservoir development in the Sulphur River Basin.

As noted in the Watershed Overview, SRBA (2014):

> *"The Marvin Nichols project is representative of a more downstream location for new storage within the Sulphur River Basin. At least five locations for this dam have been considered. The Marvin Nichols project has been evaluated as an impoundment at multiple locations on White Oak Creek and multiple locations on the Sulphur River (FNI, 2000). In general, these alternative sites represent an attempt to locate the impoundment so as to minimize conflicts with Priority 1 bottomland hardwood habitats and oilfield activity while maintaining yield. A reservoir at the Marvin Nichols IA site is a recommended strategy for North Texas Municipal Water District, the Upper Trinity Regional Water District, and Tarrant Regional Water District in the 2006 and 2011 Region C Regional Water Plan and an alternative strategy for Dallas Water Utilities and the City of Irving in the 2011 plan."*

The Marvin Nichols I reservoir site is located on the main stem of the Sulphur River at River Mile 114.7. The dam site is located upstream of the confluence of the Sulphur River and White Oak Creek. The reservoir site is located in Red River and Titus Counties, about 120 miles east of the City of Dallas and about 45 miles west of the City of Texarkana. According to the 1997 State Water Plan, the potential beneficiaries of the Marvin Nichols I reservoir include municipal and industrial water users in the vicinity of the project within the Sulphur River Basin, water users in the Cypress Creek Basin, and/or water users in the Dallas-Ft. Worth Metroplex. Other potential benefits include recreation, hydroelectric power generation, and flood control.

With a conservation pool elevation of 312.0 ft-MSL, the conservation storage capacity of the Marvin Nichols I reservoir would be 1,369,717 ac-ft, and the surface area would be 62,128 acres. At the PMF elevation of 319.1 ft-MSL, the reservoir would store 1,864,788 ac-ft and have a surface area of 77,612 acres.

As envisioned in previous studies of the site, the dam for the Marvin Nichols I reservoir would consist of a 25,000-foot-long earthen embankment dike built along the low stream divide between the Sulphur River and the White Oak Bayou. In addition, four dikes would be required at low points along the stream divide varying in length from 2,000 feet to 8,000 feet. The main dam would have a maximum height of 71 feet at the floodplain crossing. The flood spillway crest would be 940 feet long and would include nineteen 40-foot by 40-foot gates at a crest elevation of 285 ft-MSL.

Previous studies of the Marvin Nichols I site have estimated the firm yield of the project to be 624,000 ac-ft/yr. However, additional yield studies were performed as part of the *Reservoir Site Assessment Study* (Appendix B), *2001 North East Texas Regional Water Plan* using the recently completed TCEQ WAM for the Sulphur River Basin and the TWDB Daily Reservoir Analysis Model. Reservoir operations simulations performed with these models and with environmental releases as specified in the Consensus Environmental Guidelines Planning Criteria, indicated a firm yield of 550,842 ac-ft/yr for the Marvin Nichols I reservoir.

The yield for Marvin Nichols I Reservoir differs from the value given in the 2016 Region C report, which is 619,000 ac-ft per year. The difference in yield is the result of different assumptions with regard to the operation of the project:

- The North East Region's yield of 550,842 ac-ft is based on the assumption that Marvin Nichols I will impound only available unallocated flows after satisfying the environmental flow requirements in accordance with the Consensus Water Planning criteria. This assures that Wright Patman Reservoir, with a senior water right downstream of Marvin Nichols I, is full before Marvin Nichols I can impound any water.
- Regions C's yield of 619,100 ac-ft per year is based on an assumption that Marvin Nichols I could impound inflows so long as the ability to divert water from Lake Wright Patman is protected.

The yield simulation previously performed for the NETRWPG for the 2011 Region D Plan involved application of TCEQ's Sulphur River Basin WAM, which considers the seasonal variation of conservation storage in Lake Wright Patman and a daily reservoir operations model used by the TWDB (SIMDLY), which allows passage of environmental flows in accordance with the state's criteria.

The assumption used by Region C would require the negotiation of a written agreement between the operators of Marvin Nichols I and Wright Patman reservoirs (including the City of Texarkana, the water rights holder) before any application can be filed with the TCEQ for water rights for Marvin Nichols I Reservoir. Should that agreement happen in the future, it will enhance the yield of Marvin Nichols I Reservoir.

The estimated cost to develop the Marvin Nichols I reservoir, updated to September 2023 dollars, was $997.1 million. The total annualized cost of the reservoir (alone), including debt service and operations and maintenance costs, was $61.7 million, which resulted in a unit cost of roughly $112 per ac-ft of firm yield ($0.35 per 1,000 gallons).

More recently available information from the SRBA's 2014 Sulphur River Basin Feasibility Study is presented over the course of multiple reports, specifically:

1. Final Watershed Overview Report.
2. Comparative Environmental Assessment Report.
3. Socioeconomic Report.
4. Cost Rollup Report.
5. International Paper Impact Analysis.
6. Hydrologic Yields Report.

Regarding Marvin Nichols IA, per the SRBA Watershed Overview (2014):

> *"The Marvin Nichols IA project would be located on the Sulphur River and Red River and Titus counties approximately halfway between the cities of Clarksville and Mount Pleasant. The top of the conservation pool would be at elevation 328 feet NGVD. At this elevation, the reservoir would have a storage capacity of 1,532,031 acre-feet. At this location, the reservoir would have a total drainage area of 1,889 square miles (of which 479 square miles are above Jim Chapman Lake.)*
>
> *The Marvin Nichols IA project would inundate 66,103 acres…"*

A thorough suite of yield estimates for the Marvin Nichols IA project have been developed over the course of the SRBA (2014) study. Over the course of the analyses presented in the aforementioned reports, yields for various configurations of Marvin Nichols have been developed utilizing a modified version of the TCEQ WAM in which Lake Ralph Hall has been implemented, considering future sedimentation conditions and mitigated sediment conditions, employing alternative periods of record using a USACE model for comparative purposes, and considering alternative implementations of potential environmental flow requirements (i.e., no requirements or with criteria developed utilizing the Lyons method). Resultant firm yields from these analyses range from 193,800 ac-ft/yr to 676,000 ac-ft/yr. The estimated total yield for Marvin Nichols 1A at an elevation of 328.0 feet. National Geodetic Vertical Datum (NGVD) is 590,000 ac-ft/yr, although with environmental flows considered this yield decreases to 571,710 ac-ft/yr.

From the SRBA Cost Rollup Report (2014), comprehensive cost estimates for a suite of alternatives, including various configurations of Marvin Nichols project, have been developed. The methods for evaluating the costs are reportedly consistent with TWDB guidance on Regional Water Planning, which includes consideration of Interest During Construction added to the estimated capital costs for the reservoirs, as well as for the transmission systems (using a 6 percent annual interest rate on total borrowed funds, less a 4 percent rate of return on investment of unspent funds).

From this study, the estimated total capital cost to develop the Marvin Nichols IA reservoir, at elevation 328 ft-MSL., at 2023 dollars, is $1.508 billion. Including transmission, the total capital cost of the project is $6.040 billion. The total annualized cost of the project, during debt service is $373.4 million, and after debt service is $91 million. Resultant unit costs developed for the SRBA study are presented for both with and without environmental flow restrictions (developed from using the Lyons methodology). Without environmental flows, the unit cost during debt service is roughly $633 per ac-ft of firm yield ($1.94 per 1,000 gallons), and after debt service is approximately $153 per ac-ft of firm yield ($0.48 per 1,000 gallons). Unit costs with environmental flow requirements based on the Lyons method in place during debt service is roughly $653 per ac-ft of firm yield ($2.02 per 1,000 gallons). After debt service, unit costs considering environmental flows is approximately $158 per ac-ft of firm yield ($0.49 per 1,000 gallons).

If, along with impacts from meeting environmental flow needs, the contractual relationship between the Metroplex members of the Joint Committee for Program Development (JCPD) and the SRBA is considered, whereby 20 percent of project yields would be dedicated to in-basin needs at no cost to SRBA, the unit costs to the Metroplex JCPD members based on their anticipated portion of the yield vary from those detailed above. During debt service, the unit cost is approximately $816 per ac-ft of firm yield ($2.51 per 1,000 gallons). After debt service, the unit cost is roughly $198 per ac-ft of firm yield ($0.62 per 1,000 gallons). Based on available information, depending upon the configuration of Marvin Nichols under consideration, there do not appear to be potential ecologically unique streams of high importance, wetland mitigation banks, or conservation easements within or adjacent to the sites under consideration. However, two reaches of the Sulphur River within the project boundary have previously been identified by TPWD as significant stream segments based on the presence of unique federal holdings and a USFWS priority 1 bottomland woodland site. Additionally, TPWD has included one of these reaches on a recommended list of ecologically unique stream segments.

A review of available information also indicates that there are no Superfund sites, municipal solid waste landfill sites, permitted industrial and hazardous waste locations, or air quality monitoring stations located within or adjacent to the reservoir study area. However, state and federal agency listings for threatened, endangered, or rare plant or animal species identify eight birds, five fish, one mammal, three mollusks, three reptiles, and one insect that potentially occur or have habitat in or near the project location. The reservoir site is also within and adjacent to the Sulphur River Bottom West site, which is listed by the USFWS as having excellent quality bottomlands of high value to waterfowl. Also, available data indicates that there are hydric soil associations within the reservoir site. The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist.

The SRBA (2014) Comparative Environmental Assessment Report presents the results of a comparative environmental assessment that includes Marvin Nichols IA. This assessment considered potential impacts to land resources, federal and state-listed threatened and endangered species, cultural resources, and water quality.

As detailed in Chapter 6 herein, the Marvin Nichols IA project was determined to have the highest impact on cultural resources and was ranked the second highest overall in terms of environmental impacts when compared to the remaining alternative reservoir sites under consideration in that study.

The NETRWPG does not recommend the designation of the potential Marvin Nichols I or Marvin Nichols IA reservoir sites as a unique reservoir site.

8.12.2 Marvin Nichols II

The Marvin Nichols II reservoir site is located on White Oak Creek, which is a tributary of the Sulphur River located primarily in Titus County. The site is immediately south of the proposed Marvin Nichols I reservoir site described above. Potential beneficiaries of the project include municipal and industrial water users in the vicinity of the project within the Sulphur River Basin, water users in the Cypress Creek Basin, and water users in the Dallas-Ft. Worth Metroplex. Other potential benefits include recreation, hydroelectric power generation, and flood control.

From the 2011 Region D Plan, at an elevation of 312.0 ft-MSL, the reservoir would have conservation storage capacity of 772,000 ac-ft and a surface area of 35,900 acres. The estimated firm yield of the project is 280,100 ac-ft/yr and the cost to develop the reservoir (alone) was determined to be approximately $559.2 million in 2023 dollars.

The SRBA (2014) Sulphur River Basin Feasibility Study has not explicitly evaluated the Marvin Nichols II reservoir site. Rather, this study considered potentially suitable dam locations and configurations further upstream on White Oak Creek. In particular, a site upstream of the City of Talco near the Talco gage was identified as an opportunity for an on-channel reservoir that could be hydraulically connected to the main stem of the Sulphur River, to take advantage of flows from both the White Oak Creek and Sulphur River watersheds.

Based on readily available information, there do not appear to be potential ecologically unique streams of high importance or wetland mitigation banks within or adjacent to the site. There is one conservation easement located within or adjacent to the footprint of the potential Marvin Nichols II reservoir.

A review of available information also indicates that there are no Superfund sites, municipal solid waste landfill sites, permitted industrial and hazardous waste locations, or air quality monitoring stations located within or adjacent to the reservoir study area. However, state and federal agency listings for threatened, endangered, or rare plant or animal species list eight birds, five fish, one mammal, three mollusks, three reptiles, and one insect that potentially occur or have habitat in or near the project location. The reservoir site is also within and adjacent to the Sulphur River Bottom West site, which is listed by the USFWS as having excellent quality bottomlands of high value to waterfowl. Also, available data indicates that there are hydric soil associations within the reservoir site. The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist.

The NETRWPG does not recommend the designation of the potential Marvin Nichols II reservoir site as a unique reservoir site.

8.12.3 George Parkhouse I

The George Parkhouse I reservoir site is located approximately 18 miles northeast of the City of Sulphur Springs, on the South Fork of the Sulphur River, which forms the border between Delta and Hopkins Counties. The dam site would be located at River Mile 3.0 downstream of the existing Cooper Reservoir. Potential beneficiaries of the project include municipal and industrial water users within the Sulphur River Basin and/or water users in the Dallas-Ft. Worth Metroplex. Other potential benefits include recreation, hydroelectric power generation, and flood control.

From the SRBA (2014) Watershed Overview:

> *"The top of the conservation pool would be at elevation 401 feet NGVD. At this elevation, the reservoir would have a storage capacity of 651,712 acre-feet. At this location, the reservoir would have a total drainage area of 654 square miles (of which 479 square miles are above Jim Chapman Lake)."*

The reservoir would inundate 28,362 acres. From the 2011 Region D Plan, the dam would consist of a 20,000-foot-long earthen embankment constructed across the South Sulphur River with an additional half-mile-long earthen dike built across the low stream divide between the North Sulphur River and the South Sulphur River. The dam would have a gated ogee-shaped flood spillway with a crest elevation of 390.0 ft-MSL and four 40-foot gated bays to discharge flood flows.

The estimated firm yield of the Parkhouse I reservoir is 124,300 ac-ft/yr, although with environmental flow needs this yield decreases to 118,707 ac-ft/yr. Costs presented herein are adjusted from the original September 2018 estimates reported by SRBA (2014) to September 2023 costs using the ENR Construction Cost Index. The total capital cost to develop the project, including the dam and spillway, land acquisition, conflict resolution, mitigation, permitting, transmission, and interest during construction, would be $1.85 billion. The project would provide water at a total annual cost, during debt service, of $114.2 million and $28 million after debt service. Resultant unit costs developed for the SRBA study are presented both with and without environmental flow restrictions (developed using the Lyons methodology). Without environmental flows, the unit cost during debt service is roughly $919 per ac-ft of firm yield ($2.83 per 1,000 gallons), and after debt service is approximately $223 per ac-ft of firm yield ($0.69 per 1,000 gallons). Unit costs with environmental flow requirements (based on the Lyons method) during debt service is roughly $962 per ac-ft of firm yield ($2.96 per 1,000 gallons). After debt service, unit costs with environmental flows applied are approximately $233 per ac-ft of firm yield ($0.72 per 1,000 gallons).

If, along with impacts from meeting environmental flow needs, the contractual relationship between the Metroplex members of the JCPD and the SRBA is considered, whereby 20 percent of project yields would be dedicated to in-basin needs at no cost to SRBA, the unit costs to the Metroplex JCPD members based on their anticipated portion of the yield vary from those detailed above. During debt service, the unit cost is approximately $1202 per ac-ft of firm yield ($3.69 per 1,000 gallons). After debt service, the unit cost is roughly $292 per ac-ft of firm yield ($0.91 per 1,000 gallons).

Based on available information, there are no potential ecologically unique streams of high importance, bottomland hardwoods, wetland mitigation banks, or conservation easements within or adjacent to the reservoir site.

Analyses also indicate that there are no Superfund sites, municipal solid waste landfill sites, permitted industrial and hazardous waste locations, or air quality monitoring stations located within or adjacent to the reservoir study area. However, state and federal agency listings for threatened, endangered, or rare plant or animal species list seven birds, four fish, one mammal, one mollusk, and two reptiles that potentially occur or have habitat in or near the project location. Also, available data indicates that there are hydric soil associations within the reservoir site. The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist.

The SRBA (2014) Comparative Environmental Assessment Report presents the results of a comparative environmental assessment that includes Parkhouse I. This assessment considered potential impacts to land resources, federal and state-listed threatened and endangered species, cultural resources, and water quality. The Parkhouse I project was ranked third lowest overall in terms of environmental impacts when compared to the total seven alternative reservoir sites under consideration in that study.

The NETRWPG does not recommend the designation of the potential George Parkhouse I reservoir site as a unique reservoir site.

8.12.4 George Parkhouse II

The George Parkhouse II reservoir site is located on the North Sulphur River at River Mile 5.0. The impoundment is approximately 15 miles southeast of the City of Paris, and would straddle the county line between Delta and Lamar Counties. The Parkhouse II site was recommended for development in the 1997 *State Water Plan*, and was a reservoir site recommended in the 2017 and 2022 *State Water Plans* for designation as unique. Potential beneficiaries of the project include municipal and industrial water users within the Sulphur River Basin and/or water users in the Dallas-Ft. Worth Metroplex. Other potential benefits include recreation, hydroelectric power generation, and flood control. It should be noted that the development of the Marvin Nichols I reservoir would significantly delay or eliminate the need for this reservoir as a supply source for the Dallas-Ft. Worth Metroplex.

Previous studies have investigated a reservoir with a conservation pool elevation of 401.0 ft-MSL, which would have a conservation storage capacity and surface area of 243,600 ac-ft and 12,300 acres, respectively. With a probable maximum flood elevation of 415.7 ft-MSL, the Parkhouse II reservoir would have a surface area of 17,400 acres. The dam would have a gated ogee-shaped flood spillway with a crest elevation of 390.0 ft-MSL. Flood discharges would be through eight 40-foot gated bays.

From the SRBA (2014) Watershed Overview:

> *"The top of the conservation pool would be at elevation 410 feet NGVD. At this elevation, the reservoir would have a storage capacity of 330,871 acre-feet. At this location, the reservoir would have a total drainage area of 421 square miles, of which approximately 101 square miles is above the proposed Lake Ralph Hall. The Parkhouse II project would inundate 15,359 acres."*

Previous studies of the George Parkhouse II reservoir site estimated the firm yield of the project to be 136,700 ac-ft without consideration of potential environmental pass-through requirements. A reevaluation of the project firm yield using the TCEQ WAM for the Sulphur River Basin and the TWDB Daily Reservoir Analysis Model performed for the 2011 Region D Plan indicated a firm yield with environmental releases of 131,850 ac-ft. At a cost of approximately $358.2 million to develop the reservoir, the annualized cost of water from the project would be $168 per ac-ft of firm yield ($0.52 per 1,000 gallons).

From the SRBA (2014) Cost Rollup Report, the estimated total yield of the Parkhouse II reservoir alternative would be 124,200 ac-ft/yr, although with environmental flow needs, this yield decreases to 121,343 ac-ft/yr. The total capital cost to develop the project, including the dam and spillway, land acquisition, conflict resolution, mitigation, permitting, transmission, and interest during construction, would be $1.7 billion. The project would provide water at a total annual cost, during debt service, of $105.3 million and $25.6 million after debt service. Resultant unit costs developed for the SRBA study are presented both with and without environmental flow restrictions (developed using the Lyons methodology). Without environmental flows, the unit cost during debt service is roughly $848 per ac-ft of firm yield ($2.61 per 1,000 gallons), and after debt service is approximately $205 per ac-ft of firm yield ($0.64 per 1,000 gallons). Unit costs with environmental flow requirements (based on the Lyons method) during debt service are roughly $867 per ac-ft of firm yield ($2.67 per 1,000 gallons). After debt service, unit costs with environmental flows applied are approximately $210 per ac-ft of firm yield ($0.65 per 1,000 gallons).

If, along with impacts from meeting environmental flow needs, the contractual relationship between the Metroplex members of the JCPD and the SRBA is considered, whereby 20 percent of project yields would be dedicated to in-basin needs at no cost to SRBA, the unit costs to the Metroplex JCPD members based on their anticipated portion of the yield vary from those detailed above. During debt service, the unit cost is approximately $1084 per ac-ft of firm yield ($3.33 per 1,000 gallons). After debt service, the unit cost is roughly $263 per ac-ft of firm yield ($0.81 per 1,000 gallons).

Based on available information, there do not appear to be major natural resource conflicts at the reservoir site. There are no potential ecologically unique streams of high importance, wetland mitigation banks, priority designated bottomland hardwoods, or conservation easements within or adjacent to the site. A review of available information also indicates that there are no Superfund sites, municipal solid waste landfill sites, permitted industrial and hazardous waste locations, or air quality monitoring stations located within or adjacent to the reservoir study area. However, state and federal agency listings for threatened, endangered, or rare plant or animal species identify seven birds, six fish, one mammal, one insect, and three reptile species that potentially occur or have habitat in or near the project location. Also, available data indicates that there are hydric soil associations within the reservoir site. The number of hydric soil associations does not indicate the number of potential wetlands but rather that a wetland area could occur where these hydric soil associations exist.

The SRBA (2014) Comparative Environmental Assessment Report presents the results of a comparative environmental assessment that includes Parkhouse II. This assessment considered potential impacts to land resources, federal and state-listed threatened and endangered species, cultural resources, and water quality. The Parkhouse II project was ranked second lowest overall in terms of environmental impacts when compared to the total seven alternative reservoir sites under consideration in that study.

The NETRWPG does not recommend the designation of the potential George Parkhouse II reservoir site as a unique reservoir site.

A summary of key characteristics of the four reservoir sites that have been examined in the Sulphur River Basin is provided in Table 8.6.

Table 8.6 Potential Reservoir Sites in the Sulphur River Basin

Reservoir Site	Conservation Storage (ac-ft)	Surface Area (acres)	Firm Yield (ac-ft/yr)	Reservoir Development Cost ($ Millions)	Total Capital Cost ($ Millions)	Unit Cost, with environmental flows ($/ac-ft)	
						During Debt Service	After Debt Service
Marvin Nichols IA	1,532,031	66,103	571,710	$1,508	$6,039.8	816	198
Marvin Nichols II*	772,000	35,900	280,100	$559.2	Not Analyzed	Not Analyzed	Not Analyzed
Parkhouse I	651,712	28,362	118,707	$652	$1,847	1,202	292
Parkhouse II	330,871	15,359	121,343	$531	$1,702	1,084	263

8.13 Recommendations for Unique Reservoir Site Identification, Development and Reservoir Site Preservation

8.13.1 Comments on the Texas Administrative Code With Regard to Reservoir Development

The NETRWPG has previously received comments concerning the protection of natural resources as they relate to the building of new reservoirs in the Sulphur River Basin within the North East Texas region. Rule 358.3 (4) and (9) of the TAC, relating to Guidance Principles, would be violated in regard to the protection of the natural resources should reservoir development take place in the Sulphur River Basin within the North East Texas region. Specifically, the new reservoirs being contemplated in the North East Texas Region within the Sulphur River Basin would not be protective of the agricultural and natural resources in the region. This is germane since the region has more than adequate surface water supply within the basin to meet all of the needs within the Sulphur River Basin in the North East Texas Region as projected for the next 50 years.

It is the position of the NETRWPG that there will be unavoidable impacts on agricultural resources should there be further development of new reservoirs in the Sulphur River Basin within the North East Texas Region. TAC Rule 357.34(d)(3) cited above includes the requirement that the RWPG evaluate all water management strategies to determine the potential of feasibility by including quantitative reporting of several specific factors as follows:

1. The net quantity, reliability, and cost of water delivered and treated for the end user's requirements during drought of record conditions, taking into account and reporting anticipated strategy water losses, incorporating factors used calculating infrastructure debt payments and may include present costs and discounted present value costs. Costs do not include distribution of water within a water-use group (WUG) after treatment.

2. Environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico. Evaluations of effects on environmental flows will include consideration of the Commission's adopted environmental flow standards under 30 TAC Chapter 298 (relating to Environmental Flow Standards for Surface Water). If environmental flow standards have not been established, then environmental information from existing site-specific studies, or in the absence of such information, state environmental planning criteria adopted by the Board for inclusion in the state water plan after coordinating with staff of the Commission and the TPWD to ensure that water management strategies are adjusted to provide for environmental water needs including instream flows and bays and estuaries inflows.
3. Impacts on agricultural resources.

Therefore, the NETRWPG recognizes that there may be the possibility of recommendations from other planning groups that include further development of additional reservoirs in the Sulphur River Basin as a recommended water management strategy or as an alternative strategy. The NETRWPG opposes the development of such reservoirs unless it is demonstrated that there will be no significant adverse impacts on the water, agricultural, and environmental resources within the North East Texas Region and the State.

Furthermore, due to foreseeable detrimental impacts, the NETRWPG asserts strongly that the option of pursuing new major reservoirs in the Sulphur River Basin as a water management strategy or an alternative strategy should be viewed as inconsistent with the protection of natural resources within the region.

8.13.2 Recommendations for Unique Reservoir Site Identification and Preservation

The NETRWPG recommends that any new reservoirs in Region D be pursued only after all other viable alternatives have been exhausted. The NETRWPG further recommends that no reservoir sites in the North East Texas Region be designated as unique reservoir sites in this plan or in the 2027 State Water Plan. At the time of publication of this Regional Water Plan, no agreement has been made between Regions C and D for the purposes of the 2026 Region D Plan.

The NETRWPG recognizes that there are 16 locations in the NETRWPG area where the topography is such that the area could be classified as uniquely suitable as a reservoir site. The NETRWPG recognizes that the waters of the State of Texas belong to the citizens of Texas for their specific use, but it is also recognized that the property rights belong to individuals. Local government should be recognized for the effect that major alterations to the local economy, such as the development of a unique reservoir site, will have on them. To address the issue of unique reservoirs and the accompanying property owners, industry, and local government concerns, the NETRWPG would recommend that the following be instituted when a unique reservoir site is being considered and included in planning studies:

- The required mitigation area is to be acquired from the water planning region requesting the reservoir or other such region willing to provide the mitigation area.
- At the identification of a unique reservoir site as a water planning strategy, the property owners in the area of the unique reservoir site and the accompanying mitigation site or sites must be notified by the requesting entity of such intent.

- At the initiation of the appropriate studies for the identified unique reservoir site, a mitigation site study shall be completed as soon as possible to identify and preliminarily map the mitigation area.
- Property owners should be afforded compensation based on replacement value to the maximum allowed by law in addition to a fair market value approach.
- Property owners whose properties are directly inundated by a reservoir constructed for the purpose of interbasin transfers shall have the right to receive royalties for the water stored over the property taken as an ongoing compensation.
- Local government and other taxing entities shall have the right to direct payments in lieu of taxation for property lost and per ac-ft for waters stored in the reservoirs constructed in the NETRWPG area for transfer to other basins to replace the taxation lost due to property removed directly from the tax rolls. Direct payment in lieu of taxation may differ on stored water and transferred water.
- Local government, school districts, and industry affected directly by the development of a reservoir proposed for interbasin transfer shall be aided and supported by the production of planning and remuneration for direct reduction of economic activity, resources, and jobs.
- The NETRWPG area will retain a portion of the impounded water of the developed reservoir for future use by the region.

The development of reservoirs in the NETRWPG area as a future water source for other portions of the state would require interbasin transfer authorizations from the TCEQ. Among its many provisions, State Bill (SB) 1 includes provisions (TWC, Section 11.085) requiring the TCEQ to weigh the benefits of a proposed new interbasin transfer to the receiving basin against the detriments to the basin supplying the water. SB 1 also established the following criteria to be used by the TCEQ in its evaluation of proposed interbasin transfers:

- The need for the water in the basin of origin and in the proposed receiving basin based on the period for which the water supply is requested, but not to exceed 50 years;
- Factors identified in the applicable approved regional water plans which address the following:
    - » the availability of feasible and practicable alternative supplies in the receiving basin to the water proposed for transfer;
    - » the amount and purposes of use in the receiving basin for which water is needed;
    - » proposed methods and efforts by the receiving basin to avoid waste and implement water conservation and drought contingency measures;
    - » proposed methods and efforts by the receiving basin to put the water proposed for transfer to beneficial use;
    - » the projected economic impact that is reasonably expected to occur in each basin as a result of the transfer; and
    - » the projected impacts of the proposed transfer that are reasonably expected to occur on existing water rights, instream uses, water quality, aquatic and riparian habitat, and bays and estuaries that must be assessed under Sections 11.147, 11.150, and 11.152 of [the TWC] in each basin. If the water sought to be transferred is currently authorized to be used under an existing permit, certified filing, or certificate of adjudication, such impacts shall only be considered in relation to that portion of the permit, certified filing, or certificate of adjudication proposed for transfer and shall be based on historical uses of the permit, certified filing, or certificate of adjudication for which amendment is sought;

- Proposed mitigation or compensation, if any, to the basin of origin by the applicant;
- The continued need to use the water for the purposes authorized under the existing permit, certified filing, or certificate of adjudication, if an amendment to an existing water right is sought; and
- The information required to be submitted by the applicant.

The NETRWPG supports the full application of the criteria for authorization of interbasin transfers contained in current state law. With regard to compensation to the basin of origin, the NETRWPG recommends that a portion of the firm yield of projects developed in the NETRWPG basins for interbasin transfer be reserved for future use within the basin of origin. The specific terms of such compensation, along with other issues associated with development of the project (e.g., financing, operation of the reservoir, etc.), should be addressed by the appropriate representatives of the authority within the basin of origin in coordination with the water districts and the entities in receiving regions and within the North East Texas Region that are seeking the additional water supply.

The NETRWPG also endorses the recommendation contained in the adopted *Comprehensive Sabine Watershed Management Plan* that the Sabine River Authority (SRA) develop the Prairie Creek Reservoir. Located centrally in the upper portion of the Sabine Basin, the proposed reservoir would enable the SRA to supply projected future manufacturing needs in Harrison County. As previously noted, the Prairie Creek Reservoir and Pipeline Project is not being pursued by the Sabine River Authority at this time due to the conservation easement limitation on the Waters Bluff reservoir site. If the conservation easement were removed, the Water Bluff Reservoir would become the Sabine River Authority’s top priority project to meet projected water needs in the upper Sabine River Basin.

The NETRWPG also has definite concerns about local property owners who would be directly impacted by reservoir construction. A particular concern is that landowners be compensated fairly for the value of any land acquired for reservoir development.

8.13.3 Environmental Protection Agency and Corps of Engineers

In March of 2008, the EPA and the COE *announced innovative new standards to promote no net loss of wetlands by improving wetland restoration and protection policies, increasing the effective use of wetland mitigation banks, and strengthening the requirements for the use of in-lieu fee mitigation. The new standards clearly affirm the requirement to adhere to the “mitigation sequence’ of “avoid, minimize, and compensate.”* The NETRWPG recommends that the Wetlands Compensatory Mitigation Rule be closely followed to minimize any impact on the region through the consideration of reservoirs and the mitigation thereof. The group strongly supports the requirement of the mitigation sequence of “avoid, minimize, and compensate” should any new reservoirs in Region D be pursued.

8.13.4 Environmental Flows

It is the position of the NETRWPG that there be no development of new reservoirs in the Black Cypress portion of the Cypress Creek Basin or the entire Sulphur River Basin within Region D, nor transfer of water out of these basins for that part that is within Region D until the flow needs for a sound ecological environment are defined for these basins through the process established in Senate Bill 3, 2007 Regular Session of the Texas Legislature. Those flow needs are defined as the low, pulse, and flood flows.

No additional development should take place until the State has identified the environmental flows necessary to maintain the Black Cypress and Sulphur Rivers and their tributaries and established standards for the environmental flows for these basins.

The NETRWPG recognizes that other RWPGs may include recommendations for new reservoirs in the Sulphur River basins, or for the transfer of water out of these basins to basins in other regions, as part of their recommended water management strategies or as alternate strategies. It is the position of the NETRWPG that unless such proposed reservoirs or transfers include explicit recognition that the needs for environmental flows in the North East Texas Region must be satisfied first consistent with Senate Bill 3, that these strategies are inconsistent with the legislative mandate established by Senate Bill 3 and are inadequate in addressing the required quantitative reporting of environmental factors including effects on environmental water needs, such as required in TAC 357.34(d)(3).

Development of new reservoirs prior to determination of the water needs for environmental flows in the Sulphur River Basin would be premature. It is the position of the NETRWPG that proposed reservoirs or transfers need to be consistent with the protection of significant agricultural and natural resources of Region D and the State. The impacts from such projects' effects on environmental flows could further affect downstream operations, such as those in and downstream of Wright Patman Lake.

8.14 Legislative Recommendations

TWDB rules for the 2026 regional water planning activities (31 TAC Chapter 357.43(a), (d), (e), and (f) also provide that:

> *(a) The RWPs shall contain any regulatory, administrative, or legislative recommendations developed by the RWPGs.*
>
> *(d) Any other recommendations that the RWPG believes are needed and desirable to achieve the stated goals of state and regional water planning including to facilitate the orderly development, management, and conservation of water resources and prepare for and respond to drought conditions. This may include recommendations that the RWPG believes would improve the state and regional water planning process.*
>
> *(e) RWPGs may develop information as to the potential impacts of any proposed changes in law prior to or after changes are enacted.*
>
> *(f) RWPGs should consider making legislative recommendations to facilitate more voluntary water transfers in the region.*

The approved scope of work for the development of the 2026 Region D Plan includes development of legislative recommendations for ecologically unique stream segments, ecologically unique reservoir sites, and general recommendations to the state legislature on water planning activities, as well as issues in the North East Texas Region.

Throughout the 2026 planning process, the one major policy issue that remained dominant during the meetings of the NETRWPG and received the most comment from the public during the public comment portion of the regular meetings was the designation of the Marvin Nichols reservoir site in the Sulphur River Basin as a water management strategy for providing water outside the Region. Issues that remained from the 2011, 2016, and 2021 Region D Plans are future interbasin transfers from the North East Texas Region; conversion from groundwater to surface water supplies; various regulatory policies of the TCEQ; and improvements to the regional water supply planning process. Each of these issues is briefly discussed in the section below. Also presented are the recommendations adopted by the NETRWPG on each issue.

8.14.1 Recommendation: Marvin Nichols Reservoir Sites

The Marvin Nichols Reservoir Sites (including but not limited to I, IA, and II) in the Sulphur River Basin as designated in the 2001 plan has remained of great concern in the 2026 Plan preparation. In December 2002, the NETRWPG amended the 2001 plan to change the designation of the sites from proposed sites to potential sites, but the issue has remained at each of the subsequent planning meetings.

In May 2005, the NETRWPG voted to completely remove the Marvin Nichols I site from the Region D Water Plan. The 2006 and 2011, Region D Plans state that the Marvin Nichols I reservoir should not be included in any regional water plan as a water management strategy and not be included in the State Water Plan as a water management strategy. The NETRWPG stated that the Marvin Nichols I Reservoir was not consistent with protecting the timber, agricultural, environmental, and other natural resources, as well as third parties in the Region D area. Among the specific issues are basic rights of the property owners and the local governmental entities.

Based on the reasons set forth in Section 6.9 of this regional plan, it has been the position of the NETRWPG that Marvin Nichols Reservoir should not be included in the 2027 State Water Plan as a water management strategy. Region D continues to oppose Marvin Nichols Reservoir but is willing to work with other regions to obtain water supplies from the Sulphur River Basin that do not involve new reservoir construction.

Subject to the comments in Chapter 6, the following recommendations should apply to all reservoirs considered in NETRWPG area:

- All other alternatives such as conservation, alternate available water supply sources and water resources in existing reservoirs must be exhausted prior to consideration of new reservoir development.
- New mitigation rules must be considered, such as requiring the mitigation area to be acquired from the basin or region requesting the new reservoir. It is believed to be too harsh a requirement to take property from a basin for a reservoir and then acquire more property from the same basin to mitigate the property taken for the new reservoir, especially at a requirement of 2 to 10 times the reservoir property.
- Property owners must be afforded more rights when confronted with acquisition of their property. These rights should include, but not be limited to, proper notification of the consideration of acquisition in a timely manner; extent of considered acquisition; the maximum compensation possible, including compensation based on replacement value; royalties for water stored above acquired properties as compensation for yielding ongoing earnings potential; and the additional rights for use of mitigation lands.

- Local governmental taxing agencies, including school districts, should receive direct payments in lieu of taxation for waters stored in the NETRWPG area reservoirs for transfer to other regions. This is considered partial replacement value for lost revenue for the local agencies.
- Local government, school districts, and economic areas affected directly by the consideration of development of a reservoir site shall receive assistance for the recapture of lost resources, jobs, or income.
- The NETRWPG area will retain a portion of the impounded water of the developed reservoir for future use by the region.

Concerning the potential Marvin Nichols reservoir sites (including but not limited to I, IA, and II) the NETRWPG does not recommend any of the potential reservoir sites for designation as a Unique Reservoir Site. Also, the potential Marvin Nichols reservoir site as described in the Reservoir Site Protection Study, TWDB Report 370, published July 2008, is not recommended by the NETRWPG for designation as a unique Reservoir Site.

8.14.2 Recommendation: The Growth of Giant Salvinia

The NETRWPG received a report from Lee Thomas, Northeast Municipal Water District, in October of 2009, concerning the presence of Giant Salvinia within the NETRWP Area.

Giant Salvinia is an invasive floating aquatic weed and presents a significant threat to the state resources because of its severe impacts on freshwater ecosystems. It adversely affects the biodiversity and functioning of wetlands and riparian ecosystems, water quality, water storage and distribution infrastructure, recreation, and amenity values. It has often been described as one of the "world's worst weeds." Production losses combined with the control and management costs it has incurred annually reach a multi-billion-dollar figure worldwide. The environmental costs will never be fully known but is well in excess of the management costs in dollar terms.

Specifically, Giant Salvinia is a free-floating, sterile aquatic fern that reproduces by vegetative growth and fragmentation. Under normal conditions, up to three lateral buds may develop on each node. Salvinia typically passes through three vegetative growth forms starting with the primary juvenile or invasive form, followed by the secondary, then tertiary forms. As growth progresses through each phase, the leaves become larger, begin to fold upwards, and the plants become more compact. While the primary phase is easily distinguished from the tertiary, there are many factors that can affect the development of Giant Salvinia. In a rapidly expanding population, it is quite easy to find all three forms present. Under ideal growth conditions, it has been reported that Giant Salvinia can achieve extraordinary growth rates, doubling its biomass in as little as two days.

8.14.2.1 Background on Giant Salvinia

The NETRWPG was informed of the presence of Giant Salvinia (*Salvinia molesta)* within the region by the October report. In that report, it was stated that the presence of Giant Salvinia in the region is a relatively recent development, but it has been noted to be expanding specifically in the Cypress Creek Basin. Giant Salvinia is a noxious, invasive aquatic plant that has significant adverse effects on affected wetlands and related environments and is an increasing threat to water quality.

Giant Salvinia has been found to be present in both Louisiana and Texas. In Texas, it is present in Caddo Lake in the Cypress Creek Basin, which is in the eastern most portion of the North East Texas Regional Water Planning area. There are significant control measures underway in relation to Giant Salvinia infestations in Caddo Lake.

The impacts of Giant Salvinia are many and varied, but essentially it reduces aquatic biodiversity by removing light from the water body. The removal of light kills all submerged plants and eventually their associated fauna below the floating infestation.

To maintain the health of our waterways by limiting the impact and restricting the spread of Giant Salvinia, community understanding about the dangers of Giant Salvinia must be raised in order to mitigate existing conditions and prevent further impact, introduction, and spread to surrounding aquatic habitats. Environmental impacts such as increased runoff, sedimentation, and leaching of fertilizers can dramatically increase the establishment and spread of aquatic weed species. The possession of all species of the genus *Salvinia* is prohibited under Texas State law. Despite this law, the transportation of Giant Salvinia from one water body to another continues.

Control of Giant Salvinia is very difficult, especially in high-value wetlands, which may contain endangered species. While integrated use of biological control and herbicides is successfully used in some locations, there are fewer effective options in riverine and wetland habitats. Most efforts, therefore, involve methods that are time-consuming, intensive, and expensive.

8.14.2.2 Environmental, Social and Economic Impacts of Giant Salvinia

Public safety and health are endangered by the presence of Giant Salvinia, as it is known to encourage breeding of disease-carrying pests by providing a perfect habitat for larval development; these include mosquito vectors of malaria and West Nile virus. The development of thick floating mats can provide a dangerous platform for children and animals. Animals frequently mistake the dense carpets of Giant Salvinia for firm ground and fall into the water body underneath.

Giant Salvinia greatly reduces the aesthetic value of water bodies by an accumulation of litter, water stagnation, and development of foul odors. Increased numbers of mosquitoes and midges, aside from any public health issue, can severely reduce visitor numbers and length of stay at aquatic venues.

Giant Salvinia disrupts use of waterways for recreation, boating, fishing, and swimming. Heavy infestations prevent access by boats and recreational fishing is impeded. Swimming is dangerous, if not impossible, in dense infestations.

The presence of Giant Salvinia impacts water storage facilities and distribution infrastructure. These facilities have been adversely affected through the blocking of irrigation channels and pump intakes. Blockage of channels and pumps can increase pumping times and costs and can lead to expensive repairs or significantly reducing the time between planned maintenance events. By accelerating the amount of water removed from storage through plant transpiration, the presence of Giant Salvinia can have a significant effect on water quantity.

Giant Salvinia modifies the environment by shading out submerged aquatic plants and lowering oxygen levels, causing animal deaths, some of which may be endangered species. Dense infestations could eventually kill most plant life normally found below water level, and much aquatic life will either die out or relocate. This loss of aquatic biodiversity could be devastating to the environmentally unique areas.

General water quality is also degraded through decomposing plant material and dramatically increasing water loss through transpiration. Giant Salvinia has negatively impacted at least one Ramsar wetland (Caddo Lake), in addition to 13 major reservoirs in Texas.

The direct costs of control of the menace and the associated management activities are affecting many governmental, as well as private budgets. Chemical and mechanical costs incurred by local, state, and federal government agencies, along with private control programs are likely to be in excess of $301,825 per year per water body. Some government authorities keep breeding tanks of the leaf-eating weevil called Salvinia weevil (Cyrtobagous salviniae) to assist in dealing with Giant Salvinia infestations in their region. This may help reduce the long-term cost of controlling Giant Salvinia, but colonies of the weevil have yet to be established in the North East Texas Water Planning Region due to the colder climate.

The education and outreach to the public is an ongoing effort. It is important to educate the public of the threat Giant Salvinia on the water resources of the State and how to identify Giant Salvinia. Hopefully, the public can lower the rate of spread of infestation and will report possible new infestations and assist with methods of mitigation. This is an area where efforts need to be extended by government and industry in the State.

8.14.2.3 Local, State, and Federal Government Efforts

The NETRWPG recommends that available State funds be dedicated to the control of Giant Salvinia and that governmental sources provide additional resources when available, such as enactment of complementary legislation to support control efforts and prevent distribution of Giant Salvinia. The Texas Legislature is also recommended to approve legislation that will assist local and state officials in controlling the spread and elimination of existing infestations of the plant.

It is further recommended by the NETRWPG that the local and state governments adopt the following:

- Continue to research and develop efficient, effective, and appropriate control techniques.
- Provide extension and education services to urban and industry stakeholders.
- Support enforcement of legislation and control measures.
- Ensure that Giant Salvinia is identified in local, regional, and State level pest management plans.
- Coordinate with landholder, community, and industry interest groups to cooperatively manage and control Giant Salvinia infestations.
- Research and develop best management practices.
- Monitor water pollution.
- Periodically inspect all water bodies for Giant Salvinia.
- Promote reporting of new Giant Salvinia infestations.

The NETRWPG also recommends that the appropriate State and Federal governmental departments adopt the following actions:

- Develop awareness campaigns to discourage the transportation and/or possession of Giant Salvinia.
- Eradicate infestations where feasible, and ensure Giant Salvinia control is undertaken on all federally managed land.

8.14.3 Recommendation: Toledo Bend Reservoir and Pipeline

At the previous request of the Sabine River Authority, the NETRWPG recommends that the Toledo Bend Reservoir be designated a supply strategy for meeting the upper Sabine Basin needs within the NETRWPG area and a supply option for Region C. This reservoir, along with the proposed pipeline from Toledo Bend to the Prairie Creek Reservoir, will eventually be used as a supply source for the upper Sabine Basin.

8.14.4 Recommendation: Concerning Oil and Gas Wells

The NETRWPG recommends that the Texas Railroad Commission review the practices and regulations concerning the protection of the fresh water supply located in the aquifers that supply much of East Texas with fresh water as to the regulation of the drilling, maintaining, and plugging of oil or gas wells with regards to public fresh water supply wells.

In a report presented December 9, 2004, by Mr. Tommy Konezak, Kilgore, Texas, and summarized here, the NETRWPG heard that approximately 40,000 wells have been drilled in the East Texas Field since it opened. Since these production wells penetrate some of the essential aquifers that supply much of the east Texas fresh water, there is adequate opportunity for contamination of the fresh water supply. Current regulations require public water supply wells to have a 150-foot sanitary easement in relation to a petroleum well, but there is no similar requirement for the drilling of an oil or gas well as regards to public water supply wells. The initial drilling of a petroleum well allows for the placement of 100 feet of surface pipe on a well, even though the aquifer may have 800 feet of formation. The plugging of wells termed dry holes has not kept up with the times, and the existing regulations should be enforced strictly.

8.14.5 Recommendation: Concerning Mitigation

The NETRWPG recommends that any planning group or entity proposing a new reservoir or any other water management strategy should address the subject of mitigation in conjunction with any and all feasibility studies. As evidenced in Section 6.9 of this plan, a study on possible mitigation effects should be undertaken and completed in conjunction with any and all feasibility studies. Information should include estimates of mitigation, predication ratios, and other information useful to landowners potentially affected by mitigation requirements. Also, any new reservoir proposed by a planning group must be accompanied by a map of the proposed reservoir and a map of the land proposed to be mitigated, including proposed acreage.

The NETRWPG recognizes that the rules concerning mitigation and the method of accomplishing mitigation have evolved. Some suggested references for updated mitigation rules and information are the *National Wetlands Mitigation Action Plan* (https://www.epa.gov/cwa-404/national-wetlands-mitigation-action-plan), the EPA *Mitigation Banks under CWA Section 404* (https://www.epa.gov/cwa-404/mitigation-banks-under-cwa-section-404), the EPA *Background about Compensatory Mitigation Requirements under CWA Section 404* (https://www.epa.gov/cwa-404/background-about-compensatory-mitigation-requirements-under-cwa-section-404) and the *Corps Regulatory Program* (https://www.usace.army.mil/missions/civil-works/regulatory-program-and-permits/). The following information was derived in part from these references.

The preference for Mitigation Banking was first conceived in 1983 when the USFWS supported their establishment. This program was well positioned to provide easier monitoring, long-term stewardship, and unambiguous transfer of liability for success from the permittee to the banker. The EPA in the *Mitigation Banks under CWA Section 404* has stated that the advantages of the mitigation-banking program are to:

- Reduce uncertainty over whether the compensatory mitigation will be successful in offsetting project impacts.
- Assemble and apply extensive financial resources, planning, and scientific expertise not always available to many permittee-responsible compensatory mitigation proposals.
- Reduce processing times and provide more cost-effective compensatory mitigation opportunities.
- Enable the efficient use of limited agency resources in the review and compliance monitoring of compensatory mitigation projects because of consolidation.

The EPA and the USACE announced in March of 2008 new standards to promote the "no net loss of wetlands" by improving wetland restoration and protection policies, increasing the effective use of wetland mitigation banks, and strengthening the requirements for the use of in-lieu fee mitigation. These standards clearly affirm the requirement to adhere to the "mitigation sequence" of "avoid, minimize, and compensate." The permittee must first avoid and minimize the impact on the wetland and then compensate for unavoidable impacts. The term here, "to compensate," is specifically directed at the wetland or other aquatic feature being impacted.

A mitigation bank may be created when a government agency, private corporation, non-profit organization, or other entity undertakes the prescribed activities required under a formal agreement with a regulatory agency. The value assigned to a mitigation bank is through "compensatory mitigation credits." The bank's instrument identifies the number of credits available for sale and requires the use of ecological assessment techniques to certify that those credits provide the required ecological functions. The Compensatory Mitigation Rule identifies and clarifies the consideration of watershed scale factors in the selection of appropriate mitigation sites. Mitigation credits utilized by "banks" now allow for a more varied use of options. Mitigation proposals may use on-site (i.e., located close to the impact) and in-kind (i.e., replacement of the same ecological type as the impacted resource). In addition, the rule clarifies the consideration of watershed-scale factors in the selection of appropriate mitigation sites. This clarification may increase the practical viability of mitigation proposals involving off-site or out-of-kind replacement with the regard to use of "compensatory mitigation credits." These replacement processes will still provide appropriate resource replacement in ways that are beneficial to the watershed. The USACE is the final decision maker regarding whether a proposed compensatory mitigation option provides appropriate compensation to receive a permit.

The USACE has adopted a "watershed approach" to compensatory mitigation as stated in the Wa*tershed Approach to Compensatory Mitigation Projects* (https://www.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/1088740/watershed-approach-to-compensatory-mitigation-projects/). A watershed approach is an analytical process for making compensatory mitigation decisions that support sustainability or improvement of aquatic resources in a watershed (33 CFR 332.2). The ultimate goal of a watershed approach is to maintain and improve the quality and quantity of aquatic resources through strategic selection of compensatory mitigation sites.

A watershed approach must be used, to the extent appropriate and practicable, for siting compensatory mitigation projects for Department of the Army permits. The watershed approach applies to all mitigation banks, in-lieu fee programs, and permittee responsible compensatory mitigation. As noted by the USACE, a watershed plan for the purpose of compensatory mitigation is a plan developed by any government or appropriate non-governmental organization for the purpose of aquatic resource restoration, establishment, enhancement, or preservation, in consultation with stakeholders. If there is no appropriate, available watershed plan, there is no requirement to develop a watershed plan, however. Without a watershed plan, other landscape-level information may be used to appropriately select compensatory mitigation sites.

The affected stakeholders include the local sponsors and landowners of the proposed project and the proposed mitigation sites. Project sponsors are tasked with making a reasonable effort, commensurate with the scope and scale of the project and impacts to obtain as much information as possible prior to the design of the compensatory mitigation project.

The design of compensatory mitigation projects does involve a case-by-case decision making process. This is due to the variables that are encountered on the different projects. While decision-making relies on the scientific expertise of wetlands program staff and broad-based stakeholder participation, project sponsors may propose compensatory mitigation based on the watershed approach using information from other sources. Such information includes: current trends in habitat loss or conversion; sources of watershed impairments; cumulative impacts of past development activities; current development trends; presence and habitat requirements of sensitive species; site conditions that favor or hinder the success of compensatory mitigation - including the contribution upland/riparian resources have on aquatic resource functions; requirements of regulatory/nonregulatory programs; chronic environmental problems such as flooding or poor water quality; and comprehensive treatment of all aquatic resource functions.

The NETRWPG further recommends that future mitigation strongly consider utilization of land that may have previously been a functional wetland. An emphasis on restoration of wetland functions can be of more significant benefit than preservation of existing functions, and could be accomplished through the use of marginal farmland or low-lying areas for mitigation purposes.

8.14.6 Recommendation: Future Interbasin Transfers from the North East Texas Region

The North East Texas Region currently supplies surface water to other areas of the state through interbasin transfers, and is identified in the current state water plan as a likely source of additional future water supply for various entities in Region C. Specifically, the 1997 State Water Plan includes recommendations that one or more new reservoirs be developed in the Sulphur River Basin as a source of future water supply for the Dallas-Ft. Worth Metroplex. In addition to potential future water transfers from the North East Texas Region to Region C, there may also be water management strategies for meeting needs within the North East Texas Region that will involve conveyance of supplies from one river basin to another within the region.

Among its many provisions, SB 1 included provisions (TWC, Section 11.085) requiring the TCEQ to weigh the benefits of a proposed new interbasin transfer to the receiving basin against the detriments to the basin supplying the water. However, these provisions relate only to river basins of origin, not to the water planning regions of origin. SB 1 established the following criteria to be used by the TCEQ in its evaluation of proposed interbasin transfers:

- The need for the water in the basin of origin and in the proposed receiving basin based on the period for which the water supply is requested, but not to exceed 50 years.
- Factors identified in the applicable approved regional water plans which address the following:
  - the availability of feasible and practicable alternative supplies in the receiving basin to the water proposed for transfer;
  - the amount and purposes of use in the receiving basin for which water is needed;
  - proposed methods and efforts by the receiving basin to avoid waste and implement water conservation and drought contingency measures;
  - proposed methods and efforts by the receiving basin to put the water proposed for transfer to beneficial use;
  - the projected economic impact that is reasonably expected to occur in each basin as a result of the transfer; and
  - the projected impacts of the proposed transfer that are reasonably expected to occur on existing water rights, instream uses, water quality, aquatic and riparian habitat, and bays and estuaries that must be assessed under TWC Sections 11.147, 11.150, and 11.152 in each basin. If the water sought to be transferred is currently authorized to be used under an existing permit, certified filing, or certificate of adjudication, such impacts shall only be considered in relation to that portion of the permit, certified filing, or certificate of adjudication proposed for transfer and shall be based on historical uses of the permit, certified filing, or certificate of adjudication for which amendment is sought.
- Proposed mitigation or compensation, if any, to the basin of origin by the applicant.
- The continued need to use the water for the purposes authorized under the existing permit, certified filing, or certificate of adjudication if an amendment to an existing water right is sought.
- The information required to be submitted by the applicant.

As an added protection to water rights and water users in a basin of origin, SB 1 also included a requirement that amending an existing water right for a new interbasin transfer would result in the water right acquiring a new priority date. The effect of this requirement is to give all other water rights in the basin of origin a higher priority than the amended right.

Current state law and policy regarding interbasin transfers of surface water provide a useful starting point for inter-regional discussions on the development of a new reservoir in the Sulphur River Basin. Several of the criteria that TCEQ is to consider in its review of interbasin transfers are of particular relevance, including:

- Future needs for water supply in the Sulphur River Basin.
- Economic impacts of future reservoir development and interbasin transfer on the Sulphur River Basin.
- Environmental impacts.
- Mitigation of impacts to Sulphur River Basin and compensation for the interbasin transfer.

8.14.7 Recommendation: Designation of Wholesale Water Providers

The NETRWPG supports the designation of a Wholesale Water Provider (WWP) as described in the TAC §357.10(44) as:

> "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."

The NETRWPG supports the granting of a designation of WWP for an entity within Region D, depending upon a written request from that entity to the NETRWPG that demonstrates said entity has entered, or the RWPG expects or recommends to enter into contracts to sell more than 1,000 ac-ft of water wholesale during the period covered by the plan, including the designation of expected demand and the expected supply. Without a request that includes sufficient identification of expected contractual demand and expected supply, the NETRWPG cannot plan for such an entity. With this noted, Region D expects that the water supply out of Lake Wright Patman will continue to be with Texarkana and Riverbend Water Resources District control as WWPs.

8.14.8 Recommendation: Future Water Needs

A widely held view within the North East Texas Region is that future water needs within the region must be assured before additional interbasin transfers are permitted. Many residents of the region express support for future reservoir development and interbasin transfers provided the region's long-term water demands are met. This sentiment is supported by TWDB rules for regional water planning, which require that the evaluation of interbasin transfer options include consideration of "…the need for water in the basin of origin and in the proposed receiving basin."

The results of the supply and demand assessment for the North East Texas Region indicate that at the regional level, currently legally available surface and groundwater sources are adequate to meet projected needs through 2070. This conclusion also applies for each of the river basins within the region. More importantly, however, the supply and demand assessment indicates that numerous individual water user groups are projected to experience shortages during the planning period, including several in the Sulphur River Basin. However, a majority of these shortages are projected to occur in small communities and rural areas, and it is generally believed that local water supply options will be the preferred strategy for meeting those needs.

The issue of how much water is needed in the North East Texas Region for local use is not as simple as just comparing estimates of existing water supply to projections of future water demand. It should be remembered that the water demand projections adopted by the NETRWPG and the TWDB for development of the regional plan are based largely on an extrapolation of past growth trends. While this is a common and accepted method for forecasting future conditions, there are nonetheless significant uncertainties in the projections.

Shifting demographics and economic and technological change could result in substantially higher demand for water in the North East Texas Region than is currently projected. For example, there is an observed trend over the past decade in many areas of the U.S. of higher population growth in small and medium-sized cities and rural areas.

This has been attributed in part to advancements in telecommunications and the evolving information and service-based economy, which no longer requires a concentration of labor in large cities. Another factor is the aging of the population and the trend toward retirement in rural areas. Also, development of a new reservoir in the Sulphur Basin could, itself, act as a significant catalyst for economic development and growth in the area. In fact, some in the planning region have expressed interest in building reservoirs as part of an overall regional economic development strategy. Results from the SRBA (2014) Sulphur River Basin Feasibility Study suggest a wide variety of potential demands in the region, many significantly higher than those estimates developed for regional planning.

Such factors suggest that the NETRWPG may want to review a possible policy recommendation regarding the definition of "need" in the basin of origin. Some members have also suggested broadening the test of need for interbasin transfers to consideration of projected needs throughout the region of origin, not just the basin of origin.

8.14.9 Recommendation: Economic and Environmental Impacts

The NETRWPG recommends considering potential economic and environmental impacts associated with reservoir development. For example, a significant amount of taxable private property could be removed from local tax rolls, thereby increasing the tax burden on other property owners. The effects of new development are uncertain and likely include both negative and positive consequences.

Reservoir development would also alter the natural environment, perhaps resulting in significant losses of ecologically valuable wetlands and riparian areas. However, state and federal regulations require that such impacts be minimized and mitigated to the extent possible, often through the set-aside and protection of other valuable ecological resources. Some water planners in the region have expressed the concern that mitigation requirements for large reservoirs in one basin might have to be met by restricting uses of riparian areas in other basins, thus limiting future possibilities for development at those sites.

8.14.10 Recommendation: Compensation for Reservoir Development and Interbasin Transfers

Perhaps the most important consideration in inter-regional discussions regarding reservoir development and interbasin transfers is the question of compensation. A common view is that future interbasin transfers should be of direct benefit to both the basin-of-origin and the receiving basin. As noted in the case of future water needs, RWPG members have also expressed strong interest in the distribution of benefits to the region, as well as the basin of origin. In essence, it is a question of equity or fairness. There are several ways that compensation for the transfer of additional water supplies from the Sulphur Basin could be approached. Examples include:

- Retaining ownership of water rights by an entity in the basin of origin with a portion of the water transferred out of basin under long term contract.
- Reserving some portion of the yield of a new reservoir for future use within the basin of origin.
- Setting rates on water sales sufficient to cover both the costs of developing and operating a new reservoir plus additional revenues for other purposes (e.g., supporting the functions of the local project sponsor).
- Direct payments to the governmental entities in the impacted area.

Given the significance and implications of new reservoir development and future interbasin transfers across regional lines, the NETRWPG should consider adopting a policy statement addressing the issue of future water needs within the basins of origin and/or within the North East Texas Region as a whole, economic and environmental impacts of reservoir development, and inter-regional equity and compensation issues. It should be noted the issue of compensation is applicable to all reservoir development whether an interbasin transfer is contemplated or not.

8.14.11 Recommendation: Conversion of Public Water Supplies to Surface Water from Groundwater

Many water suppliers in the North East Texas Region rely solely on local groundwater supplies. Most of these suppliers will likely continue to use groundwater for future needs. However, in some areas, groundwater supplies will not be adequate to meet future needs, and alternative sources of supply need to be considered. Also, in many areas of the region, groundwater supplies are of poor quality and do not meet current state and federal drinking water standards. Where groundwater supplies are available but are of poor quality, one supply strategy could be to develop additional groundwater with advanced treatment. However, because of the cost of treatment, and particularly the cost of disposal of the waste streams, acquisition of surface water supplies may be the most economically viable alternative.

Acquisition of surface water supplies would require that there be both legal and physical access to surface water supplies. Some communities may be in relatively close proximity to an existing surface water source but do not have access to those supplies because the water is fully committed to other users. In other cases, the physical infrastructure required to transport surface water from its source to a user does not exist and may be too costly.

Building regional water supply systems may offer the potential for significant cost savings in acquiring new water supplies and improving the reliability and quality of supplies. For some small water systems, regional approaches to water supply may be the only economically viable approach to conversion from groundwater to surface water. Connecting a number of independent systems can take many forms. It can include the development of regional water supply facilities, the physical consolidation or interconnection of two or more existing water systems, or the management of two or more independent systems by a single entity. Some local water providers and customers may object to loss of direct local control over the system, or they may feel that cost-sharing formulas are unfair. For such reasons, each proposal for a regional system must be considered on a case-by-case basis.

8.14.12 Recommendation: Texas Commission on Environmental Quality Regulations

The TCEQ minimum requirement of 0.6 gallons per minute per connection for public drinking water systems is a significant issue for many water providers in the North East Texas Region. Currently, this requirement is not directly reflected in TWDB rules relating to regional water planning. Many providers indicate that this requirement exceeds the real needs of water users and would require major additions to supplies, storage, and delivery capacities. In areas of marginal groundwater quantity, numerous wells may be required. Well spacing of approximately one-half mile between wells means new well fields would occupy extensive geographic areas.

In order to protect the investment in a new field from the effects of the rule of capture, providers must also purchase enough land to provide a buffer around the targeted supply. These new well fields might have to be located at remote sites, possibly triggering complaints, common in other parts of the state, of one population mining groundwater at the expense of the exporting area. Costs of new pipeline construction are also a major concern.

Methyl Tertiary Butyl Ether (MTBE) and other contaminants pose a significant threat to water supply sources in the North East Texas Region, as has happened in the past at Lake Tawakoni. There are two dimensions to this issue. On the one hand, the NETRWPG has urged TCEQ to phase out the use of MTBE specifically, and both the state and federal regulators across the country are looking for substitute components for reformulated gasoline. Aside from the regulatory imposition of the use of MTBE (and this is only one of many potential contaminants that can find their way into drinking water sources), there is the additional lesson from the Tawakoni experience that those providers with more than one water source were best able to deal with that crisis. It is desirable for water user groups with vulnerable sources to plan on emergency access to backup supplies.

TCEQ regularly updates its list of streams, lakes, and other water bodies that fail to meet the water quality standards established for specific water uses. Many of these water bodies are drinking water sources. This issue differs from the MTBE contamination episode at Lake Tawakoni, which was an accidental spill that was removed from the system in a matter of weeks. That temporary circumstance did not have a long-term effect on overall water quality of the lake. The planning process needs to take account; however, of continuing problems in drinking water sources that may lead to placement on the state list, such as low dissolved oxygen levels, excessive waste loads, mercury, and other contaminants, etc.

The NETRWPG has adopted the following recommendations with regard to TCEQ regulatory policies:

- There should be consistency between TWDB rules for regional water supply planning and TCEQ rules for drinking water systems with regard to minimum requirements for water supply.
- TCEQ should expedite the effort to replace MTBE in reformulated gasoline with additives that do not pose a risk to drinking water supplies.

8.14.13 Recommendation: Improvements to the Regional Water Planning Process

1. The NETRWPG believes that the regional water planning process should provide greater flexibility in development of water demand projections. TWDB rules and guidelines regarding population and water demand projections tend to confine rural and smaller urban areas to past rates of growth without allowing for consideration of alternative scenarios for future growth and economic development initiatives. Because the region has a relatively small population and water demands, the impact of a major new water user, such as a paper mill or a power plant, could dramatically alter the water supply and demand equation at a county or even basin level. There is no mechanism in the current process to provide for these potential increases, until the five-year review period.

   TWDB rules also build into municipal water demand projections conservation assumptions which may be unrealistic. In rural areas that already have low rates of per capita use, there often is an increase in per capita use as development occurs in the area. Assumptions about conservation in these areas that already use far less on a per capita basis than the very large and rapidly growing urban areas could have the effect of limiting future development.

There are more than 40 water user groups in the North East Texas Region with per capita usage levels well below the 115 gallons per capita per day (gpcd) level set as the "floor" by the NETRWPG. Some usage rates are in the 70 to 80 gpcd range, a sharp contrast with large urban areas where 200 gpcd or more is not uncommon. Landscape watering, a prime target for urban water conservation programs, is much less prevalent in rural areas. Further, the housing stock is not undergoing rapid growth or replacement, thus reducing the potential impact of plumbing fixture efficiency standards.

The NETRWPG recommends that the TWDB should revise procedures for calculating water demand reduction projections contained in its conservation scenarios by recognizing a floor for the application of demand reduction for rural and small city areas where the per capita water consumption levels are already very low.

2. Further, for the present round of planning, the TWDB established a floor for water demand at 60 gpcd. In previous rounds, the RWPGs were allowed the capability to establish individual floors, whereby Region D used an amount of 115 gpcd. It appears inappropriate to assume that usage less than 115 gpcd can be sustained over the long-term planning horizon. For those communities using in excess of 250 gallons per day, it should be noted that TWDB planning rules for this current round of planning are enabling 50-year forecasts for systems using four times or more than another community. This rule, as applied, is inherently unfair and eliminates small per capita usage systems from ever having a normal usage, as it basically confines that system to always serving an area that is constraining growth. The growth cannot be higher usage (water usage generally increases as disposable income per household increases) with the TWDB methodology as presently applied, which appears to contradict the inherent conservatism generally embedded within the State water planning process.

   The NETRWPG recommends that the TWDB allow the RWPGs to establish individual regional thresholds of gpcd for a given region, as this provides a more equitable solution for the establishment of future demands in the region.

3. The NETRWPG recommends additional funding is made available to allow for greater scrutiny of rural water supply entities at the sub-WUG level. As in the previous round of regional water planning, such entities are aggregated and represented within the Plan as a "County-Other" WUG. Where necessary, extra effort has been given to identify and evaluate the needs for entities within this "County-Other" category, but with limited funding in the present round as compared to previous rounds the level of overall effort to distinguish these entities has been necessarily diminished. Additional funding affords the capability to more rigorously evaluate these smaller, rural entities, which comprise a significant portion of the Region D population, as was done in previous rounds of regional planning.
4. The passage of House Bill 723 requires the TCEQ to obtain or develop updated WAMs for the Red River Basin and Neches River Basins, within Region D, as well as the Brazos and Rio Grande River Basins.

Given the proximity of these river basins to the remaining river basins within the North East Texas Region, it is not unreasonable to consider similar hydroclimatologies existing in the remaining basins. If a worse drought exists than the current Drought of Record utilized in the official TCEQ WAMs, this poses additional uncertainty with regard to the modeled firm yields and reliabilities upon which water supplies in the North East Texas Region are based. More recently, an updated model has been officially adopted for the Sulphur River Basin, and a similarly updated model is in the process of development for the Cypress Basin.

Thus, the NETRWPG recommends that the legislature initiate a process through TCEQ to appropriately update the Sabine WAM in a manner consistent with these WAMs' original development, to reflect more recent information on the hydroclimatology of the river basins in the North East Texas Region and provide additional certainty to resultant calculations of firm supplies in the Region.

5. It is recommended that the groundwater availability determination of the NETRWPG, for the purposes of the 2026 Region D Water Plan, be incorporated into the determination of Desired Future Conditions (DFC) for Groundwater Management Area (GMA) 8 and GMA 11. Model results developed by the TWDB, as well as the local hydrogeological assessment performed by the NETRWPG, contains relevant information of potential utility to the ongoing DFC process. Consideration of this information could improve and enhance the efficacy of the regional planning process.
6. It is recommended that the Joint Planning Process representing the coordination between GMA 8 and 11 and the NETRWPG incorporate the information regarding groundwater availabilities (as well as amounts identified by the NETRWPG) as appropriate to make adjustments to better address the identified limitations in the MAG amounts relating to actual and planned legal pumping activities. Such coordination could further consider the protection of springs and groundwater surface water interaction.
7. It is recommended that the TWDB consider revising its analytic approach to identifying allowable groundwater availabilities to more adequately address the legal capabilities of WUGs currently using or planning to use groundwater as a WMS within Region D, to better align with the intent of the aforementioned SB 1101.

8.14.14 Recommendation: Wright Patman Lake/Reservoir

The NETRWPG recommends that before any new reservoirs are planned in the North East Texas Water Planning Area, the alternative of raising the level of the Wright Patman Lake/Reservoir be considered.

8.14.15 Recommendation: Standardize Statistics Used For Conservation Assessments

The NETRWPG recommends that the Texas Legislature standardize the method used to derive the statistic known as "gpcd," and also known as "municipal per capita usage." The TWDB previously funded the Statewide Water Conservation Quantification Project (Averitt & Associates, 2017).

This research project observed the difficulty for utilities to identify the gpcd used for regional planning purposes, which is defined as the annual volume of water pumped, diverted, or purchased minus the volume exported (sold) to other water systems or large industrial facilities divided by the permanent resident population of the municipal water user group in the regional water planning process divided by 365. However, utilities are noted to use a different formula for deriving gpcd, as defined in the TWDB water conservation plan annual report as the Total Gallons in System divided by the Permanent Population divided by 365.

While the move to utility-based planning for the previous round of regional water planning was a positive move towards more consistency, the uncertainties regarding the methods used to define gpcd remain. The justification for this recommendation is demonstrated by the need to have a successful conservation program in areas that are projected to need water management strategies. The NETRWPG supports conservation as a water management strategy for any entity that has a gpcd ratio greater than the goal of 140 gpcd. Assessing the progress of communities engaged in conservation will be more reliable with a standardized method for comparison.

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CHAPTER 9 IMPLEMENTATION AND COMPARISON TO THE PREVIOUS REGIONAL WATER PLAN

9.1 Introduction

Chapter 9 addresses the statutory requirements outlined in SB 660 (82nd Legislative Session) and the planning rules under 31 TAC §357.45(a), which mandate the evaluation of the implementation status of Water Management Strategies (WMSs) and projects recommended in the 2021 Region D Water Plan. This assessment is based on data provided by Regional Water Planning Groups (RWPGs) through DB27, and supplementary information collected via TWDB-provided forms. Key metrics, including project initiation dates, implementation progress, and expenditure to date, are analyzed to identify challenges and impediments to development. Additionally, this chapter offers a comparative analysis of the 2021 and 2026 Plans, emphasizing improvements in the planning process and examining efforts to enhance regional collaboration among Water User Groups (WUGs) to achieve shared benefits and economies of scale.

9.2 Implementation of Previous Regional Water Plan

To evaluate the level of implementation and identify impediments to the development of WMSs recommended in the 2021 Plan—critical factors affecting progress in meeting projected water-supply needs—the NETRWPG conducted a comprehensive survey. In addition to the survey, several supplementary methods were employed to identify projects that may have been implemented. These methods included:

- Assessing the scope of work for potentially infeasible WMSs.
- Monitoring changes since the adoption of the previous plan.
- Reviewing funding records from the Texas Water Development Board (TWDB).
- Analyzing conservation implementation reports submitted to the TWDB.

The findings from the survey are detailed in Appendix C9-1, providing a structured overview of implementation progress and associated challenges.

9.3 RWPA's Progress In Achieving Economies of Scale

In accordance with statutory requirements established by HB 807 (86th Legislative Session) and the associated planning rules (31 TAC §357.45(b)), regional water plans are required to assess efforts to promote cooperation among WUGs to achieve economies of scale and encourage WMSs that benefit the region as a whole. This regionalization assessment must include:

- The number of recommended WMSs in the previous and current RWPs that serve more than one WUG.
- The number of recommended WMSs in the previous RWP that serve multiple WUGs and have been implemented since that plan.
- A description of efforts by the RWPG to promote WMSs and WMSPs that serve multiple WUGs and provide regional benefits.

According to data provided by the Texas Water Development Board (TWDB), there are significant number of WMSs in the previous and current RWPs that serve more than one WUG. The NETRWPG actively recognizes and encourages coordination among WUGs to develop shared water management strategies where appropriate. This approach is highly valued by the planning group, as it supports key objectives, including:

- Ensuring water solutions are practical, culturally relevant, and socially appropriate.
- Tailoring strategies to address the unique resources and challenges of each community.
- Fostering community participation to instill a sense of ownership and accountability for water resources.
- Promoting knowledge transfer to empower local communities as stewards of their water resources.

The NETRWPG remains committed to exploring opportunities for collaborative water management strategies in this and future regional water plans, ensuring the continued advancement of regional cooperation and shared benefits.

9.4 Comparison To Previous Plan

This section offers a comparative analysis of projected water demands, supplies, needs, and Water Management Strategies (WMSs) between the 2021 and 2026 Plans. Each regional water planning cycle updates population and water demand projections to incorporate the most recent census data or enhanced estimates from the Texas State Demographer.

Changes in per capita water use reflect shifting municipal water use patterns, driven by water conservation initiatives, drought response measures, and development trends. County-aggregated water demands for sectors such as irrigation and steam-electric power are similarly revised, based on updated estimates from the Texas Water Development Board (TWDB). Groundwater supply projections can fluctuate due to adjustments in Modeled Available Groundwater (MAG) determinations, which are adopted through the Groundwater Management Area process. Surface water supply projections also evolve as the WAMs are updated by the Texas Commission on Environmental Quality (TCEQ), reservoir sedimentation forecasts are revised, and the TWDB alters water availability determination requirements. These updates collectively impact the availability of water supplies for both current uses and future WMSs, leading to the observed differences between the 2021 and 2026 Plans.

9.4.1 Changes to WUGs

The 2021 and 2026 Region D Regional Water Plans exhibit notable differences. These variations stem from changes in Water User Groups (WUGs), alongside shifts in population growth, water demand, and supply availability. As a result, the assessment of water needs across the region differs significantly between the two plans.

31 TAC §357.10(41) defines WUGS as follows

- Adopts a utility-based planning approach for municipal WUGs.
- Establishes a new minimum threshold of 100 acre-feet per year provided by the utility.
- Requires privately-owned utilities to supply an average of 100 acre-feet per year across all their systems.
- Revises the definition of "County-Other" for consistency.

Table 9.1 outlines the new WUGs added to the 2026 plan in comparison to the 2021 plan. Notably, no additional WWPs have been included in the 2026 plan. And one previously existing WUGs—Scottsville—has been removed from the 2026 plan, as this entity has been merged into another WUG.

Table 9.1 New WUGs in the 2026 Plan

Entity	County
Avinger	Marion
Elysian Fields WSC	Harrison
Como	Hopkins
Cypress Valley WSC	Harrison
Talco	Red River

9.4.2 Water Demand Projections

Overall, water demand projections for the planning area are greater in the 2026 Plan than in the 2021 Plan, as illustrated in Figure 9.1, with the exception of the 2030 decade. Municipal water demand projections are higher in the 2026 Plan for each decade, increasing to 176,095 acre-feet per year by the 2080 decade. Non-municipal demands in the 2026 Plan, however, are significantly less than projections in the 2021 Plan for each decade, reaching only 254,583 acre-feet per year by the 2080 decade.

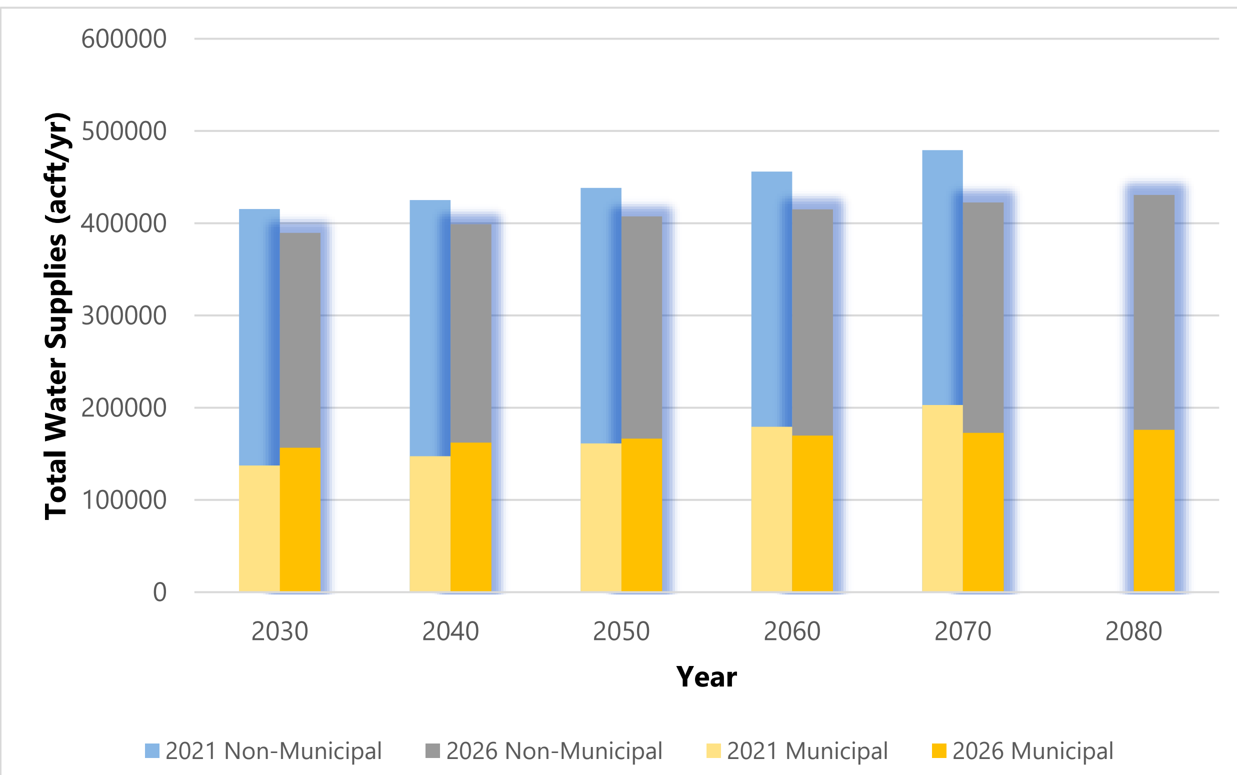

Figure 9.1 Water Demand Projections in the 2021 and 2026 Region D Plans

9.4.3 Water Supply Assumptions

For the 2021 Plan, the Modelled Available Groundwater (MAG) for each aquifer system in the Region D RWPA was used. For aquifers without MAG values, the NETRWPG developed local hydro availability estimates from the 2016 Plan. The same method was generally applied to the 2026 Plan. The North East Texas Region D Area is underlain by six aquifers, including two major and four minor aquifers in Texas, with their locations shown in Chapter 1 of this report.

In broad terms, the MAG represents the annual volume of groundwater that can be developed without exceeding the criteria outlined in the aquifer Desired Future Conditions (DFCs), as determined by modeling. When assessing proposed pumping for regulatory approval, the MAG serves as a guideline, often alongside other criteria. However, for planning purposes, the MAGs are treated as firm limits, with annual groundwater production not allowed to exceed these values. When available, the amount of groundwater for development is based on the Texas Water Development Board's determination of MAG, which reflects the desired future conditions (DFC) set by the Groundwater Conservation Districts within a Groundwater Management Area (GMA). The locations of the Groundwater Management Areas (GMAs) are depicted in Figure 9.3.

For aquifers without Modeled Available Groundwater (MAG) values, North Esat Texas Region D utilized groundwater availability estimates from the 2021 North East Texas Region D Regional Water Plan, which were derived from various sources, primarily historical reports from the Texas Water Development Board (TWDB) and the TWDB groundwater database. A more detailed analysis of these estimates for specific aquifers is provided in Chapter 3. Groundwater supplies in both plans were allocated to individual WUGs and WWPs based on well capacities and recent withdrawal records. These allocations were adjusted as necessary to ensure that the total groundwater extracted from each aquifer within a county did not exceed the estimated available supply. Figure 9.2 below compares the total groundwater availability in the North East Texas Region D Area between the 2021 and 2026 Plans.

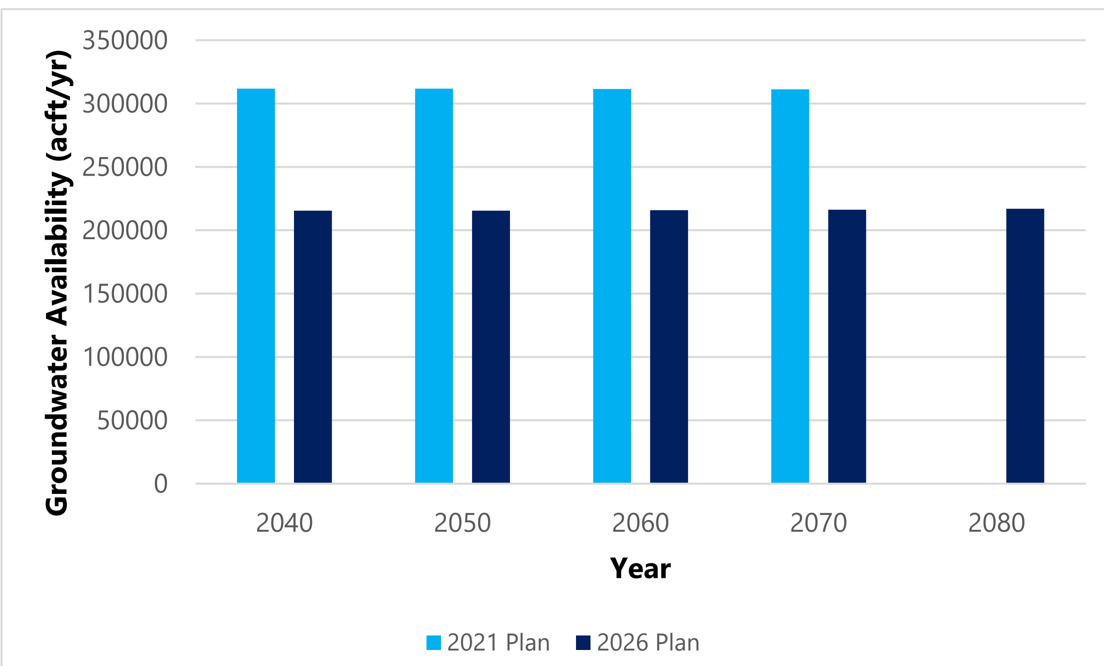

Figure 9.2 Groundwater Availability in North East Texas Region D Area

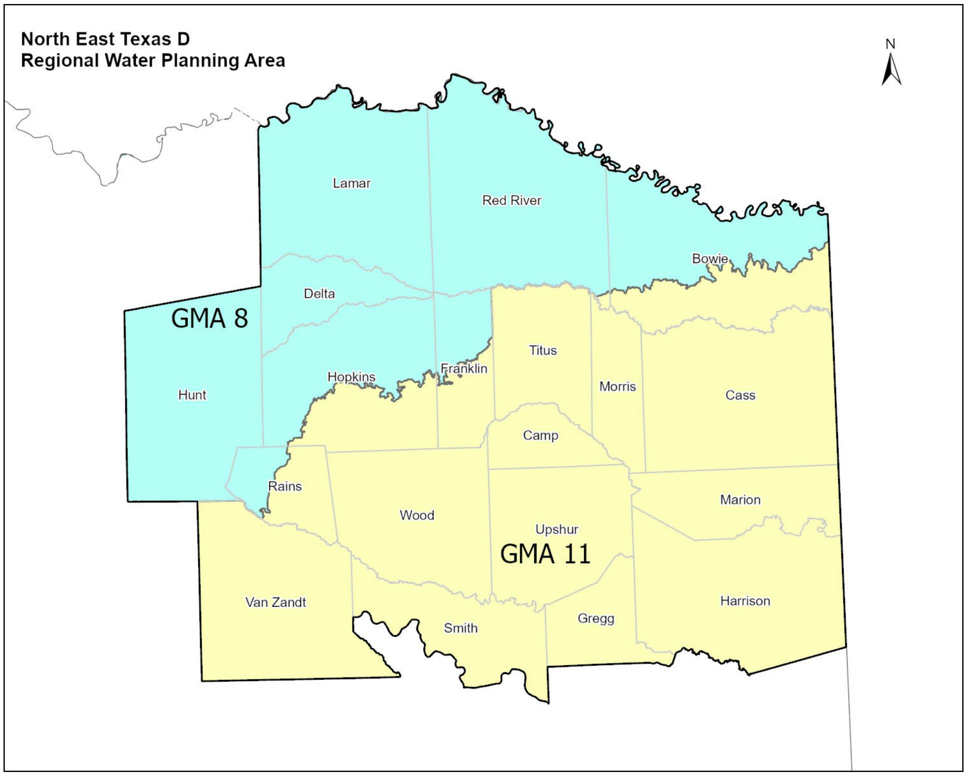

Figure 9.3 Groundwater Management Areas in North East Texas Region D

For surface water availability, both the 2021 and 2026 plans utilized the TCEQ Water Availability Model (WAM) as the base model, which was then adapted with additional assumptions specific to the regional context, and referred to as the North East Texas Region D WAM. This model incorporates assumptions defined by the TCEQ when evaluating water right reliabilities, though these assumptions may not always align with the needs of regional water planning. For instance, the TCEQ WAM uses permitted storage capacities for all reservoirs, whereas water supply planning requires consideration of current and future sedimentation conditions. A comprehensive list of the assumptions used in the WAM can be found in Chapter 3 of this report.

Both plans also made similar adjustments to the model in determining water availability for existing water rights. This determination is based on a complex set of factors, including location, hydrologic conditions, diversion volume, reservoir storage, and priority date. The 2026 North East Texas Region D WAM includes __ primary control points that provide naturalized flow data, along with __ evaporation data sets used to estimate evaporation for the __ reservoirs represented in the model. The model covers a period of record from 1940 to 2018. Water availability computations are carried out at over __ control points across the river basin, analyzing more than __ water right records. The North East Texas Region D WAM incorporates water right data from the TCEQ for all water rights, as of October 2023.

Assumptions for determining groundwater and surface water availability in both plans are compared in Table 9.2 below.

Table 9.2 Assumptions for Determining Water Available to Current Supplies and Water Management Strategies

2021 North East Texas Region D Plan	2026 North East Texas Region D Plan
Groundwater availability based on Modeled Available Groundwater where determined, and 2016 estimates and/or modeling to support development of Modeled Available Groundwater for other aquifers. MAG Peak Factor applied to the Carrizo-Wilcox Aquifer.	Groundwater availability based on Modeled Available Groundwater where determined, and 2021 estimates and/or modeling to support development of Modeled Available Groundwater for other aquifers. MAG Peak Factor applied to the Carrizo-Wilcox Aquifer.
Existing surface water supply based on estimated 2020 and 2070 wastewater effluent discharges adjusted for reuse assumptions.	Existing surface water supply based on estimated 2030 and 2080 wastewater effluent discharges adjusted for reuse assumptions.
Existing surface water supply to irrigation rights based on minimum annual supply from minimum monthly diversions.	Existing surface water supply to irrigation rights based on minimum annual diversion from the WAM.
Surface water management strategies exclude wastewater effluent discharges (TCEQ Run 3 assumptions), except where effluent is part of the supply for the strategy.	Surface water management strategies include wastewater effluent discharges (TCEQ Run 3 assumptions).
Surface water management strategies subject to TCEQ Environmental Flow Standards.	Surface water management strategies subject to TCEQ Environmental Flow Standards.
River Authority System Operations Permit included in the TCEQ WAM.	River Authority System Operations Permit included in the TCEQ WAM.

9.4.4 Existing Water Supplies

Water supplies available to WUGs and WWPs in the North East Texas Region D Area have changed slightly since the last planning cycle. Municipal supplies have increased substantially, while supplies to non-municipal WUGs have slightly decreased. WUG supplies are based on the current infrastructure ability of each to obtain water supplies. These abilities primarily include existing infrastructure, water-rights limitations, and groundwater conservation district permit limitations. Groundwater supplies, surface water supplies, and total supplies are compared in Figure 9.4, Figure 9.5, and Figure 9.6, respectively, for municipal and non-municipal WUGs.

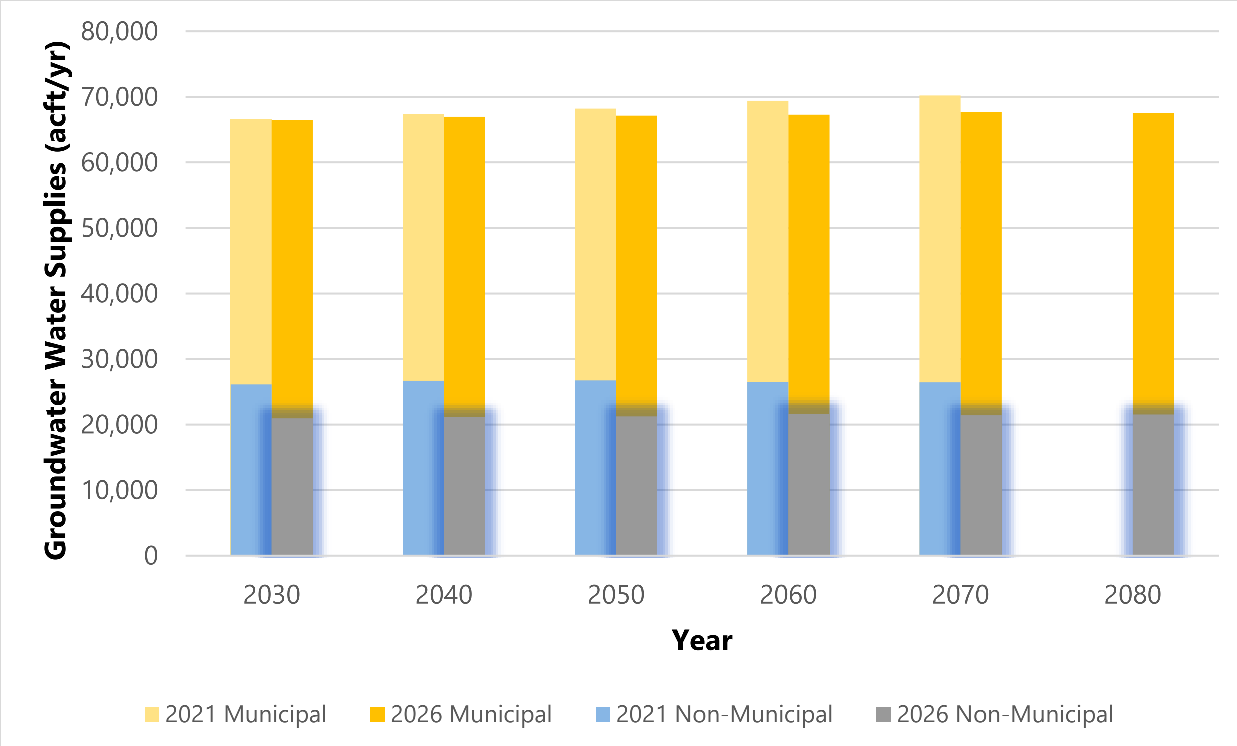

Figure 9.4 Groundwater Supplies Available to WUGs in the 2021 and 2026 North East Texas Region D Plans

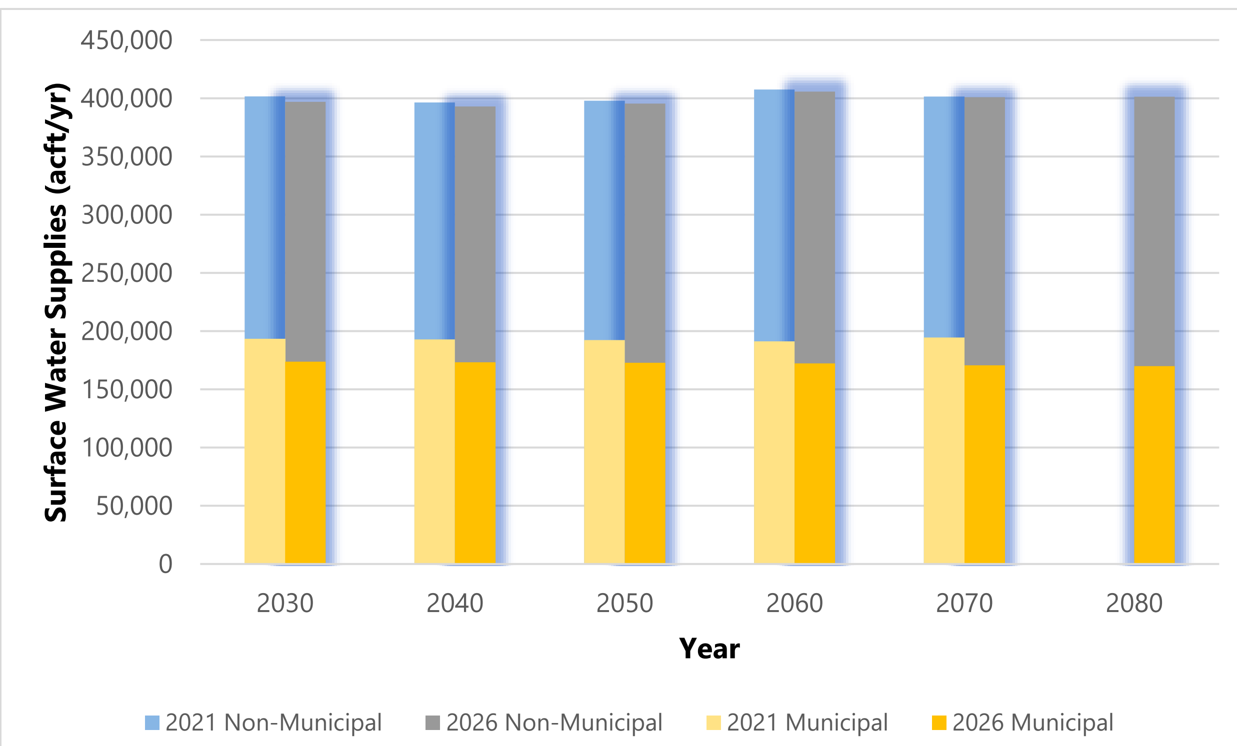

Figure 9.5 Surface Water Supplies Available to WUGs in the 2021 and 2026 North East Texas Region D Plans

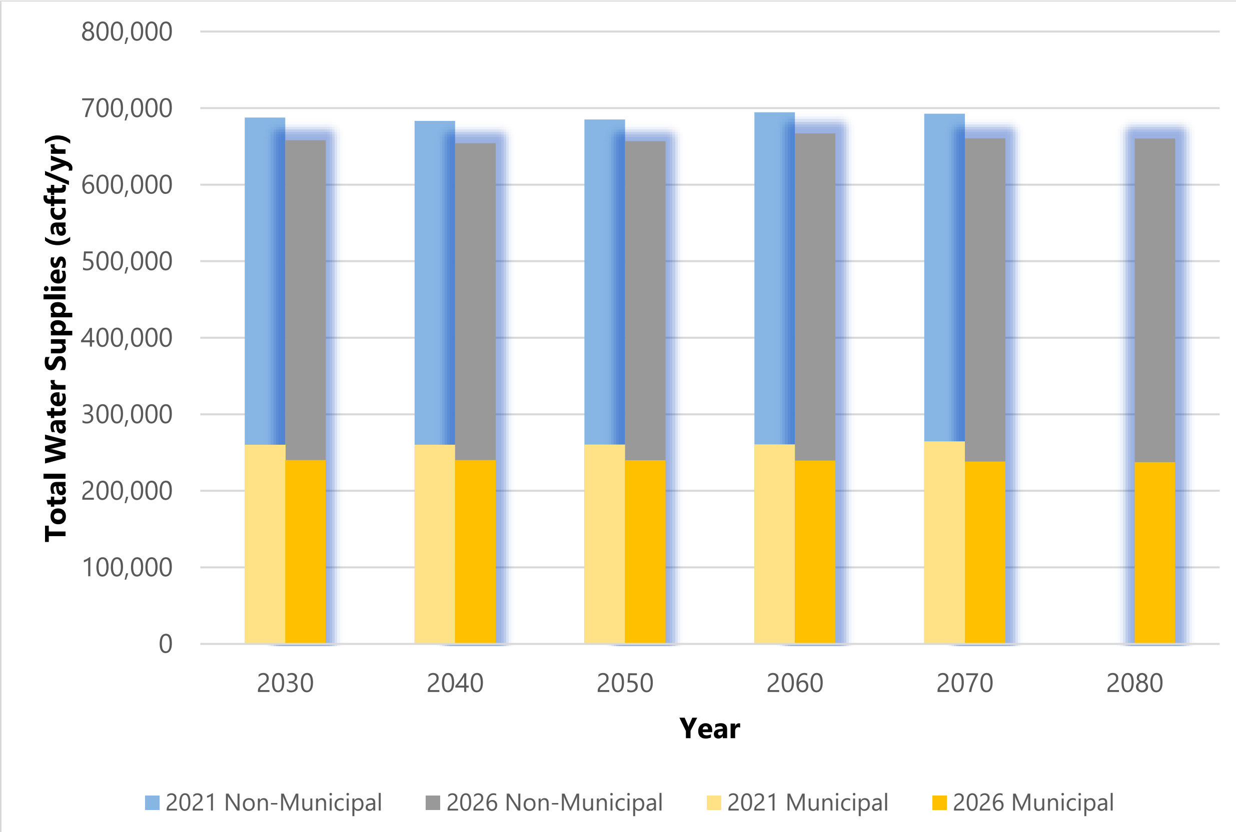

Figure 9.6 Total Water Supplies Available to WUGs in the 2021 and 2026 North East Texas Region D Plans

9.4.5 Needs

When projected water demands surpass the available supply for a WUG, the resulting gap is classified as a "Water Need". This section provides an overview of the water needs (shortages) for WUGs in the North East Texas Region D Area. A detailed table in the Executive Summary Appendix outlines the water needs for each WUG by county, labeled as "Region D Water User Group (WUG) Needs/Surplus."

As shown in Figure 9.7, municipal water shortages tend to rise over the planning period, while municipal surpluses generally decrease, a trend observed in 2021 and the municipal water shortages tend to decrease over the planning period and municipal surpluses generally slightly decrease in the 2026 Plan. However, the decline in surpluses is relatively minor. A notable difference is the significant decrease in municipal surpluses in the 2026 Plan compared to the 2021 Plan. The 2026 Plan shows municipal shortages significantly larger than 2021 Plan and municipal surpluses are significantly less in the 2026 Plan when compared to the 2021 Plan.

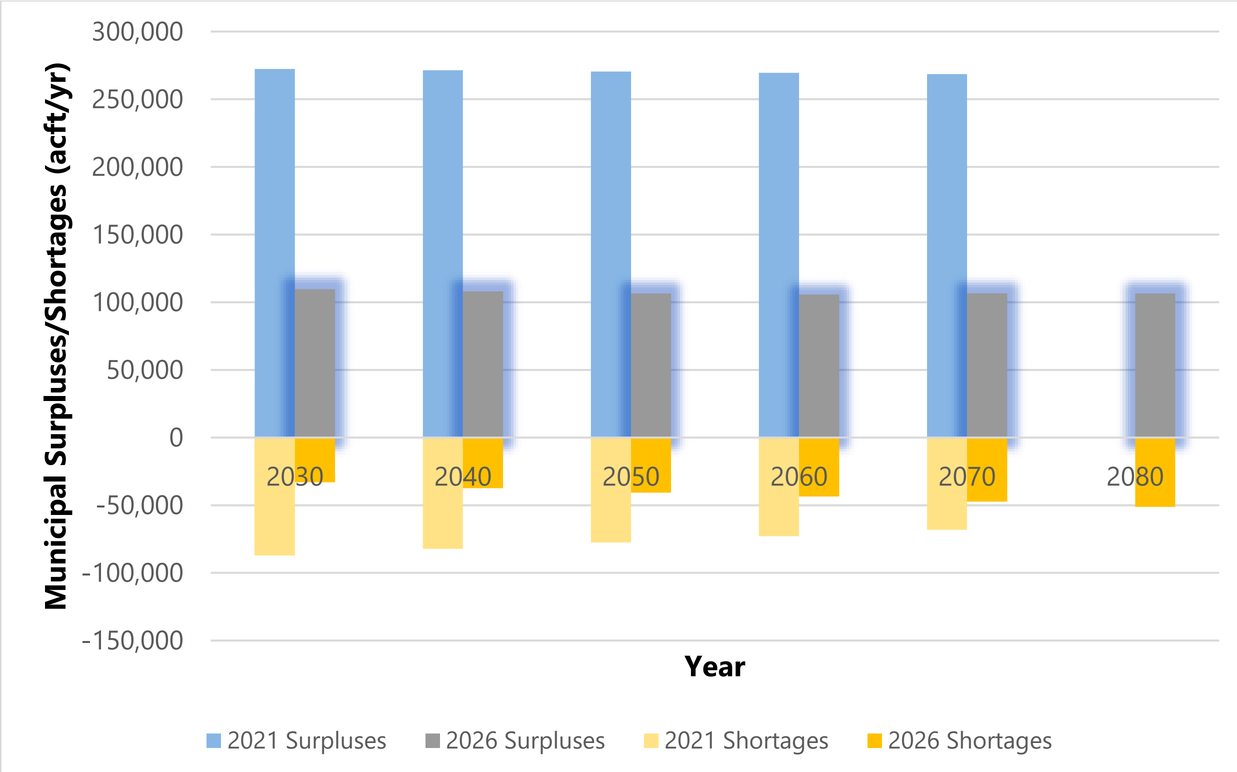

Figure 9.7 Municipal Surpluses and Needs (Shortages) in the 2021 and 2026 North East Texas Region D Plans

A comparison of total needs and surpluses between the two plans, as seen in Figure 9.8, reveals that while the total surpluses in the 2026 Plan are consistently lower than those in the 2021 Plan, the water needs in the 2021 Plan are higher in the 2026 Plan.

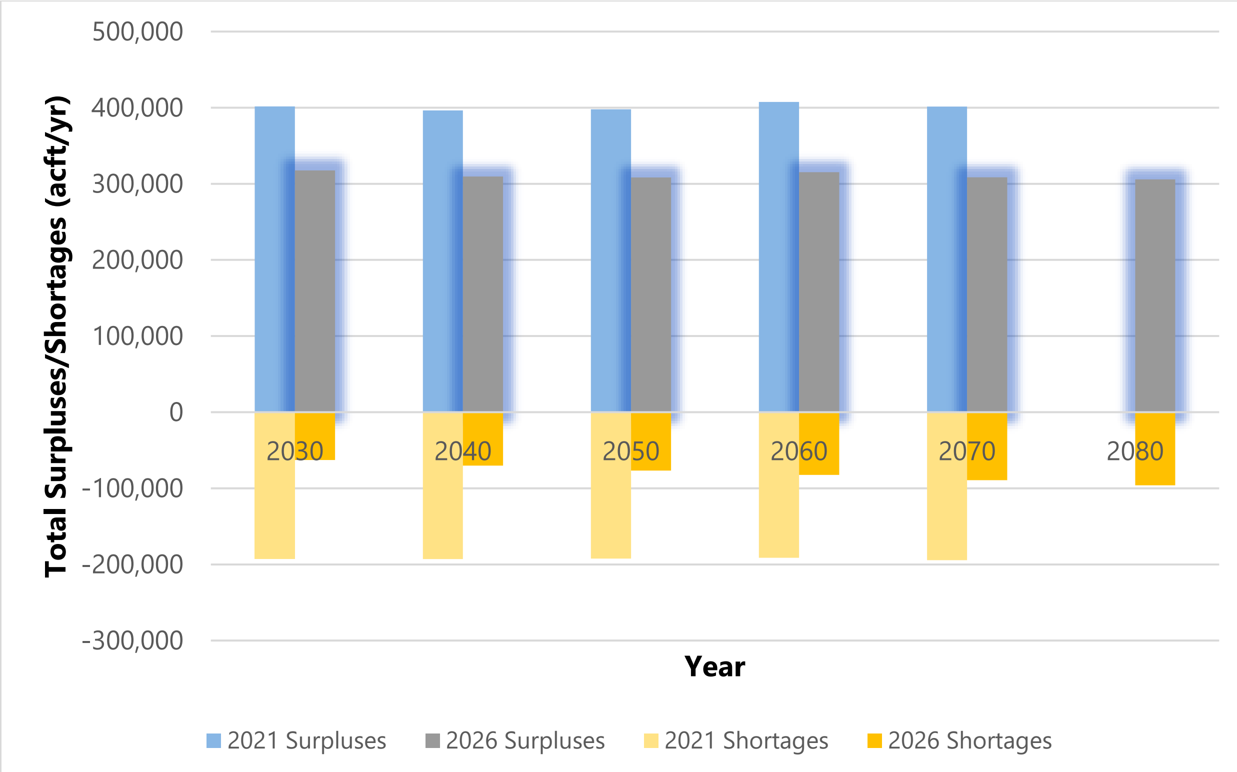

Figure 9.8 Total Surpluses and Needs (Shortages) in the 2021 and 2026 North East Texas Region D Plans

9.4.6 Water Management Strategies and Projects

As anticipated, a significant number of the water management strategies and projects proposed in the 2021 plan are once again recommended in the 2026 Plan. While the projected needs in the 2026 Plan are generally lower across each decade compared to the 2021 Plan, the corresponding surpluses are also lower in the 2026 Plan. However, the 2021 Plan shows higher surpluses and higher shortages for WUGs of similar magnitude in both plans. This section highlights the key differences in the WMSs and projects between the 2021 and 2026 Plans.

In the 2021 Plan, conservation measures are recommended for all municipal water user groups with per capita water usage exceeding 140 gpcd, regardless of their projected needs or surpluses. The 2026 Plan adopts the same methodology and assumptions for municipal water conservation as those applied in the 2021 Plan. However, there is a notable shift in the proportion of recommended water management strategy volumes attributed to conservation strategies between the two plans. In the 2021 Plan, conservation strategies accounted for approximately 4 percent (9,793 acre-feet per year) of the total recommended water management strategy volumes for 2070. In contrast, the 2026 Plan increases this share to roughly 8 percent of the total recommended volumes.

In the 2021 Plan, municipal conservation strategies recommended for 2070 totaled approximately 9,793 acre-feet. Water loss reduction was included as part of the conservation strategies in the 2021 plan. These conservation strategies addressed approximately 23 percent of the identified municipal water needs in 2020 and 20 percent of the projected needs for 2070.

For the 2026 Plan, approximately 12,118 acre-feet in municipal conservation strategies are recommended for 2080, with 7,859 acre-feet dedicated to water loss reduction. These conservation strategies address about 29 percent of the identified municipal water needs in 2030 and 29 percent of the needs projected for 2080. These changes reflect an evolving focus on conservation as a key strategy to meet future water demands in the region. Reuse is also a key water management strategy in both the 2021 and 2026 Plans.

Supplies from Other Regions

The 2021 Plan in 2070 decade includes roughly 15,218 acre-feet per year of water to be supplied from outside of the North East Texas Region D Area, while 2026 Plan includes almost 13,581 acre-feet per year of out-of-region-supplies in 2080.

New Reservoirs

The 2021 Plan had no recommended new reservoirs. Region D encourages utilization of existing supplies before any development of new supplies.

Additional Groundwater Development

The 2026 Plan recommends (19,083 acre-feet per year in 2030 and 20,501 acre-feet per year in 2080) and 2021 Plan (32,207 acre-feet per year in 2020 and 38,280 acre-feet per year in 2070). Some miscellaneous groundwater projects carried out in the 2021 Plan are no longer recommended due to insufficient MAG being available.

Aquifer Storage and Recovery (ASR)

The 2021 Plan and 2026 Plan do not include any recommended ASR projects.

Unmet Needs

The North East Texas Region D RWPG conducts a thorough evaluation of proposed water management strategies to ensure they are both technically feasible and economically viable. Strategies deemed infeasible due to practical, technical, or financial constraints are not recommended to address existing water supply needs. As a result, these needs are classified as unmet within the regional water plan. In the 2021 Plan only one unmet municipal need was identified, along with several unmet irrigation needs. Significantly more municipal and non-municipal unmet needs have been identified this planning cycle, predominantly due to avoidance of recommending infeasible WMSs that would not be cost effective. Within the IPP, there are a number of strategies that will require further coordination with other regions as well as WUGs and WWPs/MWPs. Many of these unmet needs would be capable of being met by pumping groundwater in exceedance of the MAG, as there is no GCD within the region to regulate such pumping.

Alternative Water Management Strategies and Projects

Both the 2021 and 2026 Plans include alternative water management strategies for specific WUGs and WWPs. These alternatives are intended to serve as substitutes in the event that the recommended strategies become infeasible. Examples of such alternatives include the development of Carrizo aquifer groundwater for the Wood County Pipeline to supplement supplies for Sabine River Authority from Lake Fork, which represents an evolution of the similar alternative strategy contemplated in the 2021 Plan for groundwater from Wood County.

9.5 Progress of Regionalization

The regional water planning process is a pivotal mechanism for promoting collaboration and regionalization. It establishes a cohesive framework for planning, incorporating shared population and water demand projections, as well as a standardized approach to assessing supply availability. The public meetings convened regularly by North East Texas Region D facilitate the exchange of information across a vast and diverse planning area, effectively bridging the "silos" that often isolate different entities in their water planning efforts. North East Texas Region D represents two Groundwater Management Areas, which collectively span the entire planning region. Each member brings a distinct perspective, contributing their expertise and insights into the sustainable management of groundwater resources. North East Texas Region D regards groundwater management as a regional issue that necessitates active and engaged participation from local stakeholders.

The 2026 North East Texas Region D Plan outlines several "regional" projects, such as the Riverbend Strategy to serve municipal and industrial needs in multiple counties for multiple entities. Many of the recommended water management strategies and projects are designed to serve multiple entities-directly or indirectly-, providing comprehensive, regional solutions to the pressing issue of water scarcity as WUG's outside of the region search for new supplies. North East Texas Region D also works in close collaboration with neighboring regional water planning areas, sharing resources and strategies with Regions C and I.

North East Texas Region D serves as an essential forum for ongoing participation and dialogue on water supply challenges across the 19-county region. It has fostered a mindset that views water supply issues through a regional lens, encouraging the development of integrated solutions to address the needs of all stakeholders.

CHAPTER 10 ADOPTION OF PLAN AND PUBLIC PARTICIPATION

The North East Texas Regional Water Planning Group (NETRWPG) is most sensitive to the public's participation and the process used to extract their concerns and comments. This Chapter summarizes how the public participated in the preparation of the plan, were kept informed and ultimately participated in the adoption of the plan. The public's comments and the NETRWPG responses to specific comments will be documented. Appendix C10 will ultimately include a copy of all written public comments received on the Initially Prepared Plan (IPP) for the purposes of the Final 2021 Region D Plan.

10.1 Introduction

The NETRWPG has long recognized the critical importance of public participation at all stages of the planning process. Because this is largely a region of small cities and towns scattered over a large area, which lacks mass media to cover the entire region, it is especially difficult to extend opportunities for participation to each of the 19 counties. There is no central concentration of population, for example, where the NETRWPG could hold public hearings. Therefore, the NETRWPG elected to hold the majority of its public and regular meetings at the Civic Center in Mount Pleasant, Titus County. On certain occasions meetings were also held at the Region 8 Education Service Center located in Pittsburg, Camp County. There is no newspaper within the region comparable to that of the Dallas Morning News in Region C or the San Antonio Express News in the South Central Texas Region. Instead, developing press relationships required regular contact with a half-dozen daily newspapers and dozens of weekly papers. Outreach to citizen organizations and private interest groups as well as to public officials also required regular calls and visits to every county in the Region. The NETRWPG has provided opportunity at every occasion for public participation and input. A summary of the communication program and of the public participation program is included herein.

The NETRWPG formally adopted its process for identifying, evaluating and selecting water management strategies on February 21, 2024, and included opportunities for public input during the development of the scope of work to develop the 2026 Plan.

The NETRWPG will hold a public hearing to receive comments from the public on the Initially Prepared Plan.

The NETRWPG complied with all Texas Open Meetings Act and Public Information Act requirements during the development of the 2026 North East Texas Regional Water Plan.

10.2 Public Participation Process

The communication program to the public and the planning group has taken several different methods. These are as follows:

10.2.1 Public Comment Opportunities at NETRWPG Meetings

Every regular meeting of the NETRWPG was noticed as a public meeting under the Texas Open Meetings Act (TAC), meeting all requirements under TAC §357.21 and the Public Information Act, and was attended by approximately 50 persons in addition to the planning group members. Those attending represented many sectors of the public, including water provider organizations, local government officials, members of the business community, farmers, representatives of area councils of government, utility officials, environmentalists, community activists, and members of the general public. Comments and responses from these meetings have been included in meeting minutes and press release summaries.

10.2.2 Public Hearing Prior to Submission of TWDB Funding Proposal

As required by Texas Water Development Board (TWDB) rules, the NETRWPG held an initial public meeting to gather comment and ideas from the public before submitting a proposed scope of work and budget to the TWDB for consideration prior to the regional planning process.

10.2.3 Public Hearing on the Initially Prepared Plan

As required by TWDB rules, the NETRWPG held a public hearing on the IPP to solicit public input on aspects of the plan. The hearing was held in Mount Pleasant in Titus County on June 11, 2020, and was attended by approximately 50 persons from the public. Comments made at the public hearing are summarized in Appendix C10-3 and Appendix C10-4.

10.2.4 Outreach and Survey of Water Providers

One of the exceptional aspects of the planning process in the North East Texas Region was the outreach process to involve every water provider in the region. This was done for two reasons. First, the NETRWPG wanted a review of population and water demand data provided by the TWDB. Second, the consultant team surveyed water providers in the regional water planning area (RWPA) to gather a large volume of information about current water supplies, current and projected water demands, and the management and policy problems encountered by these organizations in their day-to-day operations and long-term planning. This was an invaluable source of information provided by the public outreach process.

10.2.5 Development of a Public Participation Plan

From the beginning of this planning period, the NETRWPG emphasized the importance of public outreach and education. The consultant team worked closely with NETRWPG members, the Regional Administrator (the Riverbend Water Resources District, RWRD), and the NETRWPG Chair Mr. Jim Thompson. The public outreach program consisted of two principal elements: public comment periods at the beginning and conclusion of each meeting and making information available to interested citizens via the Chairs and NETRWPG representatives.

10.2.6 Interviews with NETRWPG Members

An important method of identifying issues of public concern was the opportunity for public comment at the beginning and end of meetings. These opportunities for public comment allowed the NETRWPG to identify the issues involved in regional water planning. Once these issues had been identified the NETRWPG members were requested to form recommendations and comment on the issues. These resulted in the recommendations and comments which are contained herein.

10.2.7 Contacts with Media

All meetings were posted as required and were often attended by members of the media. In addition to distributing news releases, reporters and editors at major papers in the region were contacted directly. Through the efforts of these reporters and editors, numerous major stories were published and aided in educating the public about the regional planning process. There is an absence of a metropolitan area in the region containing major media, rendering television and radio coverage impractical. Most information was disseminated by daily and weekly newspapers in the RWPA. The RWRD, administrator of the NETRWPG, was identified as a contact point for news releases because of the knowledge about water planning and access by the public.

10.2.8 Reports Filed with Public Authorities

Pursuant to the rules, the NETRWPG will make digital or physical copies of the IPP available for public inspection in the County Clerk's office of each county within the North East Texas Region, in at least one public library in each county, and in each county where a potential water management strategy for the region is located. The IPP will also be available on the internet, and in the administrator’s office in New Boston in Bowie County.

10.2.9 Rural Outreach Efforts

The majority of Region D encompasses a multitude of rural communities across Northeast Texas. Engagement with these communities has always been a critical component of regional water planning for the NETRWPG and has been a point of emphasis this planning cycle. Rural outreach has helped to improve data accuracy, promote sustainable practices, provide opportunities for learning, developing a better understanding of the unique needs and priorities of the communities, and help to spread knowledge, connecting people with resources.

This Plan is largely supported by information provided by WUGs based on survey results and numerous outreach efforts from the RWPG members and its technical consultant. For example, a survey was distributed to all WUGs to update and refine information needed to report on population and water demand projection revisions (Chapter 2), existing supplies and physical and legal capacity (Chapter 3). The survey also served as a starting point for the identification of infeasible water management strategies from the 2021 RWP and the implementation progress of recommended strategies and projects (Chapters 5 and 9), as well as drought information, activities and responses (Chapter 7). Each of these are examples of where rural outreach and engagement were performed for the development of this Plan.

As part of the survey process, surveys were distributed to all the identified WUGs within the Region. Information was further shared with WWP/MWPs in order to reach a broader audience for engagement. In addition, telephone follow-up calls, virtual, and non-virtual meetings were conducted to ensure that responses from WUGs had been appropriately characterized. The results of these surveys are presented in multiple tables throughout the Plan.

The NETRWPG conducted outreach specifically to rural entities in the planning area to collect and evaluate information to support the development of the 2026 Region D RWP. This included a record of which rural entities were contacted by the NETRWPG's technical consultant, and which entities were not responsive to RWPG contact efforts. Particular focus was given to those rural public water systems that had self-reported water restrictions to TCEQ due to water supply issues during this planning cycle, reported to TCEQ that they had less than 180 days of water supply remaining during this planning cycle, have not previously engaged in the regional planning process, and have already been identified as facing significant near-term shortages under drought conditions in previous regional water planning. Information on these elements was provided by the TWDB to facilitate the engagement with these rural entities and was used by the NETRWPG's technical consultant for targeted outreach activities.

10.3 Public Meetings and Hearings

10.3.1 Public Hearings and Comments on the Initially Prepared Plan

The NETRWPG conducted public comment sessions at the conclusion of each NETRWPG meeting. With the passage of HB 2840 by the 86th Texas Legislature, public comment sessions were conducted both at the beginning and conclusion of each NETRWPG meeting.

A public hearing on the IPP will be held at a date to be decided by the NETRWPG.

10.3.2 Summary of the Public Hearing

A detailed transcription of all public comments received at this hearing will be presented in the Final 2026 RWP in Appendix C10-3. Responses to these comments will be included in Appendix C10-6.

10.3.3 Synopsis of Oral and Written Comments

A synopsis of oral and written comments on the 2026 NETRWPG IPP will be provided here for the Final 2026 Plan.

10.4 North East Texas Regional Water Planning Group Website (https://rwrd.org/region-d/)

The NETRWPG has directed the RWRD to maintain a website where meeting notices, agendas, and presentation materials may be viewed by the public. In addition to meeting materials, the latest 2021 Region D RWP is posted for public viewing and download, as well as documents from the planning process for the 2026 Plan. The website offers other features including board minutes, agendas, and an email subscription list.

10.5 Texas Water Development Board Comments

The TWDB will review the IPP and submit comments on their findings by letter, offering the opportunity to identify where the IPP may be enhanced or modified to meet all statutorily and contractually required elements for finalization of the 2026 RWP by October 20, 2025.

This letter will be presented in the Final 2026 RWP in Appendix C10—1. A memorandum providing responses to each of these comments will be included in the Final 2026 RWP in Appendix C10-2.

10.6 Coordination with Other Planning Regions

Coordination with other planning regions was accomplished primarily through the technical consultants, who coordinated data and shared information that was later reported to the planning groups. Coordination was accomplished with the technical consultants from Regions C and I. Other coordination was accomplished through the participation of planning group members as liaisons with other planning groups, via email and letters.

10.6.1 Region C and Region D Preliminary Interregional Conflict Resolution Process

At the time of publication of this Plan, no agreement has been made between Regions C and D for the purposes of the 2021 Region D Plan.

10.7 Attachments

The following attachments will be included in the Final 2026 RWP Appendix C10 (see Table of Contents, Appendix C10, for specific locations) of the Final 2026 North East Texas Regional Water Plan:

- TWDB Comments.
- Written responses to TWDB Comments.
- Table of Comments from Public Hearing on the IPP.
- Written comments on the IPP received from the public during the comment period.
- Written comments from other agencies.
- Written Responses to All IPP Comments.

10.8 Certification of Initially Prepared Plan

This document is the certified 2026 North East Texas Initially Prepared Plan, being complete and adopted by the North East Texas Regional Water Planning Group at its February 19, 2025, public meeting.

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TBPELS NO. F-558

In association with:

TEXAS REGISTERED ENGINEERING FIRM F-1465

Prepared for

The North East Texas Regional Water Planning Group

2026 REGION D INITIALLY PREPARED PLAN VOLUME I

March 3, 2025

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In association with:

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HAYES ENGINEERING, INC

TEXAS REGISTERED ENGINEERING FIRM F-1465